SERVICE CONTRACT TO SUPPORT THE IMPACT ASSESSMENT OF THE BLUEPRINT TO SAFEGUARD EUROPE'S WATERS

ASSESSMENT OF POLICY OPTIONS FOR THE BLUEPRINT

FINAL REPORT

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12 October 2012

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EXECUTIVE SUMMARY

Europe's waters face a number of interacting critical problems today. These problems are further likely to be exacerbated with a changing climate. The Blueprint to Safeguard Europe's Waters will set out the Commission's views on the policy initiatives that will be most appropriate to address these problems. This report sets out the problems that the EU faces in achieving effective water management and develops an initial list of potential options to tackle these problems.

Firstly, there are significant problems for Member States in achieving the objectives already required in EU law. The Water Framework Directive (WFD) and other EU legislation (including biodiversity legislation) establish legal obligations for water bodies regarding their biological, chemical and hydromorphological status. This includes objectives for water quality and (perhaps not so specifically in all cases) water quantity. Some objectives need to have been met already, while others have progressive implementation until 2027. In assessing progress in implementation in the Member States, there is significant concern over the likelihood that Member States will meet these obligations and/or that they may be seeking to delay implementation.

Secondly, the vulnerability of society to extreme events is expected to increase. Droughts and flooding both have significant social, economic and environmental impacts in Europe. The economic costs of these events are increasing and climate change models predict that the likelihood of these events will increase. Member States have significant challenges both to manage these events and to increase the resilience of society to future events.

Thirdly, there is a need to improving water efficiency. Water is a precious resource which is limiting in many Member States or regions in Member States. While various measures and techniques have been adopted to improve the efficiency with which we use water, there is still much that can be achieved to increase efficiency further. Increased efficiency would increase the resilience of communities in the face of water shortages and enable a more balanced allocation of water between water users by water managers.

Addressing these problems and needs requires that we address the barriers or gaps that prevent these problems being tackled. These barriers or gaps revolve around several themes.

There are problems setting targets (or objectives) for water. While EU water law sets a number of objectives for water bodies, there is still a major gap in the ability of (at least some) water managers to set clear targets within river basins. This includes determining what resources are required to maintain ecological targets (an 'environmental flow') as well as equitable allocations of water for different users at different times. Without these basic management decisions (based on sound information), the effectiveness of other water management actions will be reduced.

There are problems 'unlocking' measures to address particular pressures on water. In many cases technical measures or management techniques are available that can address a wide range of water management challenges, whether farm management, industrial activities or the water industry. Measures may not be used due to lack of incentives, insufficient development of individual measures, lack of information (dissemination) of tools, etc.

There is insufficient use of economic instruments. EU policy already promotes the use of economic instruments (such as water pricing) in water management and effective use of such instruments would enhance the efficiency of water use as well as provide resources for investment in necessary infrastructure. Reasons for the lack of (or insufficient) use of such instruments include insufficient knowledge, barriers to acceptance, inappropriate structures to the instruments and lack of pre-conditions for the use of these instruments (e.g. water meters).

Water management objectives are impeded by ineffective water governance. Water management is a complex activity which requires a wide range of skills and resources and effective working relationships between institutions (all of which reflect unique situations in the Member States). Ineffective governance can affect the setting of overall objectives for catchments as well as the application of individual measures and instruments.

There is often insufficient knowledge to set management objectives to introduce specific measures. Understanding the challenges facing individual water bodies and catchments and understanding the appropriate management responses to these challenges has to be based on sound information. This not only includes basic 'monitoring' information on state and pressures, but also the analytical tools to interpret these into determining which measures and instruments need to be applied where and when. In many cases there is insufficient knowledge or tools or gaps in the suit of knowledge or tools available to water managers, thus inhibiting effective decision making.

In analysing these challenges 12 specific problems were identified which are critical in taking forward action to address the issues facing Europe's waters. To address each problem, policy options were developed (see following table). The problems are:

1. Current **water pricing levels do not provide adequate incentives** to increase water efficiency. In some cases, water users are either not charged at all or are not charged in relation to the quantity of water used/consumed.

2. The **insufficient use of metering** for individual users is a key barrier for the effective implementation of pricing schemes that incentivise water efficiency. Illegal abstraction in some parts of the EU is a large phenomenon that puts at risk water availability.

3. Competing demands for **scarce water resources globally** may lead to an estimated 40% supply shortage by 2030. Mismanagement and wastage of water in water scarce countries could have very negative consequences on local development and even be the cause of migration flows from developing countries.

4. **Land use impacts** and, in particular, agriculture's impacts threaten water quality and quantity across much of Europe.

5. The **design of building and water using appliances** does not sufficiently factor-in water efficiency. The lack of coherent approach to water efficiency in buildings and products causes water waste which is problematic in areas which are water stressed or at risk of becoming water stressed and also wastes energy.

6. **Significant amounts of water are lost from leakage** in distribution systems, which is problematic in areas which are water stressed or at risk of becoming water stressed.

7. There are **no common standards for water reuse**. Without common EU standards, a potentially significant source of water is not being used. Moreover, there is a potential for some Member States to object to products grown with reused water thereby generating an obstacle to the internal market.

8. **Governance** of water and sectoral policies at Member State level is, in some cases, fragmented and faces a lack of capacity and resources to fully address water management objectives. There is also often a lack of coordination in river basin shared between different administrative entities within Member States, between Member States and with third countries.

9. **Droughts** have become increasingly damaging in many parts of Europe and are predicted to increase in frequency and intensity in the future. Droughts present a particular challenge to water managers who have to prioritise between different water users during a drought and take decisions to ameliorate the effects of droughts when they occur.

10. **Water balances and adequate water allocation** mechanisms necessary to achieve them are poorly implemented at river basin level. In many instances, river basin managers are not fully aware of how much water flows in and out of a river basin, due to lack of data, tools, capacity, etc. Without this understanding, it is difficult to take effective management decisions to protect waters and meet the needs of water users.

11. **Costs and benefits of water related measures** are not properly understood or quantified. There is a lack of a methodology to calculate the adequate recovery of environmental costs which, inter alia, prevents their incorporation into water price, charges, levies, etc.

12. There is **insufficient dissemination and sharing of compatible data and other information** between Member States, European bodies and third countries leading to an incomplete understanding of the problems facing Europe's waters or, potentially, to incoherent water management choices. Data provision is not timely and different systems prevent data access. New and emerging knowledge needs must be addressed through research activities.

Policy options to address the problems facing Europe's waters according to type of EU intervention

Problem	Information, guidance and best practices	Regulation	Conditionality of EU funding	Funding support
1. Pricing	The Commission to promote the use of trading in water rights at river basin level through the development of guidance tools under the CIS		Add national water pricing obligations for farmers, based on Art 9 of the WFD to cross compliance rules under the CAP.	
2. Metering	Mapping all EU river basins with GMES to enhance MS water management, including large irrigated areas to identify illegal abstraction and enhance enforcement	Amend WFD to make explicit that Art 11 includes mandatory metering Amend WFD to require metering of individual consumption and/or use where relevant	Make RD and CP funding for irrigation projects conditional on use of meters Make CAP Pillar I payments conditional on use of meters	
3. Global	Raise consumer's awareness of water footprint of products	Introduce mandatory labelling of most embedded water intensive products.		
4. Land use	Develop guidance and tools on EU framework to NWRMs including support PES and thereby NWRMs for administrations, users	Amend WFD to require mandatory application of NWRM	Ensure NWRM measures are mainstreamed into CSF funds, including implementing rules of new CAP (Pillars I and II) support NWRMs	Promote NWRM by prioritising them in the use of Cohesion and Structural Funds
5. Water efficiency of buildings and appliances	Voluntary labelling of water using appliances Voluntary performance rating for buildings	Mandatory labelling of water using appliances Amend the Ecodesign Directive to include water efficiency requirements for appliances Mandatory performance rating for buildings Minimum water performance requirements for buildings A Directive on water efficiency requirements in buildings		

Problem	Information, guidance and best practices	Regulation	Conditionality of EU funding	Funding support
6. Leakage	Develop a harmonised method for determining SELL			Promote leakage reduction by prioritising it in the use of Cohesion and Structural Funds Promote leakage reduction in EIB loans.
7. Water re-use	Develop guidance on certification schemes for re-use CEN standards for re-use of recycled water in agriculture	Adopt an EU Regulation establishing standards for water re-use		Promote water re-use by prioritising it in the use of Cohesion and Structural Funds Promote water re-use in EIB loans.
8. Governance	Develop a peer review process for RBD authorities	Amend WFD to make RBMPs legally binding Amend WFD to introduce a stronger mediation power for Commission in transboundary river basin management Amend the SEA Directive to cover all hydropower development plans		
9. Water balances, targets	Develop guidance and tools on water accounting and eflows Develop guidance and tools to support target setting	Adopt technical annexes to WFD on water accounting and eflows Adopt technical annexes to WFD on target setting		
10. Droughts	Adopt a Recommendation to promote DMP	Amend WFD to develop DMP Adopt a DM Directive to require DMP		
11. Costs and benefits of inaction	Produce guidance and tools for recovery of costs of water services, including environmental and resource costs and ecosystem service benefits	Adopt technical annex to WFD on recovery costs of water services, including environmental and resource costs and ecosystem service benefits	Add national water pricing obligations for farmers based on Art 9 as cross compliance under CAP	
12. Knowledge base	Develop a fully interoperable shared water knowledge system	Enhance and harmonise WFD reporting requirements and statistical obligations		

For all of the options a stakeholder consultation and Impact Assessment was undertaken. With regard to improving water management issues, the non-legislative options offer a number of advantages over the legislative options. They can deliver most of its instruments far more quickly, in particular where amending the WFD would need to be taken forward in the review of the WFD in 2019. The non-legislative approach can also deliver more nuanced tools and supporting guidance to help water managers at all governance scales, whereas the alternative legislative approach cannot be as flexible and case specific. In particular non-legislative approaches can more readily disseminate best practice and examine case specific issues, such as in individual water stressed areas. However, some legal change might be needed, in particular to reduce the administrative burdens of reporting under EU water law as this has to involve legal amendment.

With regard to the options on other problems, the non-binding options have a lower burden for Member States and economic entities in many cases and can be effective in some areas, such as the provision of guidance on NWRM and tools to enhance the decision making such as cost-effectiveness analysis for leakage reduction. However, while non-binding approaches in the areas of water efficiency of appliances or water re-use standards are possible, they would not overcome the key barriers to their uptake. In such cases legislative options are more effective. Similarly, the barrier of lack of standards for water re-use and its interaction with the internal market is difficult to address without a legislative approach. Conditionality of EU funding is an effective tool and builds, to some extent, on existing legislation and practice and generally receives high stakeholder support (with some notable exceptions). The problems with this option are both of acceptability by Member States and timing of implementation, given the current on-going adoption of revised CSF and CAP regulations. Finally, prioritising use of EU funds is effective in all areas where budgets are a limiting factor, particularly in this time of economic crisis, and this is widely accepted.

1 INTRODUCTION, THE NEED FOR A BLUEPRINT, METHODOLOGY

1.1 Introduction

In 2011 the European Commission, DG Environment (DG ENV), established three projects to "support the Impact Assessment of the Blueprint to safeguard Europe's waters". This report is the final report of the Lot 2 project "Assessment of policy options for the Blueprint".

Over the last 40 years the EU has adopted laws and policies to comprise a comprehensive approach to the management and protection of water and the health of people and biodiversity which depends upon it. The most important landmark in this regard was the adoption of the Water Framework Directive (WFD) in 2000, which adopted an integrated river basin management approach to water and requires the achievement of good status in all water bodies by the end of 2015. This has been accompanied by further legislation on floods, controlling priority substances, etc., and by a policy to address water scarcity and droughts. However, this legal and policy framework has not addressed all problems – old and new. The EEA[1], for example, highlights the wide range of problems that remain and the Blueprint will set out a comprehensive policy framework to tackle these in various ways.

This project supports the development of the Commission's Blueprint to Safeguard Europe's Waters to be published in November 2012. The development of the Blueprint comprises a review of the Strategy on Water Scarcity and Droughts (WSD), a review of the implementation of the WFD including the analysis of the large number of River Basin Management Plans (RBMPs) that were submitted to the Commission, and a review of the vulnerability of water and environmental resources to climate change and other man-made pressures, also including the results of the Fitness Check of EU water policy. These studies together with other studies by the European Commission and the European Environment Agency will form the knowledge base for the Blueprint that will focus on delivering better implementation, better integration and completion of EU water policy.

The aim of this project is to provide the Commission with clear policy options to address real water needs and policy gaps together with robust socio-economic and environmental analysis of those options to enable the Commission to take these forward within its wider policy development process for water policy and consistent with the overall requirements for proposing policy initiatives within the Commission Services. This project addresses the full range of water issues – quality, quantity, ecology and ecosystem services, governance, climate, innovation, etc.

[1] EEA 2010: http://www.eea.europa.eu/soer

1.2 Structure of the report

The structure of this report follows a logical approach to the assessment of the problems facing Europe's waters, the policy options to address these and the impacts of those options. The report sets out this analysis in the following structure:

- The first section presents an overview of the main issues facing Europe's waters identifying the need for further action and hence the justification for the Blueprint as well as the justification for intervention at EU level. It also sets out the methodology of the study.

- The second section examines the influence of different measures/policies on water in more detail and scopes the different key problems that need to be addressed in the Blueprint and how these interact.

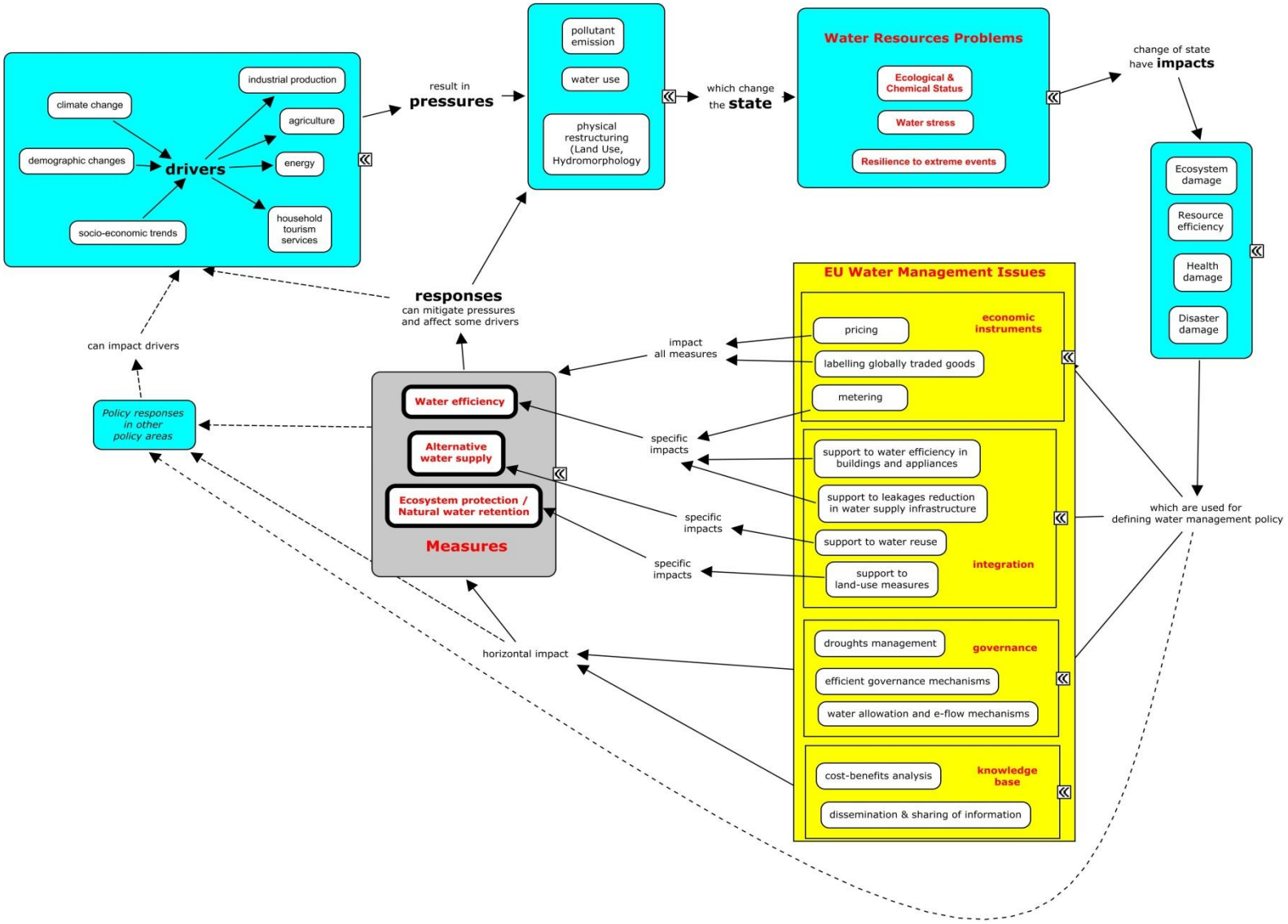
- The main part of the report is structured according to the 12 key problems that are identified in the study as needing to be addressed in the Blueprint. For each a description of the problem is given, the baseline and justification for EU intervention is set out, options described and an Impact Assessment of those options is undertaken.

- The final part of the report presents a final synthesis and conclusions examining how which options can be preferred in the Blueprint and how these interact.

1.3 Safeguarding Europe's waters – the need for a Blueprint

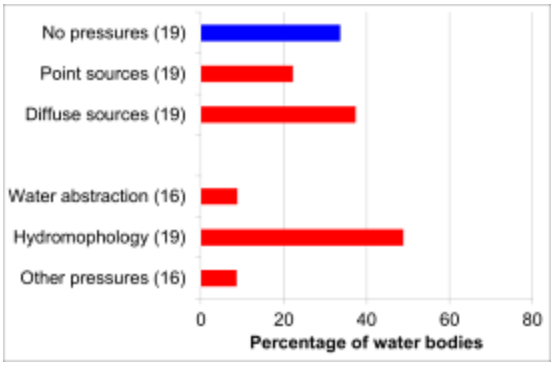
In order to identify the main issues affecting the state of Europe's waters and the influences on water users, it is necessary to have a coherent framework to analyse the key influence and Europe's waters and how different policies influence these. The European Environment Agency (EEA) has adopted an analytical framework which distinguishes driving forces, pressures, states, impacts and responses, known as the DPSIR framework (see figure below). The DPSIR framework considers a chain of causal links starting with 'driving forces' (economic sectors, human activities) through 'pressures' (emissions, land degradation) to 'states' (physical, chemical and biological) and 'impacts' on ecosystems, human health and functions, leading to political 'responses' (prioritisation, target setting, indicators). Key drivers, pressures, state issues, impacts and responses for the current and future state of Europe's water resources are summarised in the following figure.

Figure 1 *DPSIR framework for the Blueprint - Source: DG Environment, 2012*



With regard to the pressures on Europe's waters, these can be classified as pollutants, water withdrawals and physical restructuring of water courses. The EEA[2] has described the importance of each of these pressures for Europe's waters as set out in the following figure.

Figure 2. *Percentage of river water bodies with significant pressures (number of MS in brackets): Source: EEA (2012)*



With regard to pollutants, there has been major success in the control of discharges of point sources of pollutants across much of Europe. However, progress on reducing inputs of diffuse pollutants has been far more limited. Point sources have been addressed by EU law such as the Urban Waste Water Treatment Directive (UWWTD), Dangerous Substances Directive (DSD), Integrated Pollution Prevention and Control (IPPC) Directive (being replaced now by the Industrial Emissions Directive) and others (including the WFD). The implementation of these Directives has presented problems for the Member States (as evidenced by numerous infringement cases[3]), but across Europe their implementation has resulted in major improvements in environmental performance[4]. However, point sources of pollutants are still reported to be problem in a significant number of water bodies by the EEA.

Diffuse pollution has been less explicitly controlled by EU law, most notably by the Nitrates Directive, the DSD and pesticides law. The WFD requires measures to tackle diffuse pollution if it threatens achievement of good status, but measures, if they have been determined, are yet to have an effect. Some Member State action has also been important, such as phosphate bans in detergents, which has recently become part of EU law. However, the EEA has noted the large percentage of water bodies where diffuse pollution is a significant pressure and Member States have reported that agricultural pollution is a major issue in 90% of RBMPs. Thus nutrients remain an issue. For hazardous substances many substances have been controlled and reduced. However, new substances need to be controlled[5] (as is

[2] EEA (2012). State of Water Report.

[3] For further information see: Volkery, A., Geeraerts, K., Farmer, A., Merlino, C., Chalsège, L., Vandresse, B., Da Silva Gaspar, L. & Ursachi, D. (2011). Support to the Fitness Check of EU Water Policy.

[4] http://ec.europa.eu/environment/water/water-urbanwaste/implementation/implementationreports_en.htm

[5] EEA (2011). Hazardous Substances in Europe's fresh and marine waters.

seen in the current proposal to revise the Priority Substances Directive) and new types of substances are rising up the agenda (such as pharmaceuticals and, in particular, endocrine disruptors). These remain a risk to Europe's water resources.

As the figures from the EEA show, over abstraction of water is a major pressure on Europe's waters. Agriculture is the main consumer of water. This is particularly the case in southern Europe, but also in other river basins leading to low river flows with impacts on biodiversity and other water users. In the south 70% of water used is used by the agriculture sector. It also has to be noted that much water that is abstracted is not 'used', but is lost through inefficient use, such as in irrigation systems or losses from leaks in drinking water supply networks. Until the adopted of the WFD there has been no direct objective for water quantity in EU law, although there are also some support measures under the CAP. Therefore, the problems relating to over abstraction have been difficult to address and remain a major challenge. Furthermore, it has to be noted that even with a legal framework; in some countries (e.g. Spain) illegal abstraction is a serious pressure which requires enforcement action.

Under the WFD Member States have classified 12% of water bodies as heavily modified. The EEA also notes a significant percentage of water bodies where hydromophological change is a significant pressure. The implications for these water bodies will vary, but this presents a challenge not only to meet the ecological objectives of the WFD, but also of other water uses, such as flood management (comparing natural flood plains with canalised water channels).

In conclusion regarding pressures there remain some problems with point sources of pollution, significant problems with diffuse pollution and abstraction and further problems with hydromorphological change. It is important, therefore, for the Blueprint to identify actions to address these issues further order to reduce these pressures. To do this, however, requires an understanding of the main drivers affecting these pressures.

The drivers which affect these pressures are also changing in ways that indicate that pressures will remain an issue. Human drivers include:

- Population change: Europe's population continues to grow (such as through immigration). Movements within the EU place pressures on some areas of the Mediterranean (such an increasing pressure on water use). Furthermore, changes in demography in Europe are resulting in smaller householder sizes, an ageing population, etc., all changing patterns of water use.
- Personal and household behaviour is changing: our consumption of resources has increased significantly over recent years. This includes water directly, but also indirectly through the products we consume. Leisure time has increased, also with consequences for water (including pressure to improve quality).
- Energy production and consumption is changing: Europe continues to use a large amount of energy, but sources are changing and there is increasing focus on

renewable energy. However, bioenergy crops require water and use agrochemicals. Hydropower results in hydromorphological change. Combustion processes require cooling water and, while this is returned to water bodies, problems arise with temperature increases (both for power stations and for river ecology).

- Agriculture continues to be a major pressure on water through pollution and abstraction. While some policy changes have encouraged extensification, intensive agriculture remains the norm for most areas. How the CAP addresses this is considered in more detail in the following section.
- Industrial activity was a much greater driver for water pressures in the past than today – due to improved environmental performance and reduction in industrial activity in many countries. However, it still produces some pressures for pollution and water use.

It is also important to note that pressures on water are also affected by drivers which are not human in origin. This is particularly the case with extreme events – flooding and droughts. These can be exacerbated by human activity, but are primarily natural in origin. Further information on the impacts of drought, etc., are set out later in this report.

EU policies at one level or another (whether water policy, sectoral policies such as the CAP or broad strategies such as Europe 2020) affect all of these drivers directly or indirectly. Therefore, it is important for the Blueprint not only to understand how these changing drivers affect the pressures (and therefore state of waters), but also how policies can improve the performance of these drivers towards Europe's water resources.

The appropriate modifications to policies reflecting this understanding of pressures and drivers under the DPSIR framework is the 'response'. These are the policy responses. With regard to the Blueprint it is important to stress that appropriate policy options are not produced from a blank sheet. There are numerous EU policies directed at the pressures affecting Europe's waters and the drivers affecting these pressures. The next section of this report will set out the approach to identifying where policy options need to be developed for the Blueprint. However, the following section describes the key policies that are already in place or are emerging and how these have or will affect pressures and drivers. This forms the basis for future policy development.

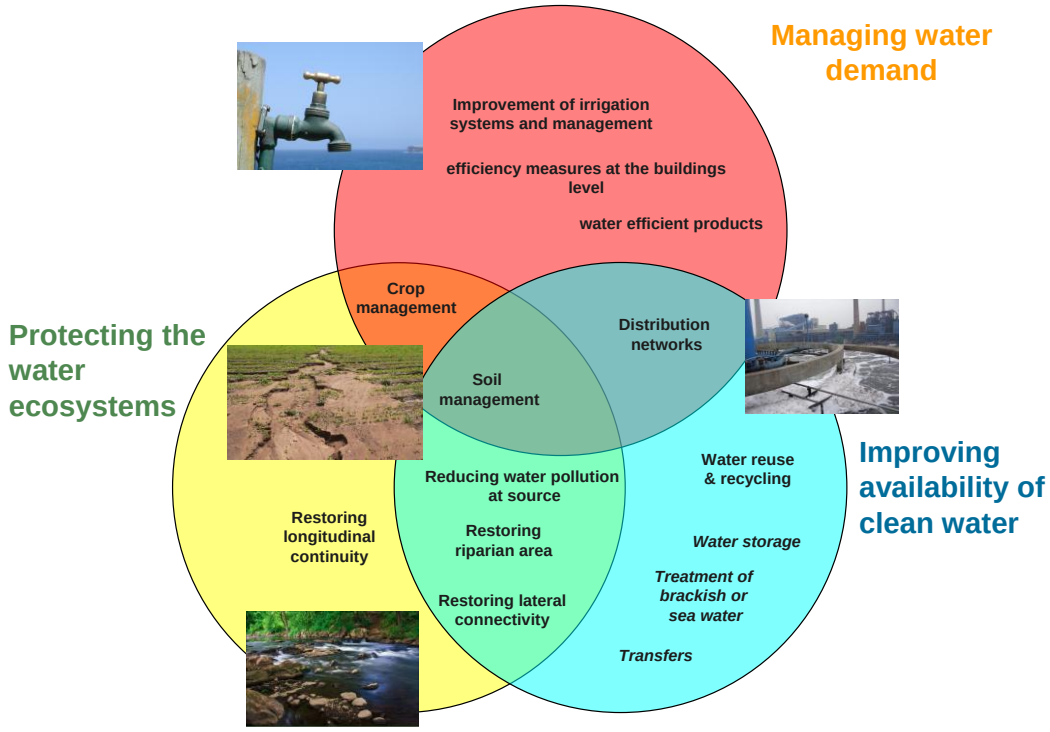
1.4 Policies affecting Europe's waters

There are many EU policies which directly or indirectly influence the quality and quantity of European waters. Here some of the main policies are summarised and Annex A provides additional detail. These can be considered as the 'response' part of the DPSIR framework, although some are also direct influencers of 'drivers'. Understanding the influence of these policies is not only important as part of determining the problems that Europe's waters continue to face and, therefore, what should be addressed in the Blueprint, the policies also

form the basis for future amendment and policy development for the options to be taken forward by the Blueprint.

These policies can be considered to address one or more objectives relating to water protection. The following figure sets out a schematic representation of how different issues interact with regard to the three water management objectives of ecosystem protection, managing demand and provision of clean water. Some actions and policies only deliver one objective. For example, water treatment for drinking water provides clean water but does not protect ecosystems or manage demand. However, reducing water pollution both aids in ecosystem protection and providing clean water. Similarly, policies focused on one measure achieve one objective (e.g. the Drinking Water Directive), but others seek to drive forward a range of measures contributing to all objectives (e.g. the Water Framework Directive).

Figure 3. *How measures interact to deliver different water objectives (source: European Commission).*



A central element of the **WFD** is the requirement to attain good ecological status (GES) or good ecological potential (GEP) in all of Europe's water bodies. More precisely, for surface waters this refers to good chemical and good ecological status; for groundwater, to good chemical and good quantitative status. The Directive calls on Member States to achieve

good status in all water bodies by 2015[6] but also allows Member States to extend the deadline up to 2027 for specific water bodies. It is further allowed to also set lower objectives under certain conditions.

While the WFD sets out GES, including both chemical and ecological status, as an overall target, it does not specify how this can be translated into a precise value for ecological status. For chemical status, water quality standards for some substances have been set in other legislation, such as the Directive on Priority Substances (2008/104/EC). For good ecological status, however, the question is more complex. The work of the Common Implementation Strategy (CIS) has addressed several issues for a consistent determination of good ecological status; however, difficulties remain. These are discussed below. In terms of defining the GEP the WFD also does not clearly indicate how GEP has to be set. Within the CIS process two approaches have been developed; the CIS approach and the Prague approach. As the assessment of the RBMPs shows, both methodologies are difficult to apply in practice and are not fully comparable.

The WFD also includes in its purposes the "[promotion of] sustainable water use based on a long-term protection of available water resources". Article 7 of the WFD requires MS to identify the bodies of water used for the abstraction of water intended for human protection (both current use, if they provide more than $10m^3$ a day or serve more than 50 persons, and future use)[7]. In addition, the Drinking Water Directive sets quality standards to ensure that the quality of such water is wholesome and clean. To avoid quality deterioration, safeguard zones are promoted. Several guidance documents have been published to support MS in their understanding of the Drinking Water Directive's definitions and requirements (ibid). The Drinking Water Directive is also important for the use of water in buildings. Water resource efficiency is further supported through Article 9 on cost recovery.

A further issue is that the WFD targets for chemical and ecological status for surface water bodies do not specifically address water quantity and, therefore, flow regimes. GES/GEP is unlikely to be reached in a water body with significantly altered flows, as this will result in changes to the river ecosystem through modification of physical habitat and alterations in erosion and sediment supply rates[8]. The WFD does not specify the flow regime required to

[6] The Directive also calls on Member States to meet, by 2015, standards and objectives for protected areas such as those for drinking water abstraction, economically significant aquatic species such as molluscs, and recreational waters: Art. 4(1)(c) and Annex IV.

[7] Bio Intelligence Service (2012b). Literature review on the potential climate change effects on drinking water resources across the EU and the identification of priorities among different types of drinking water supplies – ADWICE project. Interim Report. Study for the European Commission, DG Environment.

[8] Sànchez Navarro, R., Seiz Puyuelo, R., Schmidt, G. (Forthcoming): Environmental streamflows in the EU. Briefing paper. Study under the Service contract for the support to the follow-up of the Communication on Water Scarcity and Droughts.

achieve Good Status, but requires that the flow regime should provide conditions 'consistent with the achievement of the values specified for the Biological Quality Elements'.

A hydrological regime consistent with the environmental objectives of the Directive is very close to the eflow concept. Accepting this relationship it can be said, therefore, that environmental water allocation is implicit in the WFD and could be defined as the hydrologic regime necessary to achieve the values specified for the biological quality elements in order to be classified as Good Status. One of the most promising approaches to establish benchmarks for GES is making use of the estimates produced by comprehensive environmental flows (eflows) assessments and analyzing those estimates in the hydrological context (e.g. eflows as percentage of average flow) (ibid). Studies which aim to provide eflow recommendations should be able explicitly to indicate the magnitude of eflows, the environmental objective(s) they have, and the proportion of the long-term mean annual flow they constitute.

While the WFD mentions droughts as potential threats which may undo the efforts to achieve good ecological status of Community water bodies, drought mitigation is but the last among the aims set out in Article 1 of the WFD, and the one which is least substantiated.

In order to close these gaps, the EU has addressed some quantitative aspects of water policy. The Floods Directive (2007/60/EC) addresses this topic by requiring assessment of the risks/hazards of flooding and flood management planning, but it does not set any target in terms of risk reduction. The 2007 Communication on water scarcity and droughts presents an initial set of policy options to address and mitigate these issues, but does not set any quantifiable policy target to reduce water use (note that it sets no binding obligations on Member States). Such a policy target has now been introduced with the Roadmap to a Resource Efficient Europe (COM(2011)571). This includes a target for water abstraction: that it should stay below 20% of available renewable water resources in each RBD in the EU (thus, a target for absolute pressures on water quantity). However, in the field of drought management the Communication on WSD aims for a shift in drought risk management (DRM), away from a crisis response to a modern, comprehensive risk management approach, based on a profound understanding of the drivers and impacts of drought and making use of advanced monitoring and early warning systems at the European level. The Communication stated that the WFD has "sufficient flexibility to develop specific DMP in relevant RB" (p. 9). The WFD has, however, not triggered any legal action in that area so far and MS are thus not legally required to address water scarcity and drought issues. No specific implementation processes or tools are reported to have been put in place either. Any action to address drought management in Europe is expected to be undertaken

through existing EU policies, as well as through measures and actions taken at Member State level.[9]

Annex I of the **SEA Directive** identifies "the likely significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors" among the information to be provided in the environmental report (Article 5). This Directive calls for "measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme". The Directive does not provide any indication as to the conditions under which potential adverse effects on water resources - and environmental flows - can be considered significant. In its report on the application and effectiveness of the SEA Directive[10], the Commission stresses that this Directive is "closely linked" to, namely, water-related directives, but that "only a few member states report the existence of guidance for coordination of joint procedures for fulfilling the requirements governing assessments under other directives". This may be a source of inconsistency in target-setting.

The **EIA Directive** mandates the assessment of the direct and indirect effects of a project on a range of factors including water (Article 3). It also mandates a description of the likely significant effects of the proposed project on the use of natural resources, and the description by the developer of the forecasting methods used to assess the effects on the environment (Annex IV). Indicative threshold values for significance or minimum environmental flow requirements are not provided.

The **WFD** encourages MS to include supplementary measures in their PoMs; a non-exclusive list of recommendations for such technical measures is provided in Annex VI (e.g. changes in crop management, demand and supply, natural water retention, and efficiency and water reuse). While the Directive gives an indication of the types of intervention measures possible, it does not provide an exhaustive list and there is considerable leeway for interpretation. Member States can choose which measures to apply to a water body based on a mandatory assessment of the main pressures in a given basin. Since none of the measures are mandatory, it is unclear the extent to which certain measures will be implemented. However, it is necessary to take sufficient measures to meet the legal objectives for achieving good status.

The Urban Waste Water Directive sets rules for the use of treated wastewater, stating that treated wastewater shall be re-used whenever appropriate and that disposal routes shall

[9] Intecsa-Inarsa, 2012.

[10] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52009DC0469:EN:NOT

minimize the adverse effects on the environment." However, the UWWD fails to provide any guidelines or definitions of "whenever appropriate". This greatly limits the support of the Directive in encouraging the use of treated wastewater in the agriculture and industrial sectors. Mandatory measures are also found in the **Nitrates Directive** related to codes of good agricultural practice and specific measures focussing on preventing water pollution through application limits for nitrogen on land and techniques of fertilizer application.

The **Habitats Directive** specifies that measures taken in Natura sites "shall be designed to maintain or to restore, at a favourable conservation status, natural habitats and species of wild fauna and flora of Community interest" and that the necessary conservation measures have to correspond "to the ecological requirements of the natural habitat types of Annex I and the species in Annex II present on the sites". Although the Directive does not contain any definition of the "ecological requirements", these involve all the ecological needs of biotic and non-biotic factors to ensure the favourable conservation status of the habitat types and species, including their relations with the environment (air, water, soil, vegetation, etc.)[11]. Environmental water allocation and flow regimes are significant for the conservation of water-dependent habitat and species, and therefore they have to be adequate to maintain or restore a favourable conservation status. It is important that this objective is made compatible with the WFD's call for good ecological status. Art. 1 of the WFD, on Purpose, refers to aquatic ecosystems as well as terrestrial ecosystems and wetlands; moreover, the WFD's provisions for good quantitative status of groundwater bodies refer to associated terrestrial ecosystems. A CIS guidance document addresses wetlands. Nonetheless, further attention may be needed to integrate these two directives into RBMPs.

The **2007 White Paper on adaptation to climate change** calls for a series of actions related to water: for example, the Water Framework Directive to boost water storage capacities of ecosystems. Moreover, the White Paper calls for an assessment of the need for measures to enhance water efficiency in agriculture, households and buildings (thus supporting the objectives set out in the Communication on water scarcity and drought). The White paper also calls for a full 'climate-proofing' of the 2015 round of RBMPs. The White Paper does not, however, itself set out new targets.

The **Directive on renewable energy** provides that the EU as a whole should reach a 20% share of energy from renewable sources by 2020 and a 10% share of renewable energy specifically in the transport sector. The Directive also sets national targets, and moreover, sets out a 10% minimum target to be achieved for the share of renewable energy in overall EU transport petrol and diesel consumption by 2020. These targets may conflict with water-

[11] European Commission (2000): Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/provision_of_art6_en.pdf

related targets, as they can influence *pressures* on water systems, such as promoting hydropower and/or bioenergy crops (so affecting water use and agrochemical use).

There are many initiatives currently in place in the EU and beyond to improve the **environmental performance of the building sector**. Initiatives about green buildings, which aim to label a building according to certain certification criteria, can be found at the national level[12]. Several national Governments have announced public procurements to enhance their own buildings, as around 40% of buildings tend to be owned or used by the public sector, the report found those initiatives targeting buildings generally include a mixture of actions such as monitoring leakages more closely, installing high-performance water-using products, reusing or harvesting water, etc. Moreover, current work on EU criteria for Ecolabel, Green Public Procurement (GPP) leads the way to promote resource-efficient practices (ibid).

The Common Agricultural Policy (**CAP)** regulations include provisions to 'protect and manage water' under the requirements for good agriculture and environmental condition (GAEC). The main requirement affecting quantitative aspects of water management has to do with irrigation authorisation procedures.[13] In addition, the cross-compliance framework includes statutory requirements related to water protection and management arising from the implementation of the Groundwater Directive and Nitrates Directive. Certain rural development measures support investments for improving irrigation infrastructure or introducing irrigation techniques that reduce the abstraction of water, as well as actions to improve water quality (these elements were addressed in particular in the 2008 'Health Check' amendments to the CAP).[14] The approaches and actions to implement these measures are set by Member States (at both national and, in some MS, regional levels). As a result, there can be important variations across the EU. At the same time, EU agriculture policy follows a series of objectives that may not be directly compatible with those of water protection. Such objectives include: increasing agricultural productivity; stabilising markets; and ensuring the availability of supplies. These objectives are set in Art. 39(1) of the Treaty on the Functioning of the European Union (TFU). There can be conflicts where these goals for agricultural production lead to greater water demand as well as pollution runoff and other pressures.

[12] Bio Intelligence Service (2012). Water Performance of Buildings. Final Report. Study for the European Commission, DG Environment.

[13] http://marswiki.jrc.ec.europa.eu/wikicap/index.php/Good_Agricultural_and_Environmental_Conditions_(GAEC)

[14] http://ec.europa.eu/agriculture/envir/water/index_en.htm

On 12 October 2011, the European Commission presented a set seven of legislative proposals for the reform of the CAP. The *proposal on the financing, management and monitoring of the CAP* explicitly addresses a number of issues related to water management. More precisely, it indicates that the projected farm advisory system should cover certain elements related to climate change mitigation and adaptation, biodiversity, protection of water, animal and plant disease notification and innovation as well as the sustainable development of the economic activity of the small farms (p. 11). This proposal also states that Member States should adopt national standards of good agricultural and environmental condition and cites water, soil, carbon stock, biodiversity and landscape issues, as well as minimum level of maintenance of the land, as priority areas (p. 21).

In the same vein, when referring to monitoring and evaluation, the proposal indicates that the impact of the CAP measures shall be measured in relation to a number of objectives including "sustainable management of natural resources and climate action, with a focus on greenhouse gas emissions, biodiversity, soil and water" (p. 88). Although these elements of the proposal seem to indicate that water management could have a more prominent role in the post-2013 CAP, there are no explicit references to quantitative targets.

The Commission's proposed legislation also maintains the cross-compliance mechanism. It calls, however, for a simplification in the number of requirements, including those for Good Agricultural and Environmental Condition (GAEC), while at the same time noting that elements from the Water Framework Directive (and from the Pesticides Directive) may be added in the future.

The **Community Strategy Guidelines 2007-13 for EU Structural Funds** refer mainly to water quality issues, though on the side of water quantity issues there is a reference to droughts:

> "The provision of environmental services such as clean water supplies … and waste-water treatment infrastructures, management of natural resources… and protection against certain environmental risks (e.g. desertification, droughts, fires and floods), should all have high priority…"[15]

Overall, however, these provisions for the Structural Funds – which, along with the CAP, are the two main areas for the EU budget – do not set targets related to water. The Commission's proposed regulation for Cohesion Policy and Structural Funds[16] lists the

[15] European Council, Decision of 6 October 2006 on Community strategic guidelines on cohesion (2006/702/EC)

[16] Regulation of the European Parliament and Of The Council laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund covered by the Common Strategic Framework and laying down general provisions on the European Regional Development Fund, the European

protection of the environment and the promotion of resource efficiency among its thematic conditionalities [Article 9(6)]. The main water-related criteria for fulfilment of this particular conditionality refer to provisions in the WFD; i.e water pricing policy and recovery of the costs of water services, and existence of a river basin management plan for the river basin district where investments will take place. No quantitative targets are indicated.

Policies can, therefore, address the different stages of the DPSIR framework. EU policies (such as on renewable energy) affect drivers, stimulating or inhibiting them. Many policies are targeted at individual pressures (e.g. UWWTD for waste water discharges) or seek to address impacts and state of waters (e.g. those based on environmental quality). Policies are, of course, a response in themselves, but policies concerned with the knowledge base may be considered to be directed specifically at the response part of DPSIR. The WFD can, in its various elements, be viewed as tackling issues (as relevant in a given river basin) across the DPSIR framework.

While some policies developed may fit individual parts of the DPSIR framework, many are not so specifically targeted. This is often the case with guidance which might aim at a particular issue (e.g. a pressure), but are free to explore related subjects, such as links to drivers or impacts.

It is also important to stress that policies to address drivers are likely to be most effective in delivering water outcomes. However, there are limits to influencing EU policies in this area and, indeed, the economic drivers at Member State level. However, encouraging integrated economic, social and environmental analysis and planning at Member State level could achieve more sustainable driver conditions.

1.5 The justification for EU level intervention and types of intervention

This report (for 12 key problems) sets out the problems facing Europe's waters and then proceeds to suggest policy solutions to those problems. However, the fact that a problem exists does not automatically mean that a solution should be found at EU level or that a mixture of solutions is needed – some at EU and some at Member State level. Apart from whether an EU wide approach (if possible) is the most effective approach in theory, the appropriateness of such a response is also governed by the legal principles underlying the respective role of the EU institutions and the Member States.

The EU Treaty (TFEU) enshrines the principle of subsidiarity into the functioning and rulemaking of the EU. Subsidiarity is interpreted as meaning that decisions should be taken

Social Fund and the Cohesion Fund and repealing Council Regulation (EC) No 1083/2006, corrigendum from 14 March 2012, p. 138 ff.
http://ec.europa.eu/regional_policy/sources/docoffic/official/regulation/pdf/2014/proposals/regulation/general/general_proposal_en.pdf

at the governance level which is most appropriate for those decisions to be effective – whether at EU, Member State, regional or local level.

There are a number of reasons why actions should be taken at EU level. These are:

- Functioning of the single market: EU action is justified to ensure that the trading of goods and services within the single market is not impeded by rules or practices adopted by individual Member States or otherwise to ensure that common standards apply to goods and services traded across the Union. EU level rules may also be adopted to deliver common standards of approach to environmental protection to ensure that businesses in some Member States do not have a competitive advantage over businesses in other Member States where such environmental protection rules do not apply. Therefore, if problems related to Europe's waters are affected by, or interact with, the single market, EU level action may be justified.
- Effective application of EU funds: The EU has a number of established funding streams to support individual sectors (e.g. agriculture), achieve social coherence (Cohesion Fund), etc. The justification for EU-level funding as an EU-level intervention is made elsewhere. However, it is appropriate for EU level interventions to be made in how these funds are applied to ensure that spending is compliant with and/or contributes to the objectives of EU environmental (or other) law. Such objectives may include those for the protection of water.
- Protection of the shared environment: The TFEU recognises the necessity of environmental protection and the justification of EU level to ensure that environmental resources considered to be of importance to European citizens are protected. This includes the need to protect water, including in a transboundary context.
- Increased efficiency: EU level action may be justified where adoption of EU level rules or systems may be more efficient than a multiplicity of rules or systems developed at Member State level. The increase in efficiency may either be due simply to economies of scale or also due to avoidance of divergent systems between Member States which impede business activities across the Union or impose additional costs to business.
- Sharing of knowledge: Member States benefit from sharing of knowledge and experience. This may include environmental data, models, tools, best management practice, etc. EU level action is justified to assist in the sharing and dissemination of such knowledge to help Member States meet their obligations under EU law and/or national environmental priorities.
- Market failure: Market failure occurs when freely-functioning markets fail to deliver an efficient allocation of resources. The result is a loss of economic and social

welfare. This is, therefore, a different issue to effective functioning of the single market. Market failure exists when the competitive outcome of markets is not efficient for society as a whole. This is usually because the benefits for individuals or businesses carrying out a particular activity diverge from the benefits to society as a whole. The structure of water supply utilities and companies may not necessarily result in efficient allocation of water resources, for example, and there is arguable a failure of the market. Water is an important resource and EU level action may be appropriate in this regard.

It is important to note that these justifications for action at EU level do not necessarily imply legislative action or a need to prescribe obligations on Member States. Rules deemed to be necessary to ensure functioning of the single market would likely involve legislative obligations on Member States. However, sharing of knowledge, for example, could take the form of an enabling action which Member States contribute to on a voluntary basis.

Although the consideration of the allocation of decision making within the Treaty focuses on the relationship between Union-level and Member State-level decision making, EU water law encourages decision making at a level intermediate between the Union and the Member States, i.e. at river basin level, where rivers, lakes, groundwater bodies or coastal waters cross national frontiers. EU water law largely encourages, rather than prescribes, such co-operation. However, it is important to stress the importance of this governance level. A common understanding of the state and pressures on water bodies and co-operation on measures to address pressures (particularly those which cross frontiers) is necessary to achieve water objectives. Therefore, it is important to consider ways to enhance this scale of governance.

A wide range of different policy interventions or instruments are potentially appropriate in taking forward the objectives of the Blueprint. These can include regulatory standards, economic incentives (market-based instruments), spatial planning instruments, information and procedural instruments, cooperative measures (voluntary or negotiated) and 'soft' instruments. Some of these types of instrument are more appropriate to taking forward the different justifications for EU level intervention than others. It is also important to note that the different types of intervention are not necessarily mutually exclusive.

They can be described as follows:

- Regulatory instruments include standards, on either design (requiring the use of a particular technology), performance (prescribing the maximum amount of pollution from a source of emission or the state appropriation and designation of a specific land-use for a specific area (quality standard). Currently within EU water policy this type of instrument includes the Nitrates Directive and Environmental Quality Standards Directive. Regulation would also include product standards necessary for

the functioning of the single market (e.g. the March 2012 amending Regulation introducing limits on phosphates in detergents).

- Economic instruments include pollution taxes and charges (revenue), subsidies, conditionalites, payments for services, tax allowances, green public procurement (expenditure), tradable permits and licenses (property rights) and user-benefits and environmental liability. Currently within EU water policy this type of instrument includes cross-compliance and rural development under the CAP.
- Spatial planning instruments include regional planning systems and land-use and urban planning systems. Currently within EU water policy this type of instrument includes the spatial dimension of river basin planning within the Water Framework Directive and Floods Directive.
- Cooperative instruments include voluntary commitments from target groups (such as commitments from companies to voluntary reduce emissions of pollutants) or negotiated agreements between public authorities and targets groups without regulatory action. Currently within EU water policy this type of instrument is limited, but includes agreements such as those previously reached on detergents.
- Guidance and information: includes guidance, sharing of best practice and development of tools to help promote an objective not addressed by another instrument or to support implementation of any of the above instruments. Information actions include environmental labels for products and processes, environmental reporting, access to information and justice rights, information campaigns and educational measures. Thus policy options relevant to water of this type would include additions or changes to the guidance produced under the CIS.

EU water policy is (or has been) taken forward using almost all of the above range of instruments. Different types of regulatory approach have been used since the inception of EU water policy and the WFD as well as the Communication on Water Scarcity and Droughts promote a spatial approach to water management and the use of specific economic instruments. Voluntary agreements were developed to control detergent impacts, but are also used in other policy areas (such as Pillar 2 of the CAP) to support water management. Finally, under the CIS process guidance has been extensively developed to support these initiatives.

However, it is also important to note that there are limitations to the extent of EU competence in some areas such as land use planning and some economic instruments (e.g. taxation). This colours the likely acceptance by Member States of some potential instruments (e.g. if unanimity is required in Council, opposition is more likely to be effective).

Having said this, there is already a wide range of experience of different types of instruments that have been used to address water objectives at EU level. Of course,

instruments in other areas that support or hamper water objectives (pollution control, agriculture, regional policy) also reflect different aspects of this instrument range. For example, in evolving law from the Dangerous Substances Directive 76/464/EEC to the Directive on Priority Substances 2008/104EC, it was acknowledged that emission controls were now the province of pollution control law (IPPC Directive/Industrial Emission Directive). As a result, the range of options that is considered in this report builds on experiences already available at EU level.

It is, however, important to note that policy instruments are seldom applied alone, but in a mix of different instruments. The WFD is exemplary in this regard. Individual options for new policies may be more effective in combination with other policies. Thus, in order to respond to the issues raised, a wide range of potential options may be appropriate. Each problem could be addressed by one or more options. Of course, similar or related options may arise in the context of different problems (e.g. on the relationship between agricultural activity and water protection). However, others may be highly specific and 'unique' (e.g. to address a very specific issue of legal coherence). This re-emphasises the importance of considering the interaction between problems and the options to address those problems – a theme that is returned to later in this report.

1.6 Methodology

The initial analysis lays the foundation of the report by defining the problems relevant to the five themes of the project, setting out the weaknesses in the current set of policies/instruments in relation to the problems facing Europe's waters and problems that arise as a result. It also discusses how these problems may evolve over time through potential developments of existing water policies and key non-water policy areas such as the Commission's Proposal on the CAP, the Commission's Proposal on the Cohesion Policy, the planned issues to be included in the EU adaptation strategy on climate change and the Commission Proposal for the next research programme. Following this, objectives for EU action in the five themes were developed in line with the identified problems.

The policy options developed within the project are based on the problems and objectives for each of the 12 key problems identified in the project. The options were based on a SWOT analysis of policy options, as well as taking into account the relevancy of EU action. This is extremely important as the foundation of the Blueprint is the necessity to take action at EU level (see section on justification for EU level action below). Many actions can also (indeed should also) be taken at Member State and/or river basin level. However, only those appropriate at EU level are considered here.

The list of policy options was used for public consultation within a stakeholder consultation process (see below) and formed the basis of Impact Assessment analysis (further detail on the respective methodology will be given at the relevant part of this report).

This research has draw upon a wide range of sources of information. In particular the European Commission had launched a large number of studies to support the Blueprint and the project has drawn upon these. Some have assisted in the problem analysis (e.g. on the problems of implementing current EU policy), while others have focused on specific areas and developed (and assessed the impacts of) policy options themselves. In such cases, this study has not sought to revisit such detailed analysis, but has used those results within the overall context of the assessment of policy options for the Blueprint. It should be noted that while a number of supporting studies are complete, some remain to be concluded and, therefore, their results will further inform the analysis of the problems facing Europe's waters and the potential solutions to these. These studies include:

- Comparative study of pressures and measures in the major RBMP in the EU
- Service contract for the development of tools and services for the water information system for Europe (WISE)
- Support in preparation of the Impact assessment of the 2012 review of the Water Scarcity and Droughts. Water Scarcity & Droughts Policy in the EU - Gap Analysis
- Resource and economic efficiency of water distribution networks in the EU - Pilot project on the economic loss due to high non-revenue-water amounts in cities (Leakages)
- Assessment of options for EU action on water efficiency of buildings
- Assessment of the efficiency of the water foot printing approach and of the agricultural products and foodstuff labelling and certification schemes
- Assessment of the options for water saving in agriculture and the costs and benefits of the different options.
- The role of water pricing and water allocation in agriculture in delivering sustainable water use in Europe.
- Costs, Benefits and climate proofing of natural water retention measures
- Support for the Fitness Check – phase 1
- Support for the Fitness Check – phase 2 - public consultation and 2nd stakeholder workshop Fitness Check
- Climate Adaptation - modelling water scenarios and sectoral impacts (ClimWatAdapt)
- Contract to support the Impact Assessment of the Blueprint to safeguard Europe;s Water Resources - Lot A: Scenarios and targets for the protection of water resources
- Contract to support the Impact Assessment of the Blueprint to safeguard Europe;s Water Resources - Lot C: Communication and Consultation

The EEA has also produced studies examining different aspects of the pressures on water bodies and the state of Europe's waters in support of the Blueprint and these have been

taken into account. Furthermore, results from FP6/7 projects, independent research, etc., have all been used in the analysis.

Throughout the report, full reference is made to all of these information sources.

Fitness Check of EU Freshwater Policy

An important input to this work has been the Fitness Check of EU Freshwater Policy, which has been produced as part of the Commission's Smart Regulation policy. The Commission Work Programme for 2010 stated that, *"to keep current regulation fit for purpose, the Commission will begin reviewing, from this year onwards, the entire body of legislation in selected policy fields through "Fitness Checks".* The Fitness Check of EU Freshwater Policy has focused on, inter alia:

- Barriers (including in other policy areas) to meeting the already agreed objectives;
- Issues related to implementation and measures that could improve the implementation of EU water policy;
- Coherence of the legislation in place and whether there are any overlaps, inconsistencies and/or obsolete measures.

The scope of the Fitness Check included the following Directives: the Water Framework Directive; the Groundwater Directive; the Directive on Environmental Quality Standards; the Urban Waste Water Treatment Directive; the Nitrates Directive; and the Floods Directive. It also examines quantitative and adaptive water management issues, for which there is currently no legislation at EU level (except for Floods), i.e. the Communication on Water Scarcity and Drought and its annual follow-up reports, and the Policy paper accompanying the White Paper on Adapting to Climate change On Water, Coasts and Marine Issues. The conclusions of the Fitness Check have focused on: the relevance of EU freshwater policy; the coherence of EU freshwater policy; the effectiveness of EU freshwater policy and the efficiency of EU freshwater policy.

These themes are all highly relevant to this project as they not only focus on identifying specific problems (e.g. within EU water policy or with other EU policies), but also clarify the extent to which options are practicable. Therefore, this report draws upon the results of the Fitness Check analysis. Furthermore, the Fitness Check process include stakeholder consultation and the conclusions of this process have been included, where relevant, in examining the acceptability of options developed in this report, linking to this project's own consultation activity (see below).

Stakeholder consultation

A key element of the work of the project included consultation with stakeholders. This was achieved through the use of an internet consultation and through meetings.

Internet consultation

In discussion with DG ENV it was agreed that the internet consultation should focus on seeking views on the individual policy options developed to address the specific problems set out later in this report. The questionnaire, therefore, was drafted asking whether respondents support, or do not support, each of the policy options presented according to the 12 major problems. For each problem, respondents were also free to add options of their own. Introductory questions required respondents to indicate their country of origin, type of organisation they represent, involvement in river basin management, stakeholder group, etc., in order to provide a basis for comparing and contrasting the results. A copy of the final questionnaire is provided in Annex E. The questionnaire was converted into the format for uploading on the Commission's website by the project team. The questionnaire was open for responses from 15 March 2012 to 7 June 2012. The project team also provided an early draft of a policy options paper to be used to introduce the options for stakeholder consultation. This draft was revised by the Commission also in discussion with the project and was provided on the Commission's website as a background document for the internet consultation and for other stakeholder interaction.

The results of the stakeholder responses to the internet questionnaire are integrated into the Impact Assessment analysis later in this report. A total of 226 responses were received to the public consultation. Respondents were asked to indicate both their country and type of organisation. Table 1 provides a breakdown by country. Responses were received from:

- 24 Member States,
- 3 EFTA countries,
- 33 Europe-wide organisations, and
- 2 responses from outside Europe.

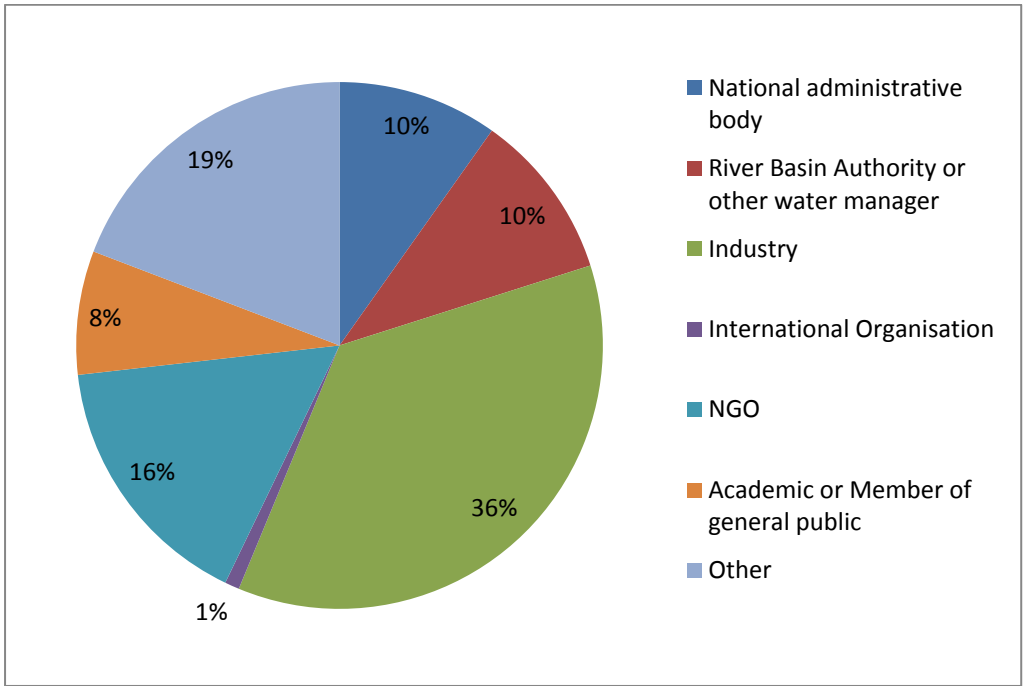
Table 1. Distribution of responses per Member State, EFTA countries (as well as Europe-wide)

	Number of responses	Percentage of total responses
EU Member States		
Austria	11	5
Belgium	10	4.5
Bulgaria	2	1
Cyprus	2	1
Czech Republic	3	1
Denmark	3	1
Finland	10	4.5
France	13	6
Germany	30	13
Greece	2	1
Hungary	7	3
Ireland	4	2
Italy	10	4.5
Lithuania	1	0.5
Luxembourg	2	1
Netherlands	11	5
Poland	11	5
Portugal	1	0.5
Romania	3	1
Slovakia	2	1
Slovenia	1	0.5
Spain	9	4
Sweden	6	3
United Kingdom	28	12
EFTA countries		
Iceland	1	0.5
Norway	7	3
Switzerland	1	0.5
Europe-wide		
Europe-wide	33	13
Outside Europe		
Other	2	0.5

The highest number of responses was received from: Europe-wide organisations (33), from Germany (30) and from the United Kingdom (28). The Europe-wide organisations include Brussels-based industry and NGO umbrella groups, as well as other organisations whose activities cover more than one Member State.

In terms of type of respondent (see the pie chart below), the largest number of submissions come from industry (36%, including both individual companies as well as industry associations). This is followed by the 'other' category (19%), which includes national associations of professionals and public water services, political parties, public research institutes and regional and local government bodies. NGOs (16%) followed, and then national administrative bodies (10%) and River Basin Authorities or other water managers (10%).

Figure 4. Distribution of responses to public consultation by type of respondent.



Although 226 replies were received, some of the replies sent via email did not provide answers that could be clearly counted for the multiple-choice questions. As a result, 221 answers could be considered for most questions in the quantitative analysis of results used later in this report.[17]

Stakeholder consultation: meetings

The project team has participated in meetings specifically focused on the Blueprint and which provided information on stakeholder views appropriate to the work of the project. These meetings include:

- Blueprint Policy Options and Recommendations: EWP Stakeholders Consultation. 20 December 2011.
- Expert Group Meeting and Water Scarcity and Droughts. Organised by COM, IT, FR and ES. 13-14 October 2011, Venice. Items in the discussion list: RBMP assessment on Water Scarcity & Drought; improvement/reminder of water scarcity and drought definitions; environmental water allocation; water scarcity & drought indicators.
- CEPS meetings on "Which Economic Model for a Water-Efficient Europe?" on 5 and 27 March.

[17] Due to the variability in the answers submitted via email, the exact number of responses for quantitative analysis varies from 220 to 222, depending on the question.

- CIS expert group on WFD and agriculture on 4 April 2012.
- Meeting of the Go4 Blueprint group 27 April 2012.

The project team also attended the third EU water conference and was in contact with Ecologic which organised the conference under the Lot 3 contract such as on preparation of background documents. The results of the conference were taken account of in the analysis in this report[18].

[18] See: http://waterblueprint2012.eu/conference-documentation

2 IDENTIFYING KEY PROBLEMS TO BE ADDRESSED IN THE BLUEPRINT

2.1 Introduction

This chapter describes how the project undertook its analysis and consultation to identify the key problems that need to be addressed by the Blueprint and for which policy options could be developed and subjected to Impact Assessment. The section begins by an outline of the initial analysis that was undertaken in the project. This full analysis was provided in the project first interim report.

The results of the analysis were discussed with Commission officials and this enabled the key problems arising from the analysis to be refined further. It also enabled a first presentation of the problems and some initial policy options to tackle these problems to be subject to public consultation (see previous chapter). This section, therefore, continues with a description of the key problems that emerged from this process. It is these problems which, one by one, are the basis for the detailed problem description, baseline assessment, options development and impact assessment in the following chapters of this report, which also draws on the initial analysis undertaken in the project as well as providing new analysis.

The chapter continues by setting out the key objectives of the Blueprint, which were elaborated in discussion with Commission officials. These objectives are important as they provide both a foundation for the elaboration of the problems and options to address the objectives and also a 'benchmark' against which the effectiveness of the options can be analysed within the IA.

This chapter concludes with a consideration of the how the problems interact with each other and with the main objectives of the Blueprint.

2.2 Initial analysis

The scope of the initial analysis of the main issues facing Europe's waters evolved during the course of the early part of the project. This concluded by being structured according to the six themes of:

- Improving tools for better management of water resources.
- Unlocking measures to improve the status of water.
- Improving the use of economic instruments.
- Governance of water policy.
- Knowledge base and innovation.
- Global issues.

The key points identified in each of these analytical themes are set out here.

Improving tools for better management of water resources:

In the face of growing water scarcity and increases in drought events, there is a strong need for sound quantitative water management. Droughts have become more frequent and severe in large parts of Europe. Severe water shortages at specific locations are expected about once every 50 years but the frequency of drought events has been increasing over the past years. This trend is likely to be further exacerbated by climate change, land use changes and water abstraction. The establishment of water balances and of targets for quantitative water management is an important driver for concrete action. Targets can be developed in different contexts, ranging from water resource management in catchments to those for individual products. Their focus can be on promoting water efficiency to setting maximum abstraction limits. However, there are issues with understanding the relationship between water balances and target setting and legal obligations, such as the WFD (e.g. the necessary flow regimes to be consistent with good ecological status), and insufficient methodologies for the development of targets. In addition to actions to decrease water scarcity through target setting and promotion of water efficiency, action is also needed to improve drought management. The analysis highlighted the following problems and needs:

- There is a need to determine robust targets for water bodies, particular for water quantity, based on the objectives of the WFD. In particular, there are major challenges for Member States in determining the water balances and eflows consistent with good ecological status, including from lack of sufficient tools to perform such an analysis.
- There is a need to determine robust targets for water uses within catchments (in particular those subject to water stress) based on an understanding of eflows and equitable distribution of water. Water management authorities often lack sufficient or robust tools to make these determinations. Target setting for (quantitative) water resource management is hampered by the failure of the current set of water quantity indicators to provide an adequate picture of the gap between water resources use and availability.
- There is a need to improve the preparedness of Member States to manage future droughts, which are expected to increase in frequency, intensity and geographical scope with climate change. The extent and effectiveness of drought management planning in some Member States is still below that necessary to meet these challenges and protect economies and society from drought impacts.

2.3 Unlocking measures to improve the status of water

In order to achieve specific water management objectives, a range of technical measures may be required to be implemented. Such measures are promoted and, as will be described in the section below, hindered depending on the synergies and conflicts between different EU policies. Table 2 shows a wide variety of water related measures and their support through EU environmental policies (see also Annex B).

The analysis highlighted the following conclusions:

- The agriculture sector is a major pressure on water quality and quantity across much of Europe. There is a wide range of measures to address these impacts, such as more sustainable use of fertiliser and pesticide inputs, maintaining soil organic matter levels, changing crop patterns, enhanced use of buffer strips, improved irrigation practices, wetland restoration, restoration of riparian areas, etc. Some measures are promoted within the Common Agricultural Policy and through implementation of EU water law. However, wider targeted use of these measures has the potential to address many of the problems that remain for Europe's waters.
- The development of new measures by industry and other sectors (and dissemination of these measures) is being taken forward within the European Innovation Partnership on Water. Its Strategic Implementation Plan the policy recommendations identified by the Blueprint. The EIP on Agricultural Productivity and Sustainability will also promote innovation at farm level.
- Improved water efficiency of appliances and buildings can reduce water demand by domestic and other users. Therefore, uptake of efficiency measures can contribute to demand management in water stressed areas.
- In water stressed/potentially stressed areas, the loss of water from leakage in distribution systems can represent a serious impact and measures are available to address this problem.
- Water re-use has the potential to contribute to the irrigation requirements of agriculture in some river basins or to industrial uses provided that all relevant safety standards are respected, but there are possible barriers to this measure due to the lack of EU level standards for water re-use.

Table 2. The range of water related measures and their support through EU environmental policies

	Water						Agriculture			Biodiversity		Infrastructures and buildings			Renewables		Soil	Coastal Areas
Measure sub-category	Water Framework Directive	Marine Strategy Directive	Floods Directive	Communication on WS&D	Nitrate Directive	Urban Waste water	Direct payments (cc)	Rural Development Regulation	Birds Directive	Habitat Directive	EU Biodiversity Action Plan	Solidarity Fund	Council Reg (EC) N° 1083/2006	Eurocodes	Renewable energy	Biomass Action Plan	Proposal for a Soil Framework Directive	Communi-cation Commission Evaluation of ICZM
Risk prevention	x		x	x		x			x	x			x	x				
Awareness/ information	x		x	x			x	x		x								
Changing management or practices	x	x	x	x				x		X		x	x	x				
Economic and financial	x		x	x			x	x				x	x					
Land use change and management	x		x	x	x		x	x	x	X	x	x	x		x	x	x	
Technical measure related to technical infrastructure	x	x	x	x		x	x	x					x	x				x
Technical measure related to green infrastructure	x		x	x		x		x	x	X	x		x	x				
Management plans	x	x	x	x				x										
Regulatory	x			x										x				

Improving the use of economic instruments

The Water Framework Directive was the first EU environmental policy that explicitly integrated economic principles (e.g. polluter-pays-principle), economic tools and methods (e.g. cost-effectiveness analysis) and economic instruments (e.g. incentive pricing[19] due to environmental charges and taxes) into a piece of EU environmental legislation. Article 11 defines water prices as "a potentially cost-effective measure" for achieving the Directive's objectives and Article 9 lists in detail the fundamental principles upon which economic instruments for water management should build:

- Water prices must allow for the cost recovery of water services, including environmental and resource costs[20]. The WFD[21] enables cost recovery assessment, but its scope is limited to water services; other water uses are only foreseen to contribute to the cost recovery of water services.
- Polluter-pays principle: the different water users (household, industry and agriculture) must adequately contribute to the recovery of costs of water services, proportionally to their role in causing these costs.
- Water pricing policies must "provide adequate incentives for users to use water resources efficiently, and thereby contribute to the environmental objectives" of the WFD.

Further indications and guidance on the implementation of the economic elements of the WFD were provided to Member States in the context of the Common Implementation Strategy[22]. These principles were renewed within the Communication on Water Scarcity and Droughts in 2007 which outlined the main challenges and identified seven policy options, aiming to move towards a water-efficient and water-saving economy by improving water demand management. The water hierarchy justifies decisions for additional water supply

[19] Incentive pricing deals with the way water users pay for their use and whether the right price signals are transmitted, i.e. it addresses the question of how water is being paid for and how the water price affects the behaviour of water users (Arcadis et al., 2012).

[20] Cost recovery is about the amount of money that is being paid for water services. The principle, however, extends not only to the financial costs for the provision of a water service, but it also covers the costs of associated negative environmental effects (environmental costs) as well as forgone opportunities of alternative water uses (resource costs) (Arcadis et al., 2012).

[21] Article 9 of the WFD states that "Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs [...] and in accordance in particular with the polluter pays principle". In concrete terms, Member States should have ensured by 2010 "that water pricing policies provide adequate incentives for users to use water resources efficiently, and thereby contribute to the environmental objectives of [the] Directive".

[22] Common Implementation Strategy Working Group 2.6 WATECO (2003): Common Implementation Strategy for the Water Framework Directive (2000/60/EC), Guidance Document No 1: Economics and the Environment – The Implementation Challenge of the Water Framework Directive.

infrastructures only when other options (including effective water pricing policy and cost-effective alternatives) have been exhausted. Within the water hierarchy for EU action, water pricing in the field of water scarcity and droughts policy is a high priority, second only to water saving.

Economic instruments consist of both economic evaluation analysis and economic policy instruments with the latter including pricing, subsidies and compensation mechanisms (e.g. water markets that offer incentives to different groups of users to engage in water-sustainable practices). They can be considered as tools to enhance water use efficiency, they can facilitate allocation of water where it creates most value, optimise timing for investment, generate revenues to operate water services, promote cost efficient options and make innovative approaches competitive[23].

Economic instruments are important tools to stimulate improved behaviour by individuals and sectors regarding water efficiency and pollution control. A range of different economic instruments are in place in Europe. The analysis concluded:

- Current water pricing levels and structure do not provide sufficient incentives to increase water efficiency and in some cases users are not charged at all.
- For water pricing to act as an incentive, there needs to be volumetric measurement of water use. However, in many places metering is limited or non-existent.
- In some areas illegal abstraction of water is a major threat to water resources.
- There are environmentally harmful subsidies in the energy and agriculture sectors which stimulate activities that negatively affect water body status.
- Financial support for specific water protection measures, e.g. within the CAP, can stimulate improved environmental performance.
- Water allocation schemes are limited and restricted due to limited application of the correct tools. The experience of water rights trading, as one approach, is limited in Europe, but might have wider applicability.
- There are still gaps in the quantification of environmental and resource costs, which are often linked to the quantification (and when possible monetization) of the benefits of ecosystem services. This prevents the development of tools such as payments for Ecosystem Services schemes.
- In many cases there is likely to be a strong economic argument for adopting water protection measures, but the lack of cost-benefit analysis reduces the likelihood of adoption of measures in RBMPs.

[23] Centre for European Policy Studies. (2012). Briefing note 'Which Economic Model for a Water-Efficient Europe', Brussels.

2.4 Governance of water policy

The effective implementation of EU water policy requires effective governance and there are important concerns or problems in this regard. Governance includes the structures, capacities and processes of the administrations of the Member States in implementing EU water policies (and other relevant policies) and the wider EU-level governance issues relating to the coherence of the policy environment which Member States are to implement as well as specific challenges for management of transboundary waters.

The analysis highlighted the following conclusions concerning water management governance:

- There are concerns over the effectiveness of water governance, including fragmented institutional structures, poor intra and inter-institutional relationships and capacity (personnel, technical capacity, training, etc.). These can undermine the ability of authorities to perform the detailed analyses necessary to implement the WFD, perform the necessary monitoring, develop and implement RBMPs and develop amended plans in an effective adaptive management framework.
- The wide range of different governance structures and relationships reflects different traditions and is a subsidiarity issue. However, whatever governance structures exist must be effective in implementing EU water law.
- The current financial crisis is likely to exacerbate the strains on delivering improved governance capacity in many Member States.
- Ineffective governance has the potential to undermine the delivery of other policy objectives set out in earlier sections in the report, such as on target setting or implementing specific measures.
- There is a particular issue with governance of transboundary river basins. There are good practice examples of co-operative assessment and planning between Member States, there are also cases where such co-operation has been particularly limited and restricts the achievement of water objectives.

2.5 Knowledge base and innovation

Without sufficient knowledge (data, tools, etc.) water managers may be unable to correctly assess the problems facing Europe's waters or identify the correct management solutions to those problems. There are a number of Europe-wide activities which provide a knowledge base in support of policy development and its continued implementation; including reporting duties by Member States, research programmes, as well as sectoral and cross sectoral initiatives to coordinate and add value to knowledge production through dissemination, interpretation and enhanced operability.

The purpose that much of the knowledge base for water is not always clearly defined. Data required to monitor progress against meeting water objectives may not for example, be found in the data provided by Member States to reach compliance, or again these data may require further synthesis and interpretation across different geographical and temporal scales, limiting its use in forecasting, or accounting for the increased uncertainties in water availability supposed within changing climatic conditions. In addition, some knowledge base activities are designed to encourage innovative methodological development or improve the capacity within and across Member States to foster or promote different ambitions, such as increasing biodiversity by restoring aquatic habitats as part of a research project.

The analysis highlighted four broad inter-related issues concerning the knowledge base for EU water management:

- At least some water management authorities do not consider that they have sufficient tools or knowledge to undertake the necessary analysis or make the necessary decisions to address the issues arising within individual river basins. Effective implementation of EU water policy raises a number of analytical challenges and these are not being effectively met.
- There is insufficient dissemination and sharing of compatible data and other information between Member States and EU institutions bodies leading to an incomplete understanding of the problems facing Europe's waters or, potentially, to incoherent water management choices.
- There are issues concerning the efficiency of the processes of reporting and value of data reported to EU level bodies and whether more effective processes are possible to reduce burdens and add value to the data.
- Future research activities should focus on the most pressing future challenges facing Europe's waters.

These challenges are also particularly issues within transboundary river basins which may have difficulties in joint analyses and in effective data sharing. Finally, these problems and requirements need to be considered in the context of developing technologies, such as for secure data transfer and the development of improved surveillance from the Global Monitoring for Environment and Security (GMES) initiative.

2.6 Global issues

The analysis on global issues considered how EU policy development on water management may affect, or be affected by, countries outside of the EU and, furthermore, how other EU policies might contribute to enhancing water issues in 3rd countries. There are two main ways which were identified in which such interactions can take place:

- The first is in the context of transboundary river basin management, where EU Member States share river basins or groundwater bodies with neighbouring

countries. Pressures and impacts may cross frontiers so that policy objectives for EU waters may be at risk from pressures beyond the EU or activities within the EU might threaten waters of a third country.

- The second is global in nature. The EU's policies should promote sustainable water management that is coherent with the EU-internal development and promotes synergies. Furthermore, the EU policies and consumption patterns should not negatively affect sustainable water management in non-EU countries due to the footprint of virtual water embedded in imported goods. Development policies should also support improved water management in developing countries.

Mismanagement and wastage of water in water scarce countries could have very negative consequences on local development and even be the cause of migration flows from developing countries. The problem analysis has highlighted two principle areas where action within the EU can contribute to meeting the objectives of sustainable water management linked to the achievement of the Millennium Development Goals of halving by 2015 the proportion of the population without sustainable access to safe drinking water and basic sanitation. These are:

- That the EU (EU institutions, Member States, civil society, etc.) can contribute, through shared experience and finance, to improved water management in third countries, building on the existing experience of collaboration and the EU Water Initiative.
- That actions (e.g. by consumers) in the EU can add to the pressures on waters in third countries through the impact of virtual or embedded water within imports of agricultural and industrial products into the EU.

2.7 Refinement of the problem definitions

The results of the analysis of the six core themes were discussed with Commission officials. This enabled the identified of the key problems that need to be addressed to safeguard Europe's waters. The first formulation of these problems, therefore, formed the basis for the public consultation (see methodology).

Here we provide a brief statement of each of the 12 problems. These will, in turn, form the basis for the detailed problem description, baseline assessment, options development and impact assessment in the following section of this report, which also draws on the initial analysis undertaken in the project as well as providing new analysis.

The 12 problems are:

1. Current **water pricing levels do not provide adequate incentives** to increase water efficiency. In some cases, water users are either not charged at all or are not charged in relation to the quantity of water used/consumed.

2. The **insufficient use of metering** for individual users is a key barrier for the effective implementation of pricing schemes that incentivise water efficiency. Illegal abstraction in some parts of the EU is a large phenomenon that puts at risk water availability.

3. Competing demands for **scarce water resources globally** may lead to an estimated 40% supply shortage by 2030. Mismanagement and wastage of water in water scarce countries could have very negative consequences on local development and even be the cause of migration flows from developing countries.

4. **Land use impacts** and, in particular, agriculture's impacts threaten water quality and quantity across much of Europe.

5. The **design of building and water using appliances** does not sufficiently factor-in water efficiency. The lack of coherent approach to water efficiency in buildings and products causes water waste which is problematic in areas which are water stressed or at risk of becoming water stressed and also wastes energy.

6. **Significant amounts of water are lost from leakage** in distribution systems, which is problematic in areas which are water stressed or at risk of becoming water stressed.

7. There are **no common standards for water reuse**. Without common EU standards, a potentially significant source of water is not being used. Moreover, there is a potential for some Member States to object to products grown with reused water thereby generating an obstacle to the internal market.

8. **Governance** of water and sectoral policies at Member State level is, in some cases, fragmented and faces a lack of capacity and resources to fully address water management objectives. There is also often a lack of coordination in river basin shared between different administrative entities within Member States, between Member States and with third countries.

9. **Water balances and adequate water allocation** mechanisms necessary to achieve them are poorly implemented at river basin level. In many instances, river basin managers are not fully aware of how much water flows in and out of a river basin, due to lack of data, tools, capacity, etc. Without this understanding, it is difficult to take effective management decisions to protect waters and meet the needs of water users.

10. **Droughts** have become increasingly damaging in many parts of Europe and are predicted to increase in frequency and intensity in the future. Droughts present a particular challenge to water managers who have to prioritise between different water users during a drought and take decisions to ameliorate the effects of droughts when they occur.

11. **Costs and benefits of water related measures** are not properly understood or quantified. There is a lack of a methodology to calculate the adequate recovery of environmental costs which, inter alia, prevents their incorporation into water price, charges, levies, etc.

12. There is **insufficient dissemination and sharing of compatible data and other information** between Member States, European bodies and third countries leading to an incomplete understanding of the problems facing Europe's waters or, potentially, to incoherent water management choices. Data provision is not timely and different systems prevent data access. New and emerging knowledge needs must be addressed through research activities.

Each of these problems has to be analysed in more detail prior to the development of policy options to address them. The following section of this report does this. For each problem a detailed analysis is undertaken leading to the identification of policy options which can be subject to Impact Assessment in the subsequent sections of this report.

However, it is important to highlight at the outset that the problems (and solutions) are not in isolation from each other and from wider drivers and pressures. Thus the Blueprint must not be viewed as a collection of actions to address 12 problems, but as a strategic approach to safeguarding Europe's waters for which specific problems need to be addressed with specific actions. The following figure is taken from the SCENES project and illustrates this with regard to water pricing. As noted in the problem description (problem 1 above) pricing levels are inadequate to deliver sufficient incentives for improved water efficiency. However, if one examines the drivers for water demand from agricultural, domestic and industrial users, there are other EU policies which affect this demand and there are also infrastructure and technology drivers which also have interactions with EU policies. Thus there are clear interactions with the problems for land-use, water re-use, knowledge base, etc., as well as broader interactions with policies such as the CAP. Addressing the issues of water pricing, therefore, requires the strategic overview and approach that the Blueprint will provide. Similar points can be made for the context in which to address the other problems set out above.

Different types of interaction can be identified. The first type of interaction is related to the nature of the environmental problems. The problems that are faced are not self-contained. Water scarcity threatens local and regional economies and threatens the objectives of ecosystem protection and enhancement. Thus an option to address the former problem

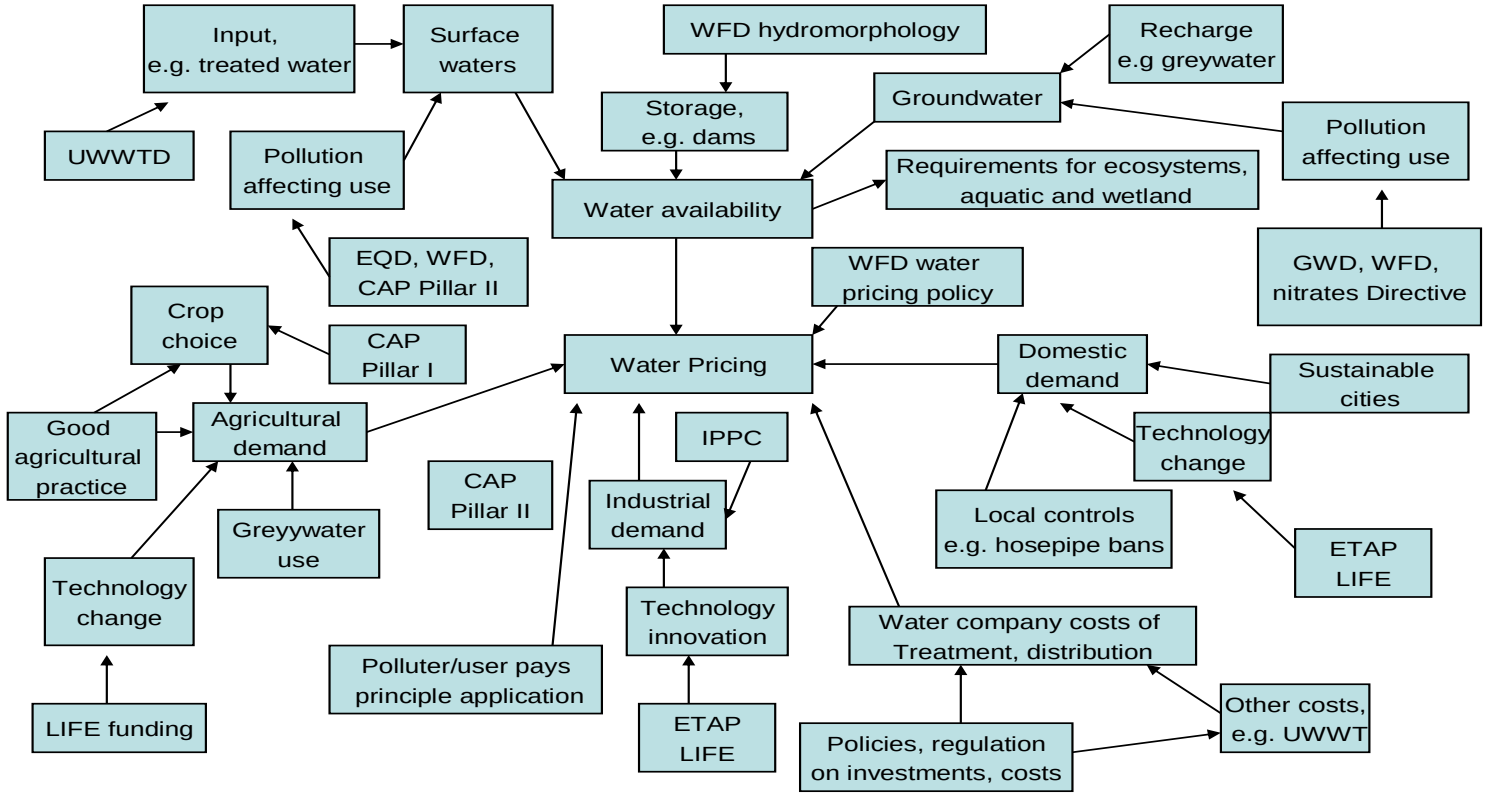
(e.g. a new water storage facility) will also affect (positively or negatively) the objectives of the latter problem.

A second area of interaction that is important from the perspective of this project is the interaction between issues. Actions to take forward the issues/gaps identified in each problem can support those of other problems. Adequate target setting drives other policy initiatives. Effective economic instruments are tools to achieve targets as are actions to unlock particular technical measures. However, without effective implementation mechanisms the objectives of these policies cannot be guaranteed, thus governance actions are required.

A third area of interaction is that between instruments (policies, support actions, etc.). Different types of instruments may be adopted to address any particular problem. However, these may interact. A new Directive may be adopted. Guidance could be developed further to support implementation. Research and information systems can be adopted to support implementation and funding can also be made available. In theory one can envisage several instruments being developed to tackle a particular problem. However, political and practical realities exist that limit the adoption of some types of instrument. Therefore, options for different types of instrument can be both complimentary and considered as alternatives.

A fourth type of interaction is integration across scales, where measures/actions at different levels need to "fit together". This presents challenges in that issues of subsidiarity can arise where larger scale EU instruments interact with smaller scale instruments, such as land use planning. Developing options at EU level has to recognise these limitations.

Figure 5. Conceptual policy map from the SCENES project illustrating the range of policies and other issues that interact with the issue of water pricing[24]



[24] Source: Farmer, A.M. (2011). Challenges of Developing a European Union Strategic Approach to Water Scarcity. International Journal of Water Resources and Arid Environments 1(3): 153-162.

2.8 Objectives for the Blueprint and interaction with problems

The development of the Blueprint identified three broad needs identified for the future protection of Europe's water resources:

- The need to implement existing EU water law and, in particular, good status objectives of the Water Framework Directive.
- The need to improve the efficiency of water use, particularly in areas where water resources are limited.
- The need to improve the resilience of society and the economy on which it depends to the risks from extreme events, in particular droughts and floods.

Each of the 12 problems that have been identified for further analysis and options assessment in the following section of this report relate to these three broad needs and interact strongly with each other. For example, improved governance and knowledge base are necessary preconditions for the success of many of the options developed to address these problems. Adequate water pricing contributes to delivering investment to address leakage.

It is useful to view the problems facing Europe's waters in three 'levels':

- Level 1 problems are the broad, high level problems - the principle challenges facing society with regard to water.
- Level 2 problems are the broad categories of the reasons why the level 1 problems are a challenge – what are the main reasons why water managers have difficulties meeting the challenges they face.
- Level 3 problems are the specific problems for which individual options for action can be proposed and subject to Impact Assessment in the Blueprint.

2.9 Level 1 problems

Europe's waters face a number of interacting critical problems today. These problems are further likely to be exacerbated with a changing climate. These problems can be categorised as:

Achieving the objectives already required in EU law

The WFD and other EU legislation (including biodiversity legislation) establish legal obligations for water bodies regarding their biological, chemical and hydromorphological status. This includes objectives for water quality and (perhaps not so specifically in all cases) water quantity. Some objectives need to have been met already, while others have progressive implementation until 2027.

In assessing progress in implementation in the Member States, there is significant concern over the likelihood that Member States will meet these obligations and/or that they may be seeking to delay implementation.

The vulnerability of society to extreme events is expected to increase

Droughts and flooding both have significant social, economic and environmental impacts in Europe. The economic costs of these events are increasing and climate change models predict that the likelihood of these events will increase. Member States have significant challenges both to manage these events and to increase the resilience of society to future events.

Improving water efficiency

Water is a precious resource which is limiting in many Member States or regions in Member States. While various measures and techniques have been adopted to improve the efficiency with which we use water, there is still much that can be achieved to increase efficiency further. Increased efficiency would increase the resilience of communities in the face of water shortages and enable a more balanced allocation of water between water users by water managers.

2.10 Level 2 problems

The level 1 problems are messages concerning the broad issues that face Europe's waters. However, in addressing these it is necessary to ask what are the barriers or gaps that prevent (or at least reduce) these problems being tackled. These are 'level 2' problems and can be categorised as follows, following the major themes of the first part of this report.

Setting targets (or objectives) for water

While EU water law sets a number of objectives for water bodies, there is still a major gap in the ability of (at least some) water managers to set clear targets within river basins. This includes determining what resources are required to maintain ecological targets (an 'environmental flow') as well as equitable allocations of water for different users at different times. Without these basic management decisions (based on sound information), the effectiveness of other water management actions will be reduced.

'Unlocking' measures

In many cases technical measures or management techniques are available that can address a wide range of water management challenges, whether farm management, industrial activities or the water industry. Measures may not be used due to lack of incentives, insufficient development of individual measures, lack of information (dissemination) of tools, etc.

Insufficient use of economic instruments

EU policy already promotes the use of economic instruments (such as water pricing) in water management and effective use of such instruments would enhance the efficiency of water use as well as provide resources for investment in necessary infrastructure. Reasons for the lack of (or insufficient) use of such instruments include insufficient knowledge, barriers to acceptance, inappropriate structures to the instruments and lack of pre-conditions for the use of these instruments (e.g. water meters).

Ineffective water governance

Water management is a complex activity which requires a wide range of skills and resources and effective working relationships between institutions (all of which reflect unique situations in the Member States). Ineffective governance can affect the setting of overall objectives for catchments as well as the application of individual measures and instruments.

Insufficient knowledge

Understanding the challenges facing individual water bodies and catchments and understanding the appropriate management responses to these challenges has to be based on sound information. This not only includes basic 'monitoring' information on state and pressures, but also the analytical tools to interpret these into determining which measures and instruments need to be applied where and when. In many cases there is insufficient knowledge or tools or gaps in the suit of knowledge or tools available to water managers, thus inhibiting effective decision making.

2.11 Level 3 problems

The level 3 problems are those specific problems for which options have been elaborated for consideration for inclusion in the Blueprint. It is important to stress that the level 3 problems are not necessarily individually underneath one of the level 2 problems. In most cases they address more than one level 2 problem, e.g. improved knowledge is necessary to address most of the options identified. The level 3 problems are listed below. In each case their link to level 1 and level 2 problems is indicated.

1. Current water pricing levels do not provide adequate incentives to increase water efficiency. In some cases, water users are either not charged at all or are not charged in relation to the quantity of water used/consumed.
    a. Level 1: achieving objectives, water efficiency
    b. Level 2: Use of economic instruments, effective governance, knowledge base
2. Insufficient use of metering for individual users is a key barrier for the effective implementation of pricing schemes that incentivise water efficiency. Illegal abstraction in some parts of the EU is a large phenomenon that puts at risk water availability.
    a. Level 1: achieving objectives, water efficiency

    b. Level 2: Use of economic instruments, effective governance
3. Global: mismanagement and wastage of water in water scarce countries could have very negative consequences on local development and even be the cause of migration flows from developing countries.
    a. Level 1: water efficiency
    b. Level 2: Use of economic instruments, effective governance
4. Land use impacts and in particular agriculture's impacts threaten water quality and quantity across much of Europe and deregulate water flow increasing water scarcity and flood risks.
    a. Level 1: Achieving objectives; vulnerability
    b. Level 2: Unlocking measures, use of economic instruments
5. The design of building and water using appliances does not sufficiently factor in water efficiency. This causes water waste which is problematic in areas which are water stressed or at risk of becoming water stressed.
    a. Level 1: water efficiency
    b. Level 2: Unlocking measures
6. Significant leakage in water infrastructure in some parts of the EU causes significant waste of water which is problematic in areas which are water stressed or at risk of becoming water stressed.
    a. Level 1: water efficiency
    b. Level 2: Unlocking measures
7. The lack of common EU standards for water re-use for agriculture and industrial uses limits a potentially important alternative water source (especially for water stressed areas), threatens farmers exporting crops within the single market and prevents industry from making long-term investment decisions.
    a. Level 1: achieving objectives, vulnerability, water efficiency
    b. Level 2: Unlocking measures
8. Governance of water and sectoral policies at MS level is, in some cases, fragmented and faces a lack of capacity and resources to fully address water management objectives. There is lack of coordination in river basin shared between different administrative entities within Member States, between Member States and with third countries.
    a. Level 1: achieving objectives, vulnerability, water efficiency
    b. Level 2: Effective governance, knowledge base
9. Water balances and adequate water allocation are poorly implemented at river basin level.
    a. Level 1: Achieving objectives; vulnerability
    b. Level 2: Target setting
10. Droughts have been more frequent and severe in large parts of Europe in the last few years, and the severity and frequency is expected to increase in the future as a result of climate change, changes in land use and water abstraction. This has and will

have important social, economic and environmental consequences for the affected Member States.

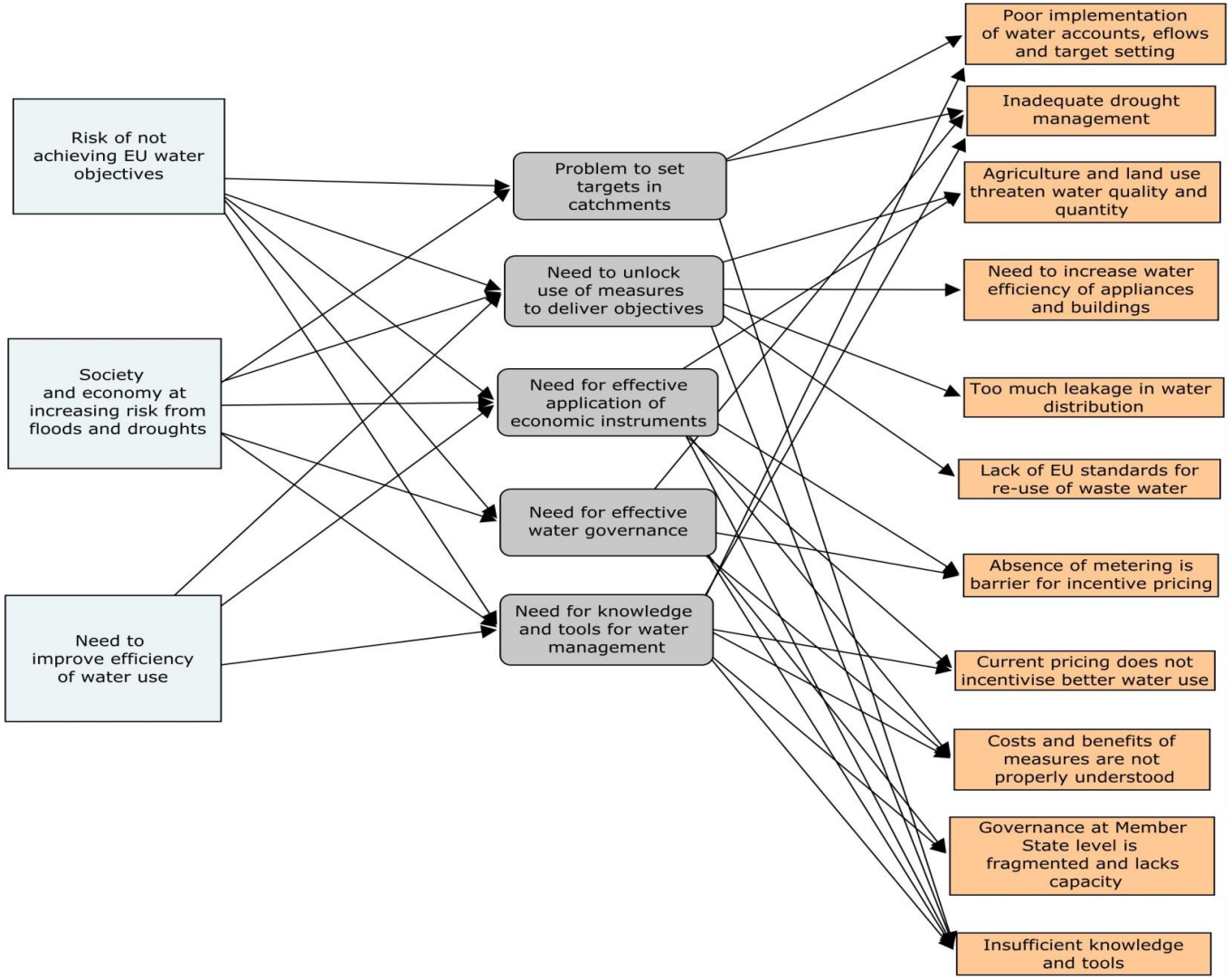
    a. Level 1: vulnerability
    b. Level 2: Target setting; effective governance

11. Costs and benefits of inaction and of water related measures are not properly understood or quantified. There is a lack of a methodology to calculate the adequate recovery of environmental and resource costs, which prevent a further implementation of economic instruments for water resources management.
    a. Level 1: achieving objectives, water efficiency
    b. Level 2: Use of economic instruments, effective governance, knowledge base
12. There is insufficient dissemination and sharing of compatible data and other information between MS, European bodies and third countries leading to an incomplete understanding of the problems facing Europe's waters or, potentially, to incoherent water management choices. Data provision is not timely and different systems prevent data access. New and emerging knowledge needs must be addressed trough research activities.
    a. Level 1: achieving objectives, vulnerability, water efficiency
    b. Level 2: Target setting, unlocking measures, use of economic instruments, effective governance and knowledge base

The options developed for the level 3 problems in the following section of this report also therefore each contribute variously to meeting the other problems. The following figure demonstrates how 11 of the problems (global issues are a separate category given their primary goal is to impact on water efficiency outside of the EU) link to each of the thematic areas of the study and the three overall objectives.

Each problem and each option (or group of alternative options) set out above requires specific and individual assessment within the Impact Assessment in the following section. However, the options do interact, the costs and benefits of the options overlap and the cumulative result needs to be viewed in an integrated manner (rather than a series of individual options) in how it addresses the overall objectives, problems and needs of Europe's waters. This issue is returned to in the final section of this report.

Figure 6. Problem tree examining how the problems arise from the key issues and objectives of the Blueprint.



2.12 Methodology for the impact assessment

Overview

The number of problems for which options are to be considered in impact assessment is large – far larger than is usually the case in an IA study for EU policy and law. For some problems and their options the options proposed focus only on improved management of water bodies. For these options a full economic, social and environmental impact assessment is not undertaken. Rather, analysis is performed of how well the different options are effective at meeting the objectives of the Blueprint, how efficient they are and how coherent they are with other EU law and policy. This level of analysis applies to the following problems:

- Global issues
- Target setting
- Analysis of costs and benefits
- Governance
- Drought management
- Knowledge base

For the remaining problems, a full assessment of the economic, social and environmental impacts is undertaken. The assessment of impacts follows in detail the issues for economic, social and environmental impact set out in the Commission's IA guidelines (SEC(2009)92). These guidelines detail a list of specific issues to consider within an IA and each of these is considered in this section. This applies to the following problems:

- Water pricing
- Water metering
- Land use
- Water efficiency of appliances and buildings
- Leakage in water distribution systems
- Standards for water re-use

Subsequent Impact Assessment of options

The Blueprint is a strategic document setting out future actions by the Commission or other EU level actors. However, with respect to these actions it is not to be accompanied by any legislative proposals. Rather, if new or amended legislation is considered to the appropriate action to be taken (based on the assessment of options within this IA), then formal proposals for such legislation would be developed at a later date. Examples of options of this type include possible amendments to the Water Framework Directive and Nitrates

Directive, amendments to the Ecodesign Directive and possible new law on drought management planning, water efficiency of buildings and standards for re-use of waste water in agriculture.

If any legislative proposal is taken forward, the Commission will have to perform a full IA on that proposal (and other relevant options). Therefore, it is important to note that this IA for the Blueprint presents an IA determining whether development of such legislation is a preferred option. It does not, however, consider the detail of that legislation (e.g. which standards to propose on water re-use). This would require analysis subsequent to publication of the Blueprint. Only then, with the details of legislation known, would full IA be possible.

In conclusion, **the IA of legislative options in this analysis must be viewed as a first stage IA and that full justification (or not) for formal proposal of new or amendment legislation would require further IAs after publication of the Blueprint**.

The timing of implementation

The options considered in this Impact Assessment analysis cover a range of different types of instruments and interact with other policies in diverse ways. It is important to note that this interaction with other policies is critical in examining when options might be expected to deliver results and, in consequence, when benefits and costs might arise. This is important in particular when comparing options.

The most obvious example of this type of interaction concerns alternative options to influence application of the Water Framework Directive, such as whether to take forward methodological support through guidance or through a technical annex amendment to the Directive. It could be considered that amendment of the Directive would only be able to take place following review of the Directive and adoption of an amendment would be unlikely before 2019 or 2020. Guidance could be produced more quickly.

However, it is important to consider how the option would be taken up by the Member States. In this example, methodological support would need to influence the analysis and measure development with River Basin Management Plans. Given the need for the 2nd RBMPs to be in place by the end of 2015 and for a minimum of six months consultation before this, much of the analysis and measures development must take place significantly before this deadline. In 2013 Member States are to complete the review of characteristics, human activities and economic analysis contributing to the 2nd RBMP. Therefore, if guidance is produced following the publication of the Blueprint, it would need to be produced very rapidly in order to influence the 2nd RBMPs. Much of the guidance produced under the CIS has not been produced quickly. Any guidance produced after this point might only influence the 3rd RBMP to be adopted in 2021 (unless Member States seek to intervene at an earlier stage).

If the option of amending the Directive were to be taken forward and this were to be done following its review, then it will also be a tight timetable to adopt an amendment in order to influence the 3rd RBMP development.

Similarly, guidance or other soft measures that seek to influence the implementation of the CAP also have to be timed to aid the development and implementation of Rural Development Plans, for example. At this stage, the development of actions subsequent to the publication of the Blueprint is likely to be timed well unless unexpected delays result.

Therefore, **in considering the absolute impact of options and in comparing options, the likely integration of the options with existing policy timetables is important**.

Taking account of smart regulation objectives

The basis for smart regulation within EU policy development and implementation is set out in the Commission Communication on Smart Regulation in the European Union COM(2010) 543 final).This sets out the overall objective of smart regulation. This is 'closing the cycle: from better to smart regulation'. This states that while better regulation has delivered important outcomes, the 'Commission believes that it is now time to step up a gear'. This means that:

- 'Smart regulation is about the whole policy cycle - from the design of a piece of legislation, to implementation, enforcement, evaluation and revision'. 'This requires a greater awareness by all actors of the fact that implementing existing legislation properly and amending it in the light of experience is as important as the new legislation we put on the table'.
- 'Smart regulation must remain a shared responsibility of the European institutions and of Member States'. 'Smart regulation is not an end in itself. It must be an integral part of our collective efforts in all policy areas.'
- 'The views of those most affected by regulation have a key role to play in smart regulation.'

This overarching area is examined under three themes. The first is 'managing the quality of regulation throughout the policy cycle'. This includes:

- Improving the stock of EU legislation – reducing administrative burdens, evaluating the benefits and costs of existing legislation, including through fitness checks, greater transparency, etc.
- Ensuring that new legislation is the best possible – using Impact Assessment to improve the evidence base, consultation, etc.
- 'Impact assessments should quantify benefits and costs when possible. The Commission will continue efforts to improve in this area with the caveat that there is

a limit to what can be quantified at the level of 27 Member States: data is frequently limited, and the impact of EU legislation often depends on how national administrations implement it. This also means that aggregating figures for benefits and costs of EU legislation over time, as some stakeholders have requested, would not be meaningful.'

- EU legislation must be implemented properly if it is to achieve its goals. The Commission should pay greater attention to implementation and enforcement in impact assessments when designing new legislation; support to Member States during implementation to anticipate problems and avoid infringement proceedings later on.
- Making legislation clearer and more accessible.

The second area is 'a shared responsibility'. This addresses the role of the EU institutions (which is not directly applicable to the IA of options for the Blueprint). It also states that 'action at EU level alone will not be enough to achieve smart regulation objectives' and that this requires action at Member State level - 'Member States are primarily responsible for ensuring that EU legislation is properly implemented'. 'There is 'no one size fits all' approach to smart regulation, and [..] Member States [should] define priorities on the basis of available human and institutional capacities'.

The third area is 'strengthening the voice of citizens and stakeholders'. This centres around improved public consultation on policy developments.

3 PRICING

3.1 Introduction and problem definition

The provision of adequate incentives for an efficient water use through the application of sufficient water price levels is included in the WFD. While Article 11 defines water prices as "a potentially cost-effective measure" for achieving the Directive's objectives, Article 9 lists in detail the fundamental principles upon which economic instruments for water management should build upon:

- Water prices must allow for the cost recovery of water services, including environmental and resource costs;
- Polluter-pays principle: the different water users (household, industry and agriculture) must adequately contribute to the recovery of costs of water services, proportionally to their role in causing these costs;
- Water pricing policies must "provide adequate incentives for users to use water resources efficiently, and thereby contribute to the environmental objectives" of the WFD.
- Further indications and full guidance on the implementation of the economic elements of the WFD were also provided to Member States in the context of the Common Implementation Strategy[25].

The importance of putting the right price tag on water was further stressed in the Commission's Communication on Water Scarcity and Drought[26], which recognized that, in spite of the provisions included in the WFD, water pricing policies existing at the time were generally ineffective in allocating water resource efficiently and reflecting the level of sensitivity of water resources at local level, ultimately being inadequate in addressing water scarcity and drought situation across the EU. In light of this situation, the Communication establishes that, by 2010, Member States must set water tariffs in line with WFD requirements, thus allowing full cost recovery, satisfying the polluter-pays principle and the providing adequate incentives for an efficient use of water resources.

Most Member States so far consider only drinking water supply and wastewater treatment as water services of which costs need to be recovered. The Commission does not share this interpretation of the WFD: water services are a wide notion that includes water abstraction

25 Common Implementation Strategy Working Group 2.6 WATECO (2003): Common Implementation Strategy for the Water Framework Directive (2000/60/EC), Guidance Document No 1: Economics and the Environment – The Implementation Challenge of the Water Framework Directive.

26 European Commission, (2007). "Communication from the Commission to the European Parliament and the Council – Addressing the challenge of water scarcity and drought in the European Union". Brussels, 18.7.2007. COM(2007) 414 final

for the cooling of industrial installations and for irrigation in agriculture; the use of surface waters for navigation purposes, flood protection or hydro-power production; and wells drilled for agricultural, industrial or private consumption. This is currently the subject of a case before the European Court of Justice and, therefore, a final legal interpretation has yet to be delivered[27].

There are taxes and charges[28] on water abstraction, their level being differentiated by water source (groundwater or surface water) and/or by the type of user. For a pricing scheme to deliver the optimal level of cost recovery, and to ensure a sustainable use of water resources through incentives and investments in water saving technologies, the design, structure and price of the tariff are crucial success factors[29]. When designing pricing schemes, the structure of the tariff is an important element: for the incentive function to work effectively, a functional relation between the amount of water used and the price paid must be clearly defined (i.e. the tariff contains some variable elements). Poorly designed pricing schemes can result in adverse incentives to use more water (e.g. through tariffs not connected to the amount of water used) or switch to non-authorised water abstraction[30]. In addition to the structure of the tariff, the price level charged is of crucial importance. In economic theory, if prices are set too low demand for water would be excessive, and if prices are set too high water from the costly source would not be used[31]. Water pricing should be regarded as an important enabling condition to produce a behavioural response, despite the fact that demand for water often is relatively inelastic to changes in price. Evidence suggests that all users alter their water consumption patterns in response to water charges, metering penetration and seasonal pricing (price elasticity)[32].

The assessment of RBMPs shows that current pricing schemes across much of the EU fail to combine the objectives of efficiency (marginal social cost pricing), fairness (polluter/user pays principle, removal of harmful subsidies) and do not allow a sustainable degree of cost recovery for the financing of the measures. The assessment does show that 49% of RBMPs include plans to modify water prices to deliver more efficient water management, but it is not clear if this objective would be achieved by the actual price changes, nor if investment

27 See http://europa.eu/rapid/pressReleasesAction.do?reference=IP/12/536&format=HTML&aged=0&language=EN&guiLanguage=en

28 Generally, the following distinction can be made between taxes and charges: where the revenues of taxes go to the general budget, the revenues raised by charges are earmarked for a particular use, used for specific service provision, or used for other activities when the revenue is not intended to reach the general budget. However, even if primarily designed for providing revenue, their unitary rates are most of the time too low. Thus, they rarely deliver financial resources that are sufficient to support water management.

29 OECD (ed.) (2009): Managing Water for All - an OECD perspective on pricing and financing

30 Common Implementation Strategy Working Group 2.6 WATECO (2003): Common Implementation Strategy for the Water Framework Directive (2000/60/EC), Guidance Document No 1: Economics and the Environment – The Implementation Challenge of the Water Framework Directive

31 World Bank (ed.) (1997): Water Allocation Mechanisms - Principles and Examples. Washington, DC

32 CEPS. (2012). Briefing note 'Which Economic Model for a Water-Efficient Europe', Centre for European Policy Studies

needs hamper progress. There are a number of different barriers to more effective pricing, ranging from public acceptance to knowledge gaps.

With respect to water pricing in adherence to Article 9 WFD, its implementation is still uneven across the EU, as revealed by the evaluation of measures promoted by the 2007 Communication of the Commission on WS&D conducted in the context of the Water Gap project[33]. Neither the objective of full implementation of the WFD in terms of recovery of costs associated with water services or the implementation of the "users pays" principle within Member States have been reached. Generally, there appears to be a lack of incentive elements in the pricing of self-abstractions. Current water pricing levels and structure do not provide adequate incentives to increase water efficiency. In some cases, water users are either not charged at all or are not charged in relation to the quantity of water used/consumed.

Besides pricing of water abstraction (water quantity), economic instruments are available for water quality management, reducing polluting discharges. A distinction can be made between point sources and diffuse sources. For handling point sources, tariffs for sewage and wastewater services as well as effluent charges are commonly applied. Wastewater tariffs are often based on the volume of drinking water used. The difficulty is to set economic instruments in the case of non-point pollution which is difficult to identify and monitor and with actual contamination depending on a variety of factors. The impact of diffuse pollution on raw drinking water quality represents such a case (in particular agricultural pollution); ensuring the contribution may be hampered by the difficulties in linking additional costs for water services to the actual polluters and by the affordability, social equity and political acceptability considerations[34].

The Commission[35] has highlighted the management of historical water rights and their link to the concept of property as a particular problem and that these "may be not compatible with measures needed to achieve WFD environmental and economic objectives".

Article 9 of the WFD generally points to the use of economic instruments in the field of water policy. A trading system for water pollution rights also fits within this definition, as a price would be attached to the right to pollute water. A system of tradable pollution rights can be considered as an alternative to the introduction of levies on non-point sources of pollution. Water polluters will thus face the costs of their pollution, which assures that the polluter pays principle is respected. A trading system will create a market for water rights,

33 ACTeon (2012). Evaluation of the measures promoted by the 2007 Communication on Water Scarcity and Droughts (COM(2007)414) – Annex 10 to the Gap Analysis Inception Report. Study for the European Commission, DG Environment.

34 ENTEC. (2010). Managing Scarce Water Resources - Implementing the Pricing Policies of the Water Framework Directive, study commissioned by DG ENV

35 Draft Communication from the Commission: Water Framework Directive implementation report.

which will encourage that water rights are entitles to the party adding the highest economic value to these rights. The use of this instrument has potential to stimulate sustainable water use.

Water markets and water trading might in specific cases be a good way to allocate the scarce water resources to the most productive uses, however they can generate considerable transaction costs and may fail to address important factors such as equity problems, socially problematic trade-offs (e.g. with food security) and environmental needs8. Economic instruments often require a comprehensive legal framework, especially where water markets and water trading are concerned. Although the idea of introducing tradable rights is not new per se, its formal implementation for water management purposes would be novel in the EU context. Although fully in line with the spirit of Article 9, the EU water regulatory framework does not require to develop water trading, as is the case in e.g. Australia[36]. Given the specific preconditions needed for a significant contribution of gain from trading such rights, providing strong guidance can be identified as essential to promote the development of this economic policy instrument.

3.2 Baseline and the justification for EU level action

Comparisons of water prices between water sectors in the EU are difficult, due to the extensive range of water tariffs between Member States but also between and within RBDs, the variability in price depending on the source of supply, the variability in tariff structures, etc.

An indication of agricultural, industrial and household water prices for some Member States is given below[37]. During the 1990s, there has been a general trend towards higher water prices in real terms throughout Europe, particularly in the domestic sector. Most Member States use domestic water tariffs with fixed and volumetric components. The EEA indicator fact sheet (2010) on water prices indicated that many cities in Mediterranean countries have below average water prices, as do those in countries with abundant water supplies; in contrast water prices are highest in northern European cities[38].

The table below gives an overview of the current range of drinking water cost in a range of Member States and regions, based on a family of 4 residents with an average drinking water consumption of 132 m³.

36 IEFE, IEEP, FFU and Adelphi consult. (2009). The links between the environment and competitiveness: Part 1 Water Policies and Competitiveness Report to the European Commission Project ENV.G.1/ETU/2007/0041

37 ARCADIS (ongoing). Comparison of prices of water/waste water/rain water for users in various European countries, study commissioned by the Flemish Water agency.

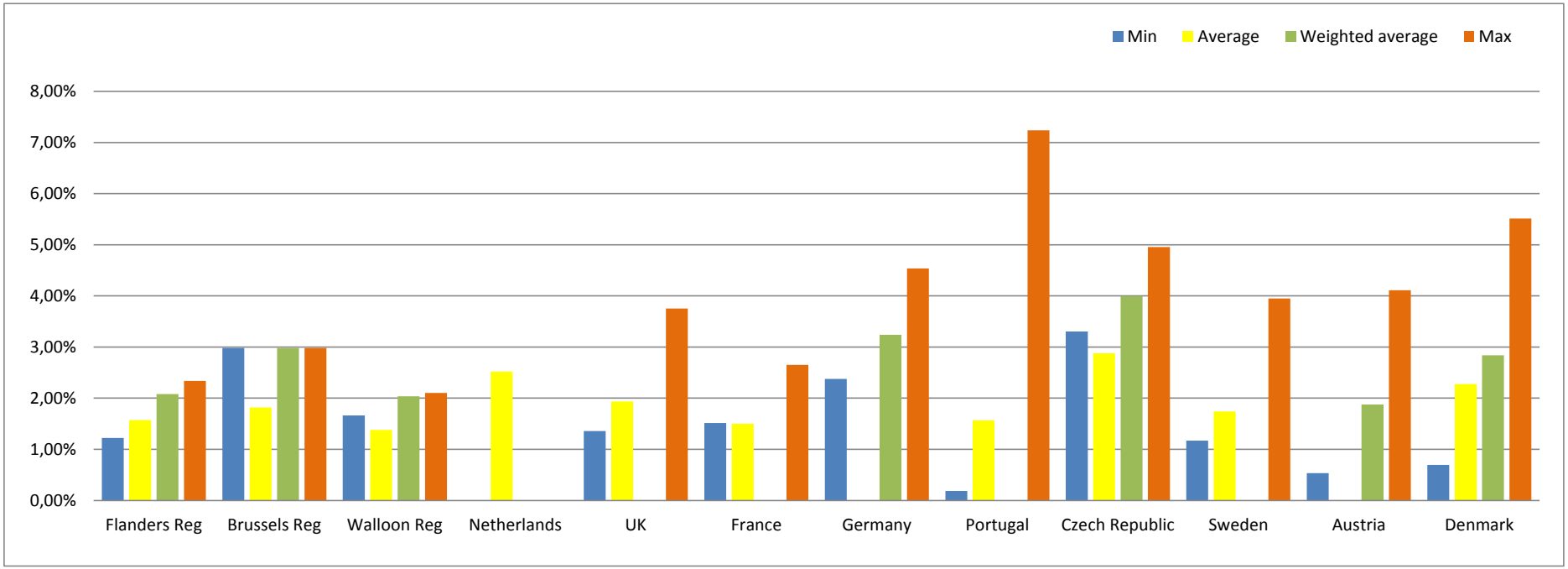
38 EEA (2003). "Indicator Fact Sheet – (WQ05) Water Prices". http://www.eea.europa.eu/data-and-maps/indicators/water-prices

Current drinking water cost (€/year) in a range of Member States and regions, based on a family of 4 residents with an average consumption of 132 m³. Source: Reproduced from ARCADIS, ongoing[10]

	Minimum	Maximum
Flanders Region	112	171
Brussels Region	219	219
Walloon region	172	239
Netherlands	171	306
UK	90	209
France	116	198
Germany	147	282
Portugal	12	241
Czech Republic	98	129
Austria	40	231
Denmark	70	469

The figure below relates these tariffs to the median disposable household income for the same type of families.

Current share of the total drinking water cost in the median disposable household income in a range of Member States and regions, based on a family of 4 residents with an average drinking water consumption of 132 m³. Source: Reproduced from ARCADIS, ongoing[10]



The table below gives an overview of a possible current range of costs for water provision to industry in a number of Member States and regions. This example is based on 2 types of companies (however it should be clear that larger users also exist):

- Type A company with a water meter diameter <20mm, a connection with a maximum volume <3 m³/hour and a yearly water consumption of 1000 m³ and
- Type B company with a water meter diameter 20-40mm, a connection with a volume between 3 and 30 m³/hour and a yearly water consumption of 5000 m³.

Current cost of water provision to industry (€/year) in a range of Member States and regions, based on two type of companies. Source: Reproduced from ARCADIS, ongoing[10]

	Type A company		Type B company	
	Minimum	**Maximum**	**Minimum**	**Maximum**
Flanders region	1.149	3.114	5.566	15.073
Brussels region	2.290	2.290	11.448	11.448
Walloon region	1.711	2.574	8.336	12.634
Netherlands	229	1.790	3.146	13.441
UK	146	4.232	7.210	21.137
France	1.362	2.022	5.743	8.389
Germany	1.448	2.121	7.082	10.093
Portugal	25	4.790	100	23.864
Czech Republic	1.271	1.681	6.356	8.403
Austria	522	3.002	2.610	15.009
Denmark	910	3.974	4.550	19.161

The Water Pricing in Agriculture study[39] showed that generally, the incentive in the agricultural water pricing mechanism to manage water sustainably is weak. Tariff levels for agricultural water use are low to very low and often much lower compared to other sectors, a tendency which was also indicated by EEA[11]. Moreover, an important share of water abstractions for agriculture in the EU, even in water stressed areas, is not yet priced. It was observed that, overall, tariff systems for individual abstraction of farmers (or irrigators) are not in place in more than one third of the Member States, while in some Member States specific exemptions are in place for agricultural water use or irrigation. The latter situation is

39 ARCADIS, Fresh Thoughts Consulting, InterSus, Typsa & Ecologic Institute. (2012). The role of water pricing and water allocation in agriculture in delivering sustainable water use in Europe, study commissioned by DG ENV

also observed in water scarce areas such as Southern Europe. This means that in the EU, an important share of water abstraction for irrigation purposes is not priced (and in this way environmental resource costs from these abstractions are not recovered). In those countries where abstraction charges do exist, they were reported to provide very little incentive elements towards a more efficient water use, as the price levels are generally low (often well below 0.01 €/m3)[12].

Generally, it is suggested that water pricing needs a volumetric element in order to provide an incentive to reduce consumption[40],[12].

However, the Water Pricing in Agriculture study shows that for the agricultural sector often payments are not linked with the actual volume of abstracted water, thus providing no incentive for an efficient resource use. Area based pricing systems do not discourage at all excess irrigation water use, as they are independent from the volume actually consumed. Their application in some water stressed areas such as the Mediterranean countries, implies that an important share of European irrigators do not have any incentive to use water more efficiently[12].

The assessment of the potential benefits of introducing tradable rights requires a geographical approach, following a recent study[41]. The magnitude of benefits is expected to be related to the probable geographical distribution of countries likely to experience water scarcity. Water stressed areas expected to benefit the most from gains from trading water rights, as is documented for cases in Australia, Chile and the US. These experiences show that the gains from trade increase as water availability declines[42]. According to the same study, about 47%[43] of the EU area could be classified as water scarce and therefore potentially develop water trading schemes. However, this should be seen as a maximum potential as this has to be limited to the basins with the possibility of physical transfers and to those with trading-compatible water rights (or reformed to be so). In the longer term, basins to become water stressed could require new management strategies. Among them,

40 ENTEC. (2010). Managing Scarce Water Resources - Implementing the Pricing Policies of the Water Framework Directive, study commissioned by DG ENV

41 ACTeon, FreshThoughts, Typsa, IACO, Artesia Consulting and FEEM. 2012. Water Scarcity & Droughts Policy in the EU - Gap Analysis. Report to the European Commission. Tender ENV.D.1/SER/2010/0049.

42 Grafton, R. Q., Libecap, G., McGlennon, S., Landry, C. & O'Brien, B. (2011). "An Integrated Assessment of Water Markets: A Cross-Country Comparison". Review of Environmental Economics and Policy, 5:2, 219-39

43 The overall area affected by individual policy area and policy option have been estimated, using a GIS based software (ACTeon et al., 2012).

both CIS documents and experience acquired in the EU with CIS support could offer the alternative of trading water rights.

Although the idea of introducing tradable rights is not new per se, its formal implementation for water management purposes would be largely novel in the EU context. Spain is the only EU Member States with any water rights trading, which has taken place since 1999. Trading exchanges are limited, but it has been concluded that during the 2005-2008 drought period, such trading supported to alleviate water scarcity[44].

There is a strong justification for supportive action on pricing at EU level. This is driven by the need to ensure implementation of Art 9 of the WFD, which is not yet the case. This, however, would be addressed within the normal enforcement action of the Commission. However, there is a need to ensure pricing more adequately penetrates specific sectors, such as agriculture and that issues such as historical water rights do not act as barriers to this.

3.3 Objectives

The following specific policy objectives can be identified with regard to pricing:

- Increase the use of economic instruments for a better allocation of resources and internalisation of external costs.
- Water pricing levels and structures in Member States should provide adequate incentives to increase water efficiency.
- The economic relationships between water users and those impacting on water needs to be clarified, such as through consideration of water rights trading.
- With regard to the operational objectives of the Blueprint, these objectives take forward two of them – the objective for sectoral integration of water objectives and the increasing use of economic instruments.

In taking forward these objectives regarding pricing in the Blueprint it is important that there are SMART indicators for monitoring their progress and, therefore, whether the objectives have, or have not, been achieved. This will enable the success of policies to be determined and potential barriers (if they occur) to be addressed as policies are reviewed.

For the objectives regarding pricing, the following SMART indicators are proposed:

- The extent to which Art 9 is fully implemented in each Member State.

44 Draft Communication from the Commission: Report on the Review of the European Water Scarcity and Droughts Policy.

- The changing relationship between water price and water consumption for each sector in each river basin in order to determine if pricing stimulates improved water efficiency.
- The extent to which, by river basin, historical water rights or other similar barriers to effective abstraction control remain in place.

3.4 The options and their elaboration[45]

Several policy options to address the problem of pricing were developed to be considered within the Blueprint and subject to IA. Amending the WFD has a number of strengths. It would overcome some of the debate on interpretation that is currently in place on pricing[46].

Options regarding the implementing rules for CAP and Cohesion Policy funding have a strong opportunity to be taken forward. Using CAP conditionality's or rural development payments have a potential to be a strong option(s) given the intensification for changed behaviour that these can entail. However, this option need to be modified to ensure it reflects the implementing rules (this also holds for the implementing rules for the new structural and cohesion fund regulations). This means that at present these options cannot be taken forward, however they are integrated here for completeness and for the sake of doing a comparative analysis.

Table 3 describes the options as originally developed in the project and submitted for the public consultation together with the final elaboration of options included within the IA, following further discussion with the Commission. The option regarding recommendations in the European Semester was removed as this is not appropriate for IA. It was felt that several options were not able to be taken forward in a practical way or that they would be part of decision making in any case. As a result, only options on cross-compliance and guidance on water rights trading were retained. As mentioned in the previous paragraph, the cross-compliance option is a theoretical option, but it cannot be taken forward in practice.

45 Note: the options developed below should be seen as complementary to and not a replacement of the enforcement of the current provision on incentive pricing under article 9 of the WFD

46 This is currently the subject of a case before the European Court of Justice and, therefore, a final legal interpretation has yet to be delivered. See http://europa.eu/rapid/pressReleasesAction.do?reference=IP/12/536&format=HTML&aged=0&language=EN&guiLanguage=en

Table 3. The options originally considered and final options to address the problem of pricing

Options originally considered	Final options for the IA
• Implement the proposed rules for Cohesion & Structural and Rural Development funds to make the establishment of incentive pricing compulsory for (relevant) projects in areas with water deficit • Add national water pricing obligations for farmers, based on Art.9 of the WFD, to cross-compliance rules under the CAP for the WFD • The Commission to promote the use of trading in water rights at river basin level through the development of guidance and tools under the WFD Common Implementation Strategy • The Commission to develop criteria for the sustainable production of bio-energy crops with specific reference to water protection • Specific recommendations are considered for Member States on water pricing policies in the context of the European Annual Growth Survey for the European Semester • Amend the WFD to require that the price of water reflects volumetric use.	• Option 1c: Add national water pricing obligations for farmers, based on Article 9 of the WFD, to cross-compliance rules under the CAP for the WFD (option cannot be taken forward at present but integrated for sake of completeness and comparison). • Option 1a: The Commission to promote the use of trading in water rights at river basin level through the development of guidance and tools under the WFD Common Implementation Strategy (CIS).

Although it is a commonly held view that increased irrigation water prices can lead to a reduction of the volume used in agriculture, whereas current underpricing is among the major causes of waste[47], the overall picture drawn so far with respect to irrigation water prices in the EU suggest that water prices currently in use in many Member States are not fully effective in discouraging a wasteful use of water resources; this is one of the main consequences of the partial or incomplete implementation of Article 9 of the WFD in some Member States reported by the RBMP assessment and which may be subject to further infringement cases. At present, therefore, significant efficiency gains could be achieved through pricing policies aimed at charging actual water consumption on the one hand (volumetric or mixed tariffs as opposed to fixed or area-based tariffs) and at setting the right price of water on the other.

47 See, for example, Wolfehnsohn, 2000; WWF, 2002; in Molle, F., and Berkoff, J., (eds.), 2007 - "Irrigation Water Pricing", Chapter 2 - CAB International

Option 1c is to add national water pricing obligations for farmers, based on Article 9 of the WFD, to cross-compliance rules under the CAP for the WFD. Cross Compliance was introduced in the Common Agricultural Policy in 2003, with the aim of contributing to sustainable agricultural production, environmental protection and animal welfare, preservation of land in good conditions and consumers' access to safe food[48].

It is important to note that there are differences of opinion on how far it is possible to include provisions for national water pricing within cross compliance under the CAP. This debate is not concluded and, therefore, this option is subject to the condition that it is possible to set it out within a future revised CAP regulation. This is not an immediate prospect given the current state of revision of the CAP. Thus this option cannot be taken forward at present but is integrated here for completeness and for the sake of doing a comparative analysis (not least, as will be seen later, extension of cross-compliance is strongly supported in the stakeholder consultation).

Through Cross Compliance, farmers receiving Single Payments through under the CAP First Pillar are requested to respect some basic requirements for agricultural activity; in case of non-compliance with these requirements such payments can be reduced or, in some exceptional cases, cancelled. The basic requirements can stem from existing pieces of EU legislation –the so-called Statutory Management Requirements, SMRs- but include also specific standards for Good Agricultural and Environmental Conditions (GAEC) specifically set up for Cross Compliance under the CAP[49] and normally adjusted at the Member State level.

The inclusion of the WFD provisions in the basic requirements to be respected through Cross Compliance would clearly fall under SMRs and it is currently under discussion at the European Commission, in view of the post-2013 CAP and a related possible evolution of the concept of Cross Compliance. At the moment, the SMRs include four Directives related to water protection: Nitrates Directive, Birds Directive, Habitat Directive and Sewage Sludge Directive. In this light it is clear that the inclusion of the WFD in the SMRs would expand the scope of Cross Compliance.

When considering the inclusion of the WFD in the scope of Cross Compliance, however, it must be pointed out that this can only happen once the WFD has been implemented and the operational obligations for farmers have been identified at Member State level, which is not exactly the case: in the first place, not all Member States have achieved full WFD implementation yet; when it comes to measures at the farm level, these have to be defined by Member States by December 2012. Looking more in detail at Article 9 of the WFD, it is

48 Jordbruks verket (2011). Environmental Effects of Cross Compliance. Report 2011:5eng

49 European Commission (2011). Commission Staff Working Paper – Impact Assessment: Common Agricultural Policy towards 2020 – Annex 2E. Brussels, 20.10.2011, SEC(2011) 1153 final/2

well acknowledged that its implementation has reached different stages across EU Member States: only in a few countries, the level of tariffs is reported to be sufficient to ensure 100% cost recovery, while in all other countries such schemes still need to be adjusted in order to comply with the provisions established by the Article. Besides this, different Member States receive different amounts of CAP subsidies, with some countries relying more than others on these subsidies; as a result, the policy option under consideration might not impact all countries with the same magnitude or intensity.

Cross Compliance in itself can only have additional effects or impacts and involve additional costs for farmers in a very few cases. SMRs, in fact, are already part of pre-existing legislation, so that compliance to these standards is already mandatory for Member States and thus farmers as well. The case of GAEC standards, in contrast, is a bit different, as they are defined by Member States specifically for Cross Compliance under the CAP; in this respect, however, in many cases GAEC standards were already part of pre-existing national legislations, and therefore farmers already had to comply with them independently from Cross Compliance[50].

In this perspective, the inclusion of the WFD in the SMRs under Cross Compliance would not add any "new" obligation for farmers, and the assessments for this option were conducted keeping this basic consideration in mind. In other words, the impacts considered here are not those connected with the full implementation of Article 9 of the WFD, as this would have been out of scope here, but only those additional impacts and/or burdens attributable to the inclusion of Article 9 in Cross Compliance standards; the same applies to the evaluation of the option in terms of efficiency, coherence, acceptability and relevance.

Option 1a is for the Commission to promote the use of trading in water rights at river basin level through the development of guidance and tools under the WFD Common Implementation Strategy (CIS).

Although the idea of introducing tradable rights is not new per se, its formal implementation for water management purposes would be largely novel in the EU context. Given the specific preconditions needed for a significant contribution of gain from trading such rights, providing strong guidance has been identified as the strategy to promote the development of this economic policy instrument (EPI). This approach should provide both informed support and flexibility to Member States as to how and where to identify and develop implementation opportunities. International experiences exist and the lesson learned from such experiences would provide most of the material feeding the development of the support developed through a CIS process.

50 IEEP (2007). Evaluation of the application of cross compliance as foreseen under Regulation (EC) No 1782/2003.

It is important to highlight that the establishment of a cap on total rights (i.e. E-Flows) is a pre-condition. Tradable water entitlements are market based instruments – legally sanctioned rights or entitlements to use water that can be exchanged thus creating incentives to improve allocation (efficiency) of water quantity amongst different sectors, including the natural environment[51].

3.5 Effectiveness, efficiency and coherence of the options

As mentioned earlier, both options under consideration aim to support and strengthen the implementation of Article 9 of the WFD through two different types of mechanisms, namely a conditionality mechanism under Cross Compliance of CAP and the provision of guidance for setting up water trading schemes. As mentioned, option 1c cannot be taken forward at present, however is integrated here for completeness and for the sake of doing a comparative analysis.

In terms of effectiveness, the two options yield overall positive scores. More in detail, effectiveness of the option was assessed against four operational objectives, and in this respect the followings were observed:

Option 1c would be highly effective with respect to sectoral integration, as it aims specifically to integrate Article 9 principles in the CAP policy through the mechanism of Cross Compliance. Option 1a, in turn, is deemed to be effective with respect to this objective as it allows a more transparent integration of water users into a single water market, although the level of effectiveness is expected to be lower as the option is voluntary and limited to water scarce basins.

Option 1a is expected to be mostly effective in increasing the use of economic instruments, although being non mandatory, it might promote the development of an original economic policy instrument. Option 1c, in contrast, it might be of course effective because it might promote and accelerate full implementation of Article 9 of the WFD in those countries where it is not fully implemented yet; its effectiveness, however, was judged to be moderate, as per se this policy option does not pose additional obligations on farmers and does not introduce new economic instruments.

Both options are expected to be moderately effective at improving governance. Option 1c might in fact promote collaboration between authorities in charge of administering CAP payments and water agencies. Option 1a, in turn, is only voluntary, but if trading is indeed developed it is to be coupled with a mandatory cap on total rights and will thus push for a more integrated water management.

51 ACTeon, FreshThoughts, Typsa, IACO, Artesia Consulting and FEEM. 2012. Water Scarcity & Droughts Policy in the EU - Gap Analysis. Report to the European Commission. Tender ENV.D.1/SER/2010/0049.

With respect to knowledge base, option 1c is expected to be highly effective, as the inclusion of Article 9 in the scope of Cross Compliance is very likely to raise farmers' awareness on EU legislation and on the real value of water. Option 1a, is moderately judged effective, as a guidance process is only expected to have limited impact but if successful with pilot cases could provide an EU knowledge base in addition to the international experiences.

When it comes to efficiency, option 1c is expected to be moderately efficient: if, on the one hand, it does not introduce new obligations for farmers or public authorities, thus having limited additional effects as compared to Article 9 in itself, on the other hand it might accelerate full implementation of Article 9 (in those countries where it not fully implemented yet) at very limited extra administrative costs. In contrast, option 1a is judged to be only weakly efficient: the option in fact contributes to the WFD objectives but its efficiency will depend on each case of introduction, not only at Member States but also basin level.

In terms of coherence, both options scored well, although option 1c seems to meet EU policy objectives to a higher level. This option, in fact, is fully coherent with EU policy objectives, and in addition CAP payments are expected to widely compensate farmers for the hardship posed on them by increased water prices. Option 1a, in turn, is coherent with EU policy objectives, given that it is implemented accounting for specific social impacts and that it is based on ecologically defined grounds.

3.6 Acceptability

The public consultation sought views on a range of options related to water pricing. The results are presented in Table 4.

Table 4. The results of the public consultation concerning options to address the problem of pricing

Option	Yes (%)	No (%)	Do not know (%)
Implement the proposed rules for Cohesion & Structural and Rural Development funds to make the establishment of incentive pricing compulsory for (relevant) projects in areas with water deficit	34	23	43
Add national water pricing obligations for farmers, based on Art.9 of the WFD, to cross-compliance rules under the CAP for the WFD	28	28	44
The Commission to promote the use of trading in water rights at river basin level through the development of guidance and tools under the WFD Common Implementation Strategy	23	54	23
Specific recommendations are considered for Member States on water pricing policies in the context of the European Annual Growth Survey for the European Semester	24	31	45
Amend the WFD to require that the price of water reflects volumetric use	34	50	16

Opinion is rather equally divided around the adoption of national water pricing obligations for farmers, based on Art. 9 of the WFD, to cross-compliance rules under the CAP: 28% of respondents are in favour, and 28% against; and 34% of the respondents support implementation of the proposed rules for Cohesion and Structural and Rural Development funds to make the establishment of incentive pricing compulsory for projects in areas with water deficit. For both of these conditionality measures, the largest share of respondents chose 'do not know' (over 40% in both cases).

Furthermore, over half of the respondents (54%) oppose the promotion of the use of water trading rights through guidance developed under the CIS.

Specific recommendations on water pricing policies in the context of the European Semester finds limited support (24% chose "yes").

Exactly half of the respondents oppose a regulatory measure, an amendment to the WFD that would require that the price of water reflects volumetric use.

In written comments, many stakeholders (including NGOs and industry) emphasise that water pricing and the trading of water rights should remain a national competence. Some industry replies question the statement that water pricing is currently not adequate. Some NGO comments cite the human right to water and argue for collective financing of water supply through taxation rather than via pricing. Maison Europeenne des Pouvoirs Locaux Francais states that costs must be equitably distributed among households, industry and farmers, i.e. households should not bear the burden of other consumers. The Leibniz Association considers that there is an urgent need for sectoral pricing in water consumption to provide a strong incentive for increasing water efficiency.

Others, however, underline that water pricing issues are vital for water management, and support EU level action. Some of these replies underline the importance of the Commission's upcoming analysis of economic issues in river basin planning to support better Member State action. One response argues that Member State interpretations of water services are overly restrictive, and that agriculture is too often exempted from full pricing. For example, AMCHAM EU supports full implementation of pricing under the WFD and that the price that should reflect the full cost of the water cycle and its true economic value. Moreover, an initiative that would aim at the internalisation of external costs of the water cycle should benefit from previous similar experiences in other sectors. Wetlands International supports the development of guidance to bring costs and benefits of river restoration into water resource planning. It considers that additional methodology and research into costs and benefits is needed.

Some responses favouring action on water trading are cautious: one emphasises that any EU guidance on water trading should take into account the wide differences in river basin conditions, and another states that trading should only be used in specific circumstances. Association Luxembourgeoise des Services de l'Eau and Veolia (CZ) consider that the use of trading in water rights is to be decided on the Member State level. Italia Nostra is opposed to a system of water rights trading. It doubts the benefits to water and considers that industry could buy up such rights to the detriment of farmers who have less economic weight. It is also opposed by WWF. Other responses, however, point favourably to current experience with water trading, notably in the UK.

The Third Water Conference concluded[52] that economic instruments will only work if necessary background data (e.g. information on environmental flows) and preconditions (e.g. abstraction licenses) to inform their design and implementation are available. This emphasises the importance of the interaction between policy options (see conclusion of this

52 http://waterblueprint2012.eu/sites/default/files/Key%20Messages_English_1.pdf

report) such as the need for adequate target setting for water and an adequate knowledge base within which to operate instruments such as economic measures. Furthermore, the conference stated that enforcement and monitoring of water legislation and property rights is a necessary requirement and that illegal water abstractions need to be controlled. This further highlights the links with good governance. The conference concluded that water pricing should be accompanied by education and awareness-raising related to water demand management and that stakeholder involvement is critical to set the prices right. All relevant actors (agriculture, industry, households) need to collaborate in achieving water policy objectives. Regarding the application of social water tariffs, it was argued that everybody should pay the same price for their water use. This would ensure consistency. Governments can use other policy tools to support low income groups.

Published positions of organizations also provide views relevant to these options. The European Federation of National Associations of Water and Waste Water Services (EUREAU)[53] considers that pricing can result in water savings. However, pricing policies have to reflect the interaction with the fixed costs of water provision and assessment of the demand price elasticity to determine whether pricing changes would deliver specific water outcomes.

The European Union of Water Management Associations (EUWMA)[54] also notes the problem of low price elasticity for water within a pricing policy. It also argues that prices should not be increased for agricultural irrigation as this may impact on agricultural production.

The European Environment Bureau55considers that there should be much stricter application of Art. 4.7 of the WFD, with the application of a wide definition of water services and the full application of effective water pricing. In particular, recommendations to Member States within the European Semester are viewed as an important mechanism.

With regard to conditionality under the CAP, it is important to note that this report is being finalised in the middle of the adoption procedure of the proposed new CAP Regulations. Both Council and Parliament have presented positions on conditionality within Pillar I and these reflect the positions of some stakeholders, Member States, etc. This is not the place to summarise the ongoing (and moving debate), except to note that the issue is controversial. Positions with regard to water policy include The European Federation of National Associations of Water and Waste Water Services (EUREAU)56 which argues for a strong

53 EUREAU (2012). Position Paper on Water Efficiency in Buildings.

54 EUWMA (2011). Position on the Fitness Check and the Blueprint to Safeguard Europe's Water Resources.

55 EEB (2012). EEB's main priorities of the Blueprint to Safeguard Europe's Water.

56 EUREAU (2012). EUREAU Position on the Water Blueprint. Also EUREAU (2010). Position Paper on the post-2013 Common Agricultural Policy.

Pillar I, for its greening and application of cross-compliance, but that measures should be decided at national level to avoid a one size fits all approach at EU level. A group of environmental NGOs makes a strong statement[57] that elements of the WFD should be added to cross compliance so as to lift the environmental baseline of farmers.

3.7 Economic, social and environmental impacts

Economic impacts

Pricing

When assessing the economic impacts of the options, one must consider only the additional impact attributable to the inclusion of Article 9 in Cross Compliance, and not the impact of the implementation of Article 9 as a whole: in fact, although water pricing obligations are likely to result quite burdensome for farmers, at least in some Member States, these additional cost cannot be attributable to the inclusion of Article 9 in the SMRs list.

The most significant type of economic impact to be looked at concerns the additional costs of the inclusion of Article 9 in the scope of Cross Compliance. This is specifically targeted at the agricultural sector. The previous section on metering provided an overall assessment of the economic and administrative costs of placing requirements within cross compliance under the CAP and they will not be repeated here.

It must be stressed, however, that the predicted costs are only administrative and, given their ease of compliance checking, are predicted to be small. The option does not affect the price farmers are required to pay for water – only that farmers pay the price that they are already required to pay.

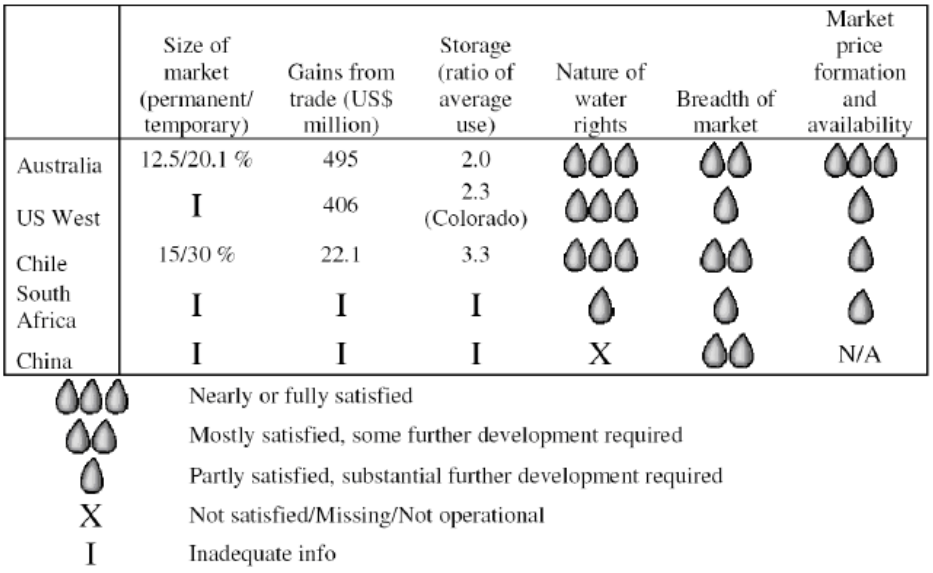
Water rights trading

The establishment of tradable water use rights might lead to the reallocation of water to high value uses, delivering positive economic outcomes which importance will depend whether it is within or between sectors and the intensity of trading that could not take place otherwise. Some evidence exists about the importance of economic gains from existing experiences in trading water rights. However, it generally comes from experiences outside the EU. Documented evidence so far (mainly in Australia, Chile and the US) shows that the gains from trade increase as water availability declines[58].

57 Birdlife et al. (2012). Briefing. Reform proposals for the Common Agricultural Policy. Common Briefing of Birdlife Europe, the European Environmental Bureau, the IFOAM EU Group and WWF.

58 Grafton, R. Q., Libecap, G., McGlennon, S., Landry, C. & O'Brien, B. 2011. "An Integrated Assessment of Water Markets: A Cross-Country Comparison". Review of Environmental Economics and Policy, 5:2, 219-39.

Figure 9: Economic efficiency indicators for the experiences of Australia, US, Chile, South Africa and China. Source: Reproduced from Grafton et al., 2011 in ACTeon et al. 2012.



	Size of market (permanent/ temporary)	Gains from trade (US$ million)	Storage (ratio of average use)	Nature of water rights	Breadth of market	Market price formation and availability
Australia	12.5/20.1 %	495	2.0	💧💧💧	💧💧	💧💧💧
US West	I	406	2.3 (Colorado)	💧💧💧	💧	💧
Chile	15/30 %	22.1	3.3	💧💧💧	💧💧	💧
South Africa	I	I	I	💧	💧	💧
China	I	I	I	X	💧💧	N/A

Administrative burdens would arise with establishing a tradable water use right system. Institutions for trading will need to be put in place. The introduction of water tradable rights imply the setting up of institutions generating three main types of (transaction) cost to the public authorities that need to be accounted[59],[60]:

- Institutional reform through formalising compatible water rights and devising acceptable system of initial right allocation
- Developing market-enabling institutions for water accounting and registers
- Supporting approval, enforcing of rights and audit.

Although of the costs benefit from economies of scale (fixed costs), others (variable costs) increase with the number of transaction for enforcing and monitoring the market at each transaction. For the variable costs, the creation of autonomous bodies for the management of the market can alleviate such costs. In early Spanish experiences, transaction costs beyond 12% of the traded price trading and the gains from trade would be too small to

59 Allen Consulting Group (2006). Transaction Costs of Water Markets and Environmental Policy Instruments: Final Report. Melbourne, Productivity Commission

60 Martin, P., Williams, J., and Stone, C. (2008). Transaction costs and water reform: the devils hiding in the details.CRC for Irrigation Futures Technical Report 08/08.

justify the establishment of the system[61], although this could also depend on the absolute gains. There is evidence that large transaction costs have prevented trading with potentially large gains from trade as some experiences in western US[62].

Although a small component gather fixed costs of being registered, most private cost are variable (each time a transaction takes place) for[63]. These variable costs comprise information and search cost (reducible through public intervention), property right defence and fees. Examples of fees range from the equivalent of EUR 20 to 375, depending on the regulators choice and whether transfers are limited use rights of definitive property rights[36]. In addition, trade took place through brokerage firms that offer services per ML traded that also range from the equivalent[64] of EUR 20 to 500 and some times more, depending on the area. However, given volumes, this only amounted to about 3.5% of the values traded. To provide additional context, prices at the time faired around EUR 1,200 /ML.

In conclusion, the option is expected to deliver a positive economic impact on the agricultural sector (main user) given that reforms, scheme development and running costs are controlled for (fixed and variable transaction costs).

The voluntary based approach through guidance does not imply anything for property rights per se. However, in the case of implementation by Member States, property right (re)definition is at the heart of a functioning water trading system. Most efforts in the development of any system of this type, irrelevant of its scale, are expected to be, particularly important at the start of the initiative. When existing rights are not well defined or too connected to other rights, substantial efforts are expected to be needed to unbundle them (i.e. separate land and water use rights) with significant costs for public authorities in charge of reform. Only one Member States, Spain, is currently in a position to introduce a system of this kind without much additional change. Spanish regulatory framework provides rooms for trading water use rights, following the 1999 Water Law reform[65], making the costs of this adjustment marginal compared to other EU countries. The UK has also experimented with partial water abstraction right trading but this is limited to purchase

61 Calatrava, 1997 in Easter, K. W., M.W., Rosegrant, and A., Dinar (eds). (1997). "Markets for water: potential and performance". Boston: Kluwer Academic Publishers.

62 Easter, K. W., M.W., Rosegrant, and A., Dinar (eds). (1997). "Markets for water: potential and performance". Boston: Kluwer Academic Publishers

63 Allen Consulting Group (2006). Transaction Costs of Water Markets and Environmental Policy Instruments: Final Report. Melbourne, Productivity Commission.

64 Financial Times currency converter AUD 1 = EUR 0.75 (www.ft.com)

65 Calatrava, J. & Garrido, A. (2006). "Difficulties in Adopting Formal Water Trading Rules within Users' Associations". Journal of Economic Issues XL,(1), 27-44.

existing rights from those who already have a licence to abstract water but may be expanded further[66].

Agriculture is potentially the sector most affected by this scheme, generally being the largest water user and the one currently holding different types of rights on water usage but not only, depending on the setting. The restriction in the total available water is expected to introduce potentially higher pricing in the context of tradable water rights were water is to be attracted by the most valuable uses, and possessing the higher willingness to pay. Trading has a combined effect. For the buyer, it is similar to the case for pricing instruments with the impact of changes in pricing. The second is offered by the possibility of selling those rights and therefore potentially earning a rent. Assessing the impact of higher prices on water use on the one hand, and on farmers' income on the other, it is a challenging task. In general, increased water prices will be effective in reducing consumption if three conditions are met:

- Higher prices are associated to technical measures to increase irrigation efficiency;
- Clear monitoring of volumes; and
- Demand for irrigation water is elastic, i.e. is responsive to price changes.

In general, increased water prices are likely to have a negative impact on farmers' income, especially small and family farms. Nonetheless, in contrast to simple pricing, trading offers the potential of increased income through the sale of temporary users or definitive property rights, as demonstrated by Australian experience[67].

Social impacts

Pricing

Whilst there has been considerable research on the social consequences of water pricing policies in different countries and impacts on different social groups (see problem analysis earlier in this report), it is important to stress that within the policy options considered for the Blueprint, pricing is only considered as a conditionality measure – to include a CAP cross-compliance requirement of meeting national water pricing policies. There are, therefore, no options to address pricing for other water users.

66 IEFE, IEEP, FFU and Adelphi consult. (2009). The links between the environment and competitiveness: Part 1 Water Policies and Competitiveness Report to the European Commission Project ENV.G.1/ETU/2007/0041. http://ec.europa.eu/environment/enveco/economics_policy/pdf/part1_report_comp.pdf

67 Young, M. (2012). "The role of the Unbundling water rights in Australia's Southern Connected Murray Darling Basin". WP6 IBE EX-POST Case studies paper, EPI-Water project. http://www.feem-project.net/epiwater/docs/d32-d6-1/CS23_Australia.pdf

Furthermore, the option does not seek to alter the price paid by farmers for water, but would only require that farmers pay the price they are supposed to pay under national rules in order to receive CAP subsidies. Therefore, there is no social impact of a pricing policy per se. Rather the impact on farmers is simply through provision of an additional cross-compliance requirement. The social impacts of an SMR are considered in the section above on metering and, therefore, will not be repeated in this section.

Water rights trading

The development of guidance itself does not have social impacts. Only the implementation of a trading system would do this. If trading were to be taken forward, the most profitable activities will secure rights, potentially driving out marginal activities. This has been the case in Australia as extensive farming was less labour intensive that the most productive parts of the sectors that have thrived under the trading scheme[68]. The impact on the labour market as a whole, however, is expected to be low as a whole but important locally given specific circumstances.

Lower income groups are likely to be affected by increased water prices (as it is the case for water pricing), but this impact can be offset by the possibility of selling rights, if profitable. For example, irrigators that sell will be compensated at some level although they might experience adverse human and social effects from their decision. "Moreover, communities that depend on irrigation might experience impacts of water entitlements leaving their region, for example via declining populations and loss of jobs and services. Community-level impacts are likely to be more significant in those communities whose economies have a greater reliance on irrigated agriculture, and that produce agricultural commodities with lower marginal value products of water, such as irrigated broadacre, Murray-Darling Basin"[69.] However, it is documented that intra-sector trading occurs among increasingly larger farms in Australia[70], although some groups have been protected like the aboriginal people

Guidance and debate about institutional reform can have a cultural impact by clarifying the perceptions about water rights. Where a tradable rights system develops, effects on certain

68 Barthélémy, N. 2008. Les marchés de quotas dans la gestion de l'eau: les exemples de l'Australie et de la Californie, CGDD, Collection « Etudes et synthèses », Paris.

69 Fenton in: Connell, D.l, and R. Q. Grafton. 2011. "Basin Futures: Water reform in the Murray-Darling Basin". Camberra: ANU E Press . http://epress.anu.edu.au/apps/bookworm/view/Basin+Futures+Water+reform+in+the+Murray-Darling+Basin/5461/upfront.xhtml

70 Barthélémy, N. 2008. Les marchés de quotas dans la gestion de l'eau: les exemples de l'Australie et de la Californie, CGDD, Collection « Etudes et synthèses », Paris.

marginal activities that are socially valued can have cultural repercussions that can be perceived as negative[71]. Thus social acceptability of the scheme is a precondition for its development[72].

Environmental impacts

Pricing

The option 1c would include national water pricing policies as a CAP pillar I conditionality. It does not, therefore, add to those national policies (or the WFD which drives those), but rather seeks to accelerate their implementation.

Water pricing schemes are expected to reduce water use and, in turn, to result in more water available for aquatic ecosystems, this having a significant positive impact on biodiversity for these ecosystems and connected ecosystems (wetlands, terrestrial ecosystems). The inclusion of such schemes in the SMRs, however, is not expected to deliver additional benefits, besides those (very marginal) benefits which might occur in case this inclusion accelerate full implementation of the WFD in some Member States.

Increased irrigation water prices might bring some marginal positive impacts on soil quality if reduction in agricultural water abstraction leads to less intensive farming – which will be the case only for some farming systems/farmers/river basins. These impacts, however, are to be attributed to implementation of Article 9, and no detectable additional benefits are expected from the inclusion of Article 9 in the scope of Cross Compliance.

The introduction of Cross Compliance has resulted, so far, in an increased awareness on existing legislation and on the role of agriculture in preserving a healthy environment (see above). The inclusion of the WFD in the SMRs is thus likely to enhance farmers' awareness also on the real value of water and on the importance of conserving the resource. In this light, this policy option might result in a more environmental friendly conduct of farmers and agricultural enterprises, thus having a positive impact with respect to the environmental consequences of agricultural enterprises in the EU.

71 Connell and Grafton 2011; Young, M. 2012. "The role of the Unbundling water rights in Australia's Southern Connected Murray Darling Basin". WP6 IBE EX-POST Case studies paper, EPI-Water project. http://www.feem-project.net/epiwater/docs/d32-d6-1/CS23_Australia.pdf

72 Simpson (1994) and Brown (1997) in Bjornlund H. (2003). Farmer participation in markets for temporary and permanent water in southeastern Australia, Agricultural Water Management 63 (2003) 57-76.

Where farmers are stimulated to improve implementation, the environmental effect is to improve water efficiency of abstracted water, with a range of knock-on benefits for water body quantitative status, qualitative status, energy use and biodiversity protection. However, the extent of any impact would depend on:

- The extent to which farmers are not paying the national water prices to which they are subject.
- The extent to which those farmers receive pillar I payments.
- The importance of water scarcity in the region of these farmers.
- The contribution of abstraction to those water scarcity problems.

At this stage, therefore, detailing the precise impacts of the option is not possible.

Water rights trading

The environmental impact of water trading will depend on the uptake (importance of basins involved) and whether the cap of total rights accounts for ecological requirements (i.e. E-Flows). This is critical as in both Australia and Spain the pressure on ecosystems rose following the introduction of trading, due to problems with over-allocation of water rights. More specifically, in Australia, water resource allocation disproportionately favours water diversions that, typically, decline by a lesser amount than inflows in dry periods generating environmental degradation[73].

The option is expected to deliver a slight but positive environmental impact and, in particular, a positive impact on the preparedness to climate change, thanks to a more efficient use of water resources and reduce vulnerability to droughts. Impact on land use changes may be significant especially in water scarce areas, where water is predominately used by agriculture. Depending on the activities, trading opportunities may induce land abandonment in the cases of Australia and the US (this is has not been reported for Spain or Chile).

The option might bring about a reduction in greenhouse gases emissions by reducing the consumption of energy needed to convey and treat water (the magnitude of this impact, however, is expected to be marginal). In addition, a more efficient water use enhance preparedness towards drought and water scarcity events, which are expected to increase as a result of climate change. Moreover, water trading systems increase their benefits as water scarcity becomes more acute, a likely scenario under the assumption of climate change.

73 Wentworth Group of Concerned Scientists 2010, in Connell, D.l, and R. Q. Grafton. 2011. "Basin Futures: Water reform in the Murray-Darling Basin". Camberra: ANU E Press . http://epress.anu.edu.au/apps/bookworm/view/Basin+Futures+Water+reform+in+the+Murray-Darling+Basin/5461/upfront.xhtml

Therefore, it is expected to deliver some degree of positive impact on climate change preparedness.

Trading is expected to ensure that more water is made available for ecosystems, thus benefiting biodiversity, flora, fauna and landscapes. Depending on the importance give to E-Flows, a more or less significantly positive impact on biodiversity and landscapes might be expected from this option. It is important to note that simple trading system (without formal environmental dimensions) have failed in allocating water by favouring human uses over ecosystems[74]. Impact on land use changes may be significant especially in water scarce areas, where water is predominately used by agriculture. Depending on the activities, trading opportunities may induce land abandonment in the cases of Australia and the US (this is has not been reported for Spain nor Chile). The most likely direct impact is therefore the intensification of agriculture.

Reuse of water is an option to fully benefit from trading opportunities. This linked to the degree of incentives provided by the scheme for agents to adopt water-saving technologies, as expected[75].

3.8 Conclusion

This section has explored two options with regard to water pricing. There are significant potential benefits to extending cross compliance to some aspect of pricing. However, as noted in the option description, there is debate on how far pricing provisions could be included in cross compliance. Even if this debate were settled, the option could not be progressed at an early stage, given that the CAP is already being revised and any further opportunity for change is some years away. This is despite the fact that a wide range of stakeholders do support this approach.

Therefore, the option of producing guidance on water rights trading is the only one that could be taken forward immediately within the Blueprint. Stakeholders were generally not particularly supportive, but these come from Member States without experience of this policy. Furthermore, the option is not that rights trading should be used, but rather to develop guidance to help ensure such an approach is effective in delivering WFD objectives. Thus this option can be justified for inclusion in the early work programme of the Blueprint.

74 Grafton, R. Q., Libecap, G., McGlennon, S., Landry, C. & O'Brien, B. 2011. "An Integrated Assessment of Water Markets: A Cross-Country Comparison". Review of Environmental Economics and Policy, 5:2, 219-39.

75 Calatrava, J. & Garrido, A. 2005. 'Spot water markets and risk in water supply.' Agricultural Economics, 33:2, 131-43.

Table 5. Summary of the impacts of the options concerned with the options for water pricing

Description of the option	Option 1a consists of promoting the use of trading in water rights at river basin level through the development of guidance and tools under the WFD Common Implementation Strategy.	Option 1c would introduce cross-compliance for national water pricing policies for payments under the CAP (this option cannot be taken forward at present but integrated for sake of completeness and comparison)
Effectiveness towards sectoral integration	+ although not mandatory the option might promote the development of an economic policy instrument with potential	+ might promote and accelerate full implementation of Article 9 in those Member States where it is not fully implemented yet
Effectiveness towards other specific objectives	+ option, although voluntary and even when limited to water scarce basins, will allow a more transparent integration of water users into a single water market + option is voluntary but if trading is indeed developed it is to be coupled with a mandatory cap on total rights and will push for a more integrated water management ≈ guidance process is only expected to have limited impact but if successful with pilot cases, it could provide an EU knowledge base in addition to the international experiences	+ option might promote collaboration between authorities in charge of administering CAP payments and water agencies + likely to raise farmers' awareness on Art. 9 of the WFD and on the real value of water
Efficiency	≈ option contributes to the WFD objectives but its efficiency will depend on each case of introduction, not only at Member States but also at basin level. Administrative costs can be considered limited.	+ might accelerate implementation of Article 9 at limited additional administrative costs

Coherence	+ option is coherent with EU policy objectives, given that it is implemented accounting for specific social impacts and that it is based on ecologically defined grounds	+ option aims to integrate Article 9 principles in the CAP policy
Acceptability	23% of respondents to Public Consultation are in favour of this option (54% opposed to it)	Respondents to Public Consultation were equally divided over this option.
Ecological Status	≈/+ to the extent that water quantity affects quality, guidance on trading would have a limited positive impact	≈/+ to the extent that water quantity affects quality, guidance on trading would have a limited positive impact.
Water Stress	≈/+ guidance on trading would improve water efficiency to a limited extent and this would lead to some improved surface water flow regimes and groundwater quantitative status in water scarce areas	≈/+ conditionality would impact by speeding up implementation in some Member States, reducing some water pressures
Vulnerability to extreme events	+ guidance on trading can be considered as positive potential adaptation responses	≈/+ conditionality would impact by speeding up implementation in some Member States, reducing some water pressures and allowing some adaptation response
Other impacts[76]	+ Reduced water use also results in lower energy consumption and lower GHG emissions	+ The option could also deliver improved awareness by farmers, leading to knock-on benefits on e.g. biodiversity and landscape
Functioning of the internal market and	≈ guidance would have no impact on this issue	+ conditionality of existing pricing requirements ensures a more equal playing field for the agriculture sector

76 The climate, Transport and the use of energy, Air quality, Biodiversity, flora, fauna and landscapes, Soil quality or resources, Land use, Renewable or non-renewable resources, The environmental consequences of firms and consumers, Waste production / generation / recycling, The likelihood or scale of environmental risks , Animal welfare, International environmental impacts

competition	+/- if trading is implemented, limited additional efficient allocation of water is expected, favouring the most efficient users. Benefits from markets are expected to be higher when scarcity increases, as exchanges spreads its economic impact	across the EU - Farmers would lose benefits where they do not pay required prices for water
Specific regions or sectors	+/- if trading is implemented, there will be winners and losers. The impact of the measure is probably going to be limited geographically to a few Member States.	- some implementation costs, particularly for farmers, will arise. However, SMRs on pricing largely reflect what farmers already need to do, so additional cost would be minimal
SMES		≈ adding conditionality on pricing would not impact on the operating costs of farmers as they would only be required to pay prices for water for which they are already required to do
Administrative burdens on businesses	- where the scheme is introduced extra administrative burden for water users is expected	- costs associated with demonstrating compliance with SMRs, etc. However, not expected to be much additional over current requirements
Other [77]		≈ no impact on e.g. competitive position of EU agricultural firms, as only very marginal extra costs for farmers can be attributed to SMRs as WFD Article 9 requirement was mandatory before implementation of Cross Compliance - Compliance checking required by public authorities.

77 (Competitiveness, trade and investment flows, Public authorities , Property rights , Innovation and research , Consumers and households , Third countries and international relations , Macroeconomic environment)

		However, likely to be very small given that compliance checking already has to take place and conditions in the option are easy to check.
Employment and labour markets	≈ guidance on trading would not impact on this issue	+/- this is difficult to predict, but given the potential SMRs are already required, there should be little net impact of the option.
Social inclusion and protection of particular groups		+ other businesses/consumers would benefit from the agriculture sector meeting its obligations
Public health and safety		Not relevant
Other [78]	Not relevant	Not relevant

Magnitude of impact as compared with the baseline scenario (the baseline is indicated as 0): ++ strongly positive; + positive; – – strongly negative; – negative; ≈ marginal/neutral; ? uncertain; n.a. not applicable

78 (Standards and rights related to job quality, Gender equality, equality treatment and opportunities, non -discrimination , Individuals, private and family life, personal data , Governance, participation, good administration, access to justice, media and ethics , Crime, Terrorism and Security , Access to and effects on social protection, health and educational systems , Culture , Social impacts in third countries)

4 METERING

4.1 Introduction and problem definition

When using water rights or permits that allow for a certain amount of water to be abstracted, metering is required to monitor how much has been abstracted compared to the allocated right[79]. Moreover, literature suggests that generally, water pricing needs a volumetric element in order to provide an incentive to reduce consumption, which requires water use to be determined either through metering or an alternative technique[10],[14]. In other words, absence of metering for individual users can be regarded as a key barrier for the effective implementation of pricing schemes that incentivise water efficiency. While measures to deal with public water supply and end-use efficiency are distinct, they share the need for metering of water use as a requirement for measures both to be effective and subject to an ex-post evaluation with a view of adapting and improving the regulatory framework[8].

Metering increases the understanding of water losses and thus improves the efficiency of the water used by different sectors. Metering is a prerequisite for a) proper monitoring to fully know how much water is abstracted, and b) proper controlling of the abstractor. This also shows that metering is not the only tool needed to combat illegal abstraction: sufficient budget and capacity for monitoring and control is also highly important[14].

Households subject to volumetric pricing – and hence metering – have been shown to use 25% less water[80]. The Water Performance of Buildings study[81] assumes that, by introducing water metering in Member States where no metering is applied, 10% of water saving could be achieved for about 25% of the EU population (which does not yet have full implementation of water meters). This assumption is based on evidence found in literature and consultation of experts. Furthermore, it is assumed that efficient awareness-raising actions could result in 3% savings across the EU. The uptake of water saving devices could be improved by information campaigns and financial incentives (e.g. for metering).

Effective metering is lacking in many Member States, particularly in agriculture but also in households[10],[14]. The (critical) issue of agriculture is only considered to a limited extent as in a significant number of regions, farmers do not pay for their water abstractions. Effective approaches to water management and allocation in the agriculture sector, especially regarding abstraction in scarce areas, rest on the ability to monitor and control water use

79 Bio-Intelligence, Cranfield University & RPA. (2012). Water saving potential in agriculture in Europe, Findings from the existing studies and application to case studies, study commissioned by DG ENV

80 Grafton, R. Q.; Ward, M.; B. To, H. Kompas T. (2011): Determinants of residential water consumption: Evidence and analysis from a 10-country household survey, Water Resource. Res., 47.

81 BIO Intelligence Service (2012), Water Performance of Buildings, Draft Final Report prepared for European Commission, DG Environment.

activities. It is indeed shown from case studies in several EU and non-EU countries that the most helpful tool in ensuring a transparent understanding of water use in a basin is metering[82]. The installation of metering is a key factor to ensure a legal framework, considering the fact that some Member States are still struggling with gaining a complete overview of abstractors[14].

In conclusion, improvements in the extent of metering are needed to ensure an accurate understanding of water use in many river basins and to ensure that control measures (permits) or pricing (based on volumetric use) can be properly implemented. The objective is for metering to be sufficient to allow for these issues to be achieved and implemented.

4.2 Baseline and the justification for EU level action

In Europe, household and industrial water metering continues to increase. Many Member States already meter the majority of water uses. However, in many countries and in relation to agriculture water use metering is still limited[83]. The assessment of RBMPs shows that the absence of metering for many major water users prevents any volumetric charging for water. The Pressures and Measures study found that 40% of RBMPs include actions to enhance metering, but it is not clear how far the problem gap will be addressed[84].

For a limited number of Member States, the following data could be collected from case studies on the share of metered connections. In Austria, Belgium, Denmark, France and Germany, the share amounts to 100% for both domestic and industrial water use. In the Netherlands the metered share is 96% for domestic water and 100% for industrial water. In Sweden it amounts to 95% for domestic water and 100% for industrial water, in the Czech Republic 93% for both domestic and industrial water use, in the UK 42% for domestic water use[12].

Metering is not yet employed to its full potential in the European agricultural sector. It is expanding but still insufficient to verify if the water allocation plans are followed, or if the gap between water availability and consumption continues increasing; and monitoring of

82 Ex-post evaluation case studies of Cyprus, France and Romania have confirmed the positive impact metering has on water use and promoting water savings in agriculture through volumetric pricing (ARCADIS et al., 2012).

83 See http://www.eea.europa.eu/themes/water/water-resources/policies-and-measures-to-promote-sustainable-water-use

84 WRc, ACTeon, Ecologic, NERI, CENIA, Intersus, ARCADIS (2012). Comparative Study of Pressures and Measures in the Major River Basin Management Plans, study commissioned by DG ENV

abstractions is also considered weak[85],[86]. In some cases, metering is obliged for permit holders, though limited evidence on the actual implementation and control at the farm level can be identified sometimes. A lack of capacity to control and enforce can be regarded as a barrier to effectiveness of existing metering.

Water metering for permitted abstractions in agriculture is at least obliged in Belgium (Flanders), Bulgaria, Czech Republic (above a certain threshold), Denmark, Estonia, France, Malta (groundwater), Lithuania, Romania and Spain. It is of note that the list may not be exhaustive, as some other EU Member States also apply volumetric charges which necessitates some type of water metering[14].

The EU disposes of a number of public financial instruments that can be used to improve water efficiency and/or plays a role in poorer regions to develop the necessary water infrastructures, both for water supply (and accompanying measures such as metering) and for water treatment.

€8 billion of regional and Cohesion Funds have been allocated over the period 2007-2013 to finance leakages, improving connections and develop infrastructures[87]. The European Commission presented its proposals for cohesion policy 2014-2020 in October 2011. It was decided that cohesion policy, rural development and maritime and fisheries policies should remain essential elements of the 2014-20 financial package because of their pivotal role in delivering the Europe 2020 strategy[88]. According to the proposed Cohesion policy, the role of innovative financial instruments will be enhanced, by extending their scope, rendering their implementation frameworks more flexible and effective, and encouraging their use as a more efficient alternative, or in a complementary way with traditional grants.

In October 2011 the Commission presented a set of legal proposals designed to make the CAP a more effective policy for a more competitive and sustainable agriculture and vibrant rural areas. The Commission proposals are currently being discussed in Council and European Parliament. The second pillar of the CAP directly or indirectly can support water pricing mechanisms and metering. There are a number of measures that can be offered in

85 Custodio, E.; Llamas, M.R.; Hernández–Mora, N.; Martínez Cortina, L.; Martínez–Santos, P. (2009). Issues related to intensive groundwater use. In: Garrido, A.; Llamas, R. (Ed.) (2009). Water policy in Spain. Balkema

86 López-Gunn, E. (2009). Making Groundwater Institutionally Visible. In: Garrido, A.; Llamas, R. (Ed.) (2009). Water policy in Spain. Balkema

87 http://ec.europa.eu/environment/water/quantity/instruments.htm

88 http://ec.europa.eu/regional_policy/sources/docoffic/official/regulation/pdf/2014/proposals/summaries/general/general_summary_en.pdf

the RDPs that can be used to fund the protection and enhancement of water resources in agriculture. The main relevant measures are: training of farmers, use of advisory services, modernisation of agricultural holdings (e.g. improvement of water efficiency), agri-environmental measures (RDR article 39) (crop rotation, catch crops, improved management of the pesticides, etc.), support for the application of mandatory measures stemming from the implementation of the WFD (RDR Article 38). These payments can set an incentive to farmers to establish higher environmental standards than those set out under Cross Compliance. However, incentives to protect water set out in Pillar two of the CAP are competing with the incentives set out under Pillar I. Due to the fact that if farmers are compensated for the income foregone or additional costs they may not be willing to apply for Rural Development measures.

Besides metering, there are other tools which can support to combat illegal abstraction. Mapping all EU large irrigated areas via the GMES initiative and matching these areas with water abstraction permits can help Member States enforce them and tackle illegal abstraction. The 'Global Monitoring for the Environment and Security' (GMES) serves as the European capacity for earth-observation-based environmental services, in which water is a component. GMES Services are currently in their initial phase, covering the period 2011-2013: the pilot services which have been developed so far are in fact expected to become actually operational and be provided on a larger scale by 2013, while a fully-fledged GMES programme is expected to be in place in the course of the next multi-annual financial framework, starting in 2014. Within the GMES programme, some initiatives contributing to sustainable water management are already on-going. At present, under the GMES Initial Operation Programme (2011-2013) the GMES Land Service is currently working on a series of new pan-EU land cover datasets, which cover the 39 partner countries of the EEA. As the new datasets will include five pan-EU high resolution layers[89], namely on water, wetlands, grasslands, forest and imperviousness, the provided information will be extremely relevant in supporting water management and water policy. Moreover, an existing project funded under the FP7 (SIRIUS) is currently developing user-driven services aimed at supporting sustainable irrigation water management and river basin governance. A proposal was also made for a local component focusing on riparian areas which is part of the 2013 GMES Work Programme (to be adopted in 2012). All these initiatives, in brief, can help demonstrate the potential of GMES in supporting sustainable water management and tackling current problems such as illegal water abstraction.

There is a strong case for EU level action regarding metering. Firstly, GMES is an EU-level activity itself and, therefore, only EU-level action is appropriate. On metering itself, it is not appropriate at EU level to set out very specific metering actions. However, it is appropriate to develop EU policy on metering as a precondition for implementing the WFD pricing

89 Layers' resolution : 1 ha

requirements. This could focus on legal amendment to promote metering or seeking integration of metering within other EU level instruments, such as funding, which could only be achieved with EU level action.

4.3 Objectives

The following specific policy objectives were identified:

- Member States need to be put in place preconditions for charging for water supply which provide adequate incentives to increase water efficiency.
- Illegal abstraction should be reduced.

With regard to the operational objectives of the Blueprint, these objectives take forward the objective for sectoral integration of water objectives by enhancing metering within specific sectors, increasing use of economic instruments as metering is a precondition for charging for volumetric use of water, improved governance of water as addressing illegal activity is an indicator of the quality of governance and potentially improved knowledge base if addressing these objectives involves additional tools (as will be seen with regard to an option on illegal abstraction below).

In taking forward these objectives regarding metering in the Blueprint it is important that there are SMART indicators for monitoring their progress and, therefore, whether the objectives have, or have not, been achieved. This will enable the success of policies to be determined and potential barriers (if they occur) to be addressed as policies are reviewed.

For the objectives regarding metering, the following SMART indicators are proposed:

- The extent to which metering is adopted by each sector in each Member State (or at least in river basins where there is water scarcity).
- The extent of illegal abstraction by river basin.

4.4 The options and their elaboration

Several policy options to address the problem of metering were developed to be considered within the Blueprint and subject to IA. Amending the WFD has a number of strengths. It would overcome some of the debate on interpretation that is currently in place and push forward some economic tools which are current only encouraged. However, legal amendment would be difficult, particularly on this issue. Having said this, it is useful to retain legal amendment options within IA and, therefore, amendments relating to metering which are highly specific should be retained for IA.

Options regarding the implementing rules for CAP and Cohesion Policy funding have a strong opportunity to be taken forward. Using CAP conditionality's or rural development payments have a potential to be a strong option(s) given the intensification for changed

behaviour that these can entail. However, this option need to be modified to ensure it reflects the implementing rules (this also holds for the implementing rules for the new fund regulations). This means that at present these options cannot be taken forward, however they are integrated here for completeness and for the sake of doing a comparative analysis.

Table 6 describes the options as originally developed in the project and submitted for the public consultation together with the final elaboration of options included within the IA, following further discussion. The options were retained, with slight clarifications.

Table 6. The options originally considered and final options to address the problem of metering

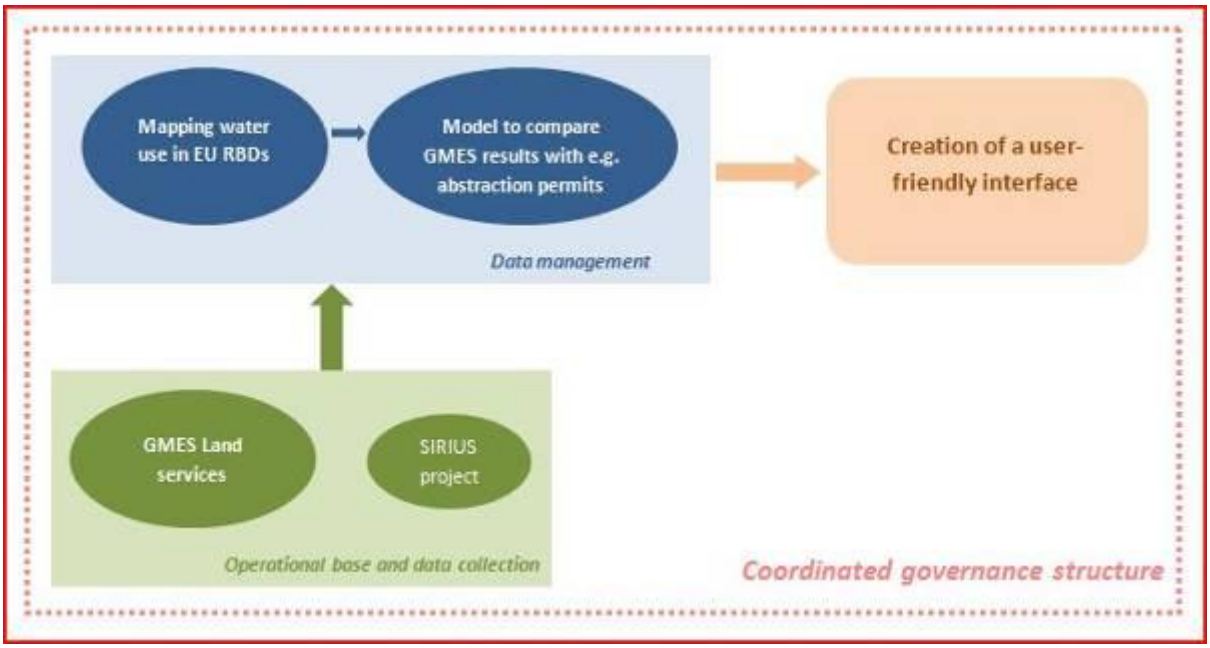
Options originally considered	Final options for the IA
Mapping all EU large irrigated areas via the remote sensing (GMES) initiative and match these areas with water abstraction permits to help Member States enforce them and tackle illegal abstraction.	Option 2a: Mapping all EU large irrigated areas via the GMES initiative and match these areas with water abstraction permits to help Member States enforce them and tackle illegal abstraction.
Making EU funding for irrigation projects conditional upon the installation of metering devices, e.g. via the CAP implementing rules.	Option 2b1 consists of amending the WFD to make it explicit that Art.11 includes mandatory metering.
Making CAP direct payments to farmers (Pillar I) conditional upon the installation of metering devices, e.g. via cross compliance rules for the WFD.	Option 2b2 consists of amending the WFD to require metering of individual water consumption and/or use in these cases where metering is a cost-effective solution.
Amend the WFD to make it explicit that the Article 11 requirement of a permit for water abstraction also includes mandatory metering of the quantities abstracted. Amend the WFD to require metering of individual water consumption and/or use where relevant.	Option 2c consists of making CAP and Cohesion Policy funding for irrigation projects conditional upon the installation of metering devices for individual users (option cannot be taken forward at present but integrated for sake of completeness and comparison).

Option 2a consists of mapping all EU large irrigated areas via the GMES initiative and match these areas with water abstraction permits to help Member States enforce them and tackle illegal abstraction.

Under this option, GMES information would be used to map water abstractions and more generally, water use for agriculture in irrigated areas. At EU level, a modelling approach would be developed to compare GMES results with information on abstraction permits, and thus to identify areas where abstraction appears to be higher than permit levels. The results could then be used to target inspections at national, regional and river basin levels.

Ideally, the policy option under consideration could yield the best results if implemented according to the structure presented in the figure below.

Figure 10. Potential implementing structure for the GMES option.



As illustrated above, implementation would therefore involve three main operational components, coordinated and managed through the creation of a unified governance structure:

Operational base and data collection: the information needed to map water use in European river basin can be provided and/or build upon existing GMES services and projects, such as the Land services, which are currently developing high-resolution layers on water, wetlands and other land cover related information across EEA countries, and the SIRIUS project.

Data management: once the data provided through existing services and infrastructures are gathered, a targeted data processing is likely to be required in order to be used for the specific aim of this policy option. This will involve the creation of a geographical information base on irrigation water use across the EU and the development of an appropriate model allowing the comparison between GMES results and, for example, abstraction permits.

Creation of a user-friendly interface: this last step will be fundamental to ensure that the information made available by GMES services is actually used for enforcing abstraction regulations at the river basin level. To date not enough attention has been paid to address users' need, to the extent that some GMES services might end up being not user-friendly. The model developed to compare GMES results with existing abstraction permits must thus be equipped with a user-friendly interface, thus enabling its use by RBD authorities and local water managers.

As the steps described above are likely to be carried out at different levels and by different institutions, it will be fundamental to put in place an overall coordinating structure, to ensure communication between the different components and, ultimately, the overall coherence of the system. The analysis of GMES carried out earlier revealed that overall the GMES programme has developed so far a weak governance structure, resulting in a weak overall coherence of the Programme and in a lower data quality, discontinuous spatial distribution of data across regions in the EU, or even lack of coherence indicators use. Consequently, a coordinated governance structure would be necessary to ensure full operationality and effectiveness of the policy option under consideration.

This option 2a focuses on improved management of water bodies and on better implementation of the WFD. Therefore, the analysis below compares the option with regard to delivering improved effectiveness, efficiency and coherence, rather than more detailed economic, social and environmental impacts.

Option 2b1 consists of amending the WFD to make it explicit that the Art.11 requirement of a permit for water abstraction also includes mandatory metering of the quantities abstracted. This option particularly concerns industry and the agricultural sector. Art.11 of the WFD requires each Member State to ensure the establishment for each river basin district, or for the part of an international river basin district within its territory, of a programme of measures (PoM). This PoM consists of both basic measures and, where necessary, supplementary measures. Basic measures consist of a.o. the execution of "controls over the abstraction of fresh surface water and groundwater, and impoundment of fresh surface water, including a register or registers of water abstractions and a requirement of prior authorisation for abstraction and impoundment. These controls shall be periodically reviewed and, where necessary, updated. Member States can exempt from these controls, abstractions or impoundments which have no significant impact on water status" (article 11.3(e)). The option 2b2 would specifically require that metering of the quantities abstracted is mandatory.

Option 2b2 consists of amending the WFD to require metering of individual water consumption and/or use in these cases where metering is a cost-effective solution. This option concerns all water users and therefore has the broadest scope.

Note that options 2b1 and 2b2 involve an amendment to the Water Framework Directive. Therefore, if these options are taken forward, a further IA accompanying the proposed amending Directive would need to be undertaken. Therefore, in taking forward these options, the wider policy context, acceptability and opportunities for legal amendment are linked to other options considered within this IA that would also amend the WFD.

Option 2c consists of making Cohesion Policy and Rural Development funding for irrigation projects conditional upon the installation of metering devices for individual users. This option specifically concerns the agricultural sector. While water infrastructure investments have been a key element of expenditure in the Cohesion and Structural Funds, there was no particular focus on water efficiency. For the next MMF the EU could issue specific guidance on increasing the focus on water efficiency. In the next funding period (2014-2020), the role of innovative financial instruments will be enhanced, by extending their scope, rendering their implementation frameworks more flexible and effective, and encouraging their use as a more efficient alternative, or in a complementary way with traditional grants. This option cannot be taken forward at present, however it is integrated here for completeness and for the sake of doing a comparative analysis.

It is important to note that there are differences of opinion on how far it is possible to include provisions for metering within cross compliance under the CAP. This debate is not concluded and, therefore, this option is subject to the condition that it is possible to set it out within a future revised CAP regulation. This is not an immediate prospect given the current state of revision of the CAP. Thus this aspect of this option cannot be taken forward at present but is integrated here for completeness and for the sake of doing a comparative analysis (not least, as will be seen later, extension of cross-compliance is strongly supported in the stakeholder consultation).

The options set out to stimulate the implementation of metering each are aimed at different water users. Option 2b1 and 2b2 are mutually exclusive, only one of both will be taken on board. Option 2c and 2b1 or 2b2 can all be taken forward.

It is important also to recognise the interaction with other options addressed in this IA. Delivering sufficient investment, to which Regional Funds contribute, can require raising sufficient additional resources at local level. Pricing of services is one way to achieve this and options to deliver improved pricing therefore interact within this option.

4.5 Effectiveness, efficiency and coherence of the options

Regarding the effectiveness of meeting the operational objectives of the Blueprint, the options regarding metering all contribute to the effectiveness of meeting all of the objectives.

As mentioned, option 2c cannot be taken forward at present, however is integrated here for completeness and for the sake of doing a comparative analysis. The Cohesion Policy

proposals are currently the subject of negotiation with the Council of the European Union and the European Parliament with the aim of agreement well in time to facilitate a smooth launch of the new programmes[90]. Commission CAP proposals are currently being discussed with the Council of the European Union and the European Parliament. Including a new GAEC into cross-compliance is therefore either too late (Commission proposals on the table), or too early (no new amendment to the CAP before 4 or 5 years).

Options 2b1 and 2b2 concern amendment of the Directive, options which would only be able to take place following review of the Directive. Adoption of an amendment would be unlikely before 2019 or 2020.

The core of Option 2a is to improve knowledge and tools available to water managers. In this way, Option 2a contributes positively, but indirectly, to fostering integration of water into sector policies by providing better information, in particular on water quantity. With respect to supporting the use of economic instruments, the option again has an indirect effect through better information. The execution of option 2a supports the implementation if economic instruments related to abstractions (water pricing). The option also provides a tool for direct use in governance and hence, by addressing the gaps in reporting, adds to more efficient governance.

Metering increases the understanding of water losses and thus improves the efficiency of the water used by different sectors. Case study analysis showed that Cyprus, France and Romania have wide-spread metering, which has proven to be a pre-condition for volumetric pricing as well as for monitoring and controlling water allocation permits. Examples from Australia, Spain, the Netherlands and Mexico indicate that insufficient or non-existent metering makes water pricing and allocation difficult to enforce and control[91]. Water pricing needs to be considered as an important enabling measure to produce a behavioural response, despite the fact that demand for water is relatively inelastic to changes in price. Evidence suggests that users tend to alter their water consumption patterns in response to water charges, metering penetration and seasonal pricing. Metering is a necessary condition to influence water consumption by pricing policy of water[92].

As all options regarding metering are indispensable for proper volumetric water pricing, they contribute to the promotion of the use of economic instruments. Absence of metering

90 http://ec.europa.eu/regional_policy/what/future/proposals_2014_2020_en.cfm

91 ARCADIS, Fresh Thoughts Consulting, InterSus, Typsa & Ecologic Institute. (2012). The role of water pricing and water allocation in agriculture in delivering sustainable water use in Europe, study commissioned by DG ENV

92 CEPS. (2012). Briefing note 'Which Economic Model for a Water-Efficient Europe', Centre for European Policy Studies

for individual users is a key barrier for the effective implementation of pricing schemes that incentivise water efficiency. If metering is combined with volumetric pricing schemes, there is a potential benefit of earmarking these charges/taxes for supporting the installation of metering or for ensuring the financing of water efficient measures. Moreover, option 2c stimulates metering by means of an economic instrument, funding, which increases their effectiveness on this objective.

Metering is a prerequisite for a) proper monitoring to fully know how much water is abstracted, and b) proper controlling of the abstractor. In that sense, the metering options contribute to the operational objective to achieve a more efficient water governance. Metering is key to ensure a legal framework which allows Illegal abstraction to be reduced. However, this also shows that metering is not the only tool needed to combat illegal abstraction: sufficient budget and capacity for monitoring and control is also highly important. Illegal abstraction in some parts of the EU is a large phenomenon that puts at risk water availability[93]. As options 2b1 and 2b2 would be compulsory and have a broader application, they potentially contribute more to the operational objective of efficient water governance (however, the additional beneficial impact from obliging metering for industry and households is smaller compared to the impact for agriculture). The same remark holds for the contribution of the metering options to the improvement of knowledge and tools available to water managers.

Option 2c contribute to cost-efficiency, as they can be considered as flexible instruments, aimed at the agricultural sector which can be considered as the water user with the largest lack of metering (and pricing), with a relatively limited administrative burden.

The administrative burden consists out of different aspects. The first concerns the legislative adaptations for the European Commission, which are the largest in the cases of options 2b1 and 2b2 where the WFD would need to be amended. These would also entail the highest burden for the relevant water users as well as for the Member States to prove compliance and both for the European Commission for compliance checking. This would entail unnecessary costs if it is obliged in specific situations with low cost-effectiveness of metering. For option 2c the CAP and Cohesion Policy rules would need to be adapted and Member States would need to transpose the GAEC in their national rules.

Option 2a is expected to have a positive impact on efficiency, but on the other hand will require investment in new governance structures. However, total costs can be considered limited for this option, as it focuses on a single issue and can provide a pilot action for a fully inter-operable, SEIS based, shared water knowledge system.

93 ARCADIS, Fresh Thoughts Consulting, InterSus, Typsa & Ecologic Institute. (2012). The role of water pricing and water allocation in agriculture in delivering sustainable water use in Europe, study commissioned by DG ENV

Option 2a can be linked to EU objectives for GMES and is considered to be coherent with EU policy objectives, both those for water as well as objectives related to resource efficiency. Option 2c is coherent with CAP and Cohesion Policy. Options 2b1 and 2b2 increase coherence in the approach between Member States which can provide a firm basis for other policy interventions.

The options set out to stimulate the implementation of metering each are aimed at different water users.

Regarding effectiveness, Option 2a contribute positively, but indirectly, to fostering integration of water into sector policies by providing better information, in particular on water quantity. With respect to supporting the use of economic instruments, the option has an indirect effect through better information, and can support economic instruments related to abstractions.

The option provides a tool for direct use in governance, and contributes to improving knowledge and tools available to water manager.

The option is expected to have a positive impact on efficiency, although it will require investment in new governance structures.

The option is considered to be coherent with EU policy objectives, both those for water as well as objectives related to resource efficiency. It is linked to EU objectives for GMES.

4.6 Acceptability

The public consultation sought views on a range of options relating to metering and monitoring of abstraction. These views are presented in Table 7.

Table 7. The results of the public consultation concerning options to address the problem of pricing

Option	Yes (%)	No (%)	Do not know (%)
Mapping all EU large irrigated areas via the remote sensing (GMES) initiative and match these areas with water abstraction permits to help Member States enforce them and tackle illegal abstraction	58	13	29
Making EU funding for irrigation projects conditional upon the installation of metering devices, e.g. via the CAP implementing rules	50	19	31
Making CAP direct payments to farmers (Pillar I) conditional upon the installation of metering devices, e.g. via cross compliance rules for the WFD	45	25	30

Amend the WFD to make it explicit that the Art 11 requirement of a permit for abstraction also includes mandatory metering of the quantities abstracted	42	41	17
Amend the WFD to require metering of individual water consumption and/or use where relevant	34	46	20

A majority of respondents supports the use of a voluntary, information approach, using GMES to help Member States tackle illegal abstraction in agriculture.

An important share of respondents also supports conditionality measures to support metering: 50% are in favour of a requirement for irrigation projects funded via the CAP and 45% are in favour of requirements for farmers receiving direct payments.

Opinion is divided on regulatory measures. For amending Article 11 of the WFD, 42% of respondents are in favour and 41% opposed. A broader amendment to the WFD receives only 34% in favour and 46% opposed.

In their written comments, many stakeholders (including both NGO and industry respondents) underline that metering is a key to effective water pricing and to changing consumers' patterns.

However, other stakeholders argue that metering is a matter of subsidiarity. A number comment on differences among sectors. One industry stakeholder argues that water metering systems could be expensive compared to the cost of water. Several responses from northern Europe state that metering is not important for agriculture in their countries.

Association Luxembourgeoise des Services de l'Eau and Veolia (CZ) state that metering is a matter of subsidiarity. Verband Kommunaler Unternehmen considers the use of metering at the individual household/ apartment level should only be promoted where the benefit of increased water use efficiency outweighs the costs of meter installation taking into account regional water availability.

Central Europe Energy Partners supports the use of economic instruments for water efficiency, but considers WFD art. 9 to be poorly implemented. Electricite de France does share the view that current water pricing levels and structures do not provide sufficient incentives to increase water efficiency particularly for the electricity sector. The sector is working to improve processes and techniques to save water.

The Royal Institute of Chartered Surveyors strongly supports mandatory water metering. Appropriate measurement of water consumption underpins any policy option and change of behaviour. Metering and progressive pricing are already applied in the majority of Member States. Switching to a meter can typically result in 5-10% water saving. Monitoring the amount of water used helps measuring water efficiency improvements, raise awareness

among consumers and enable them to adjust their behaviour to lower consumption. Metering combined with valuing water at a higher price could provide strong incentives to further reduce water demand. Only very few consider the value of water when using it, since cost of purchasing replacement fixtures is significantly higher than the cost of doing nothing and the payback is very long. However, we would like to note that any change in water pricing can only have an impact when the users have an understanding of how to reduce consumption.

Severn Trent Water does not accept the premise that metering is always an appropriate answer. In areas of water stress or where there is widespread illegal abstraction, metering can be of value However, supplying, installing and maintaining meters can be expensive relative to the average cost of water. Other demand-reduction measures like public education can be a more cost effective tool for achieving the same ends. The Severn Trent region has one of the lowest reported levels consumption at 126 litres a person, but also one of the lowest rates of domestic customer meter penetration in the UK. It believes that public education is one of the best tools to achieve improved water use.

Grune Liga considers that there should be no further CAP funding to enlarge irrigation in water-stressed/future water-stressed areas. Addressing inefficient water use in agriculture is far more important than efficiency of household use. The Country Landowners Association considers that illegal abstraction is not a primary risk to water availability in the UK. Most commercial businesses are metered in the UK if they use publicly supplied water and those that do not have to have a licence from the Environment Agency for abstraction which is closely monitored through the Catchment Abstraction Management System. As most commercial businesses in the UK are metered it would be inappropriate to have a metering system linked to CAP payments. The regulatory burden would be disproportionate to the outcome because the incentive is to reduce overall costs by being efficient due to the need for record keeping.

The Consumer Council states that further research should be carried out to determine the long term impact that metering would have on consumption levels and a cost-benefit analysis on their introduction. Others state that that key concepts (including abstraction and water use) need further definition before any legislation can be proposed; some industry responses argue that ‘non-consumptive’ uses of water should not be metered.

On several occasions, Member States had the opportunity to express informally their opinion on these specific Blueprint options, e.g. during an informal meeting of the EU Water Directors in March 2012 and during a meeting of the CIS expert group on WFD and agriculture in April 2012. Generally, participants tended to support conditionality of major irrigation funding being metering and CAP funding seems to be preferred above Cohesion funding. Generally, there was no support for amending the WFD.

Some participants made remarks on the details of how such a system could be implemented. COPA-Cogeca is opposed to a general application of individual metering and instead is in favour of a system taking into account technical constraints (e.g. not all regions have water pressures). A few participants ask for an exemption for small abstractors (metering obliged for large abstractions above a certain threshold) and in case water scarcity is not an existing problem (need for a clear definition). Other issues were mentioned such as intermittent users and transfers (UK). One participant brings up the fact that in case meters are conditional and one-time financing is foreseen from Cohesion Funding, meters could be destroyed afterwards and MS held responsible. This would not be the case with CAP conditionality as it considers ongoing funding.

During the Water Conference 'Water pricing in agriculture: on track for a fair and efficient policy in Europe?' organised on 14 September 2011 in Warsaw, a number of other issues were mentioned. A shift to individually metered systems may be difficult, especially in specific situations with area-based systems, no history of metering or from cost-perspective. Metering can face rejection by farmers because of additional costs and additional controls which are not accepted.

The Third Water Conference concluded[94] that mandatory metering is needed for the implementation of water pricing policies in Europe. Furthermore, it concluded that there is a need to impose conditions on the use of EU funds (Rural Development, Cohesion Policy). It was also argued that the objectives of the WFD should be included in cross-compliance requirements under the CAP.

The published positions of organization also provide information on the acceptability of the options. The European Federation of National Associations of Water and Waste Water Services (EUREAU)[95] considers that while metering can be an important tool to improve water efficiency and raise consumer awareness, a cost-benefits and cost-effectiveness assessment must be done when developing a metering policy, so as to address particular economic and technical feasibility questions. The Federation argues that 'it should be left free to local authorities to decide whether to put in place further metering systems'.

With regard to conditionality under the CAP, it is important to note that this report is being finalised in the middle of the adoption procedure of the proposed new CAP Regulations. Both Council and Parliament have presented positions on conditionality within Pillar I and these reflect the positions of some stakeholders, Member States, etc. This is not the place to summarise the ongoing (and moving debate), except to note that the issue is controversial. Positions with regard to water policy include The European Federation of National

94 http://waterblueprint2012.eu/sites/default/files/Key%20Messages_English_1.pdf

95 EUREAU (2012). Position Paper on Water Efficiency in Buildings.

Associations of Water and Waste Water Services (EUREAU)[96] which argues for a strong Pillar I, for its greening and application of cross-compliance, but that measures should be decided at national level to avoid a one size fits all approach at EU level. A group of environmental NGOs makes a strong statement97 that elements of the WFD should be added to cross compliance so as to lift the environmental baseline of farmers.

4.7 Economic, social and environmental impacts

Note that the option 2a focuses on improved management of water bodies and on better implementation of the WFD. Therefore, the analysis has been limited to the issues of effectiveness, efficiency and coherence above. Only the other options are analysed according to the full range of detailed economic, social and environmental impacts in this section.

Economic impacts

The economic impact of mandatory options (2b1 and 2b2) for metering can be viewed as the economic impact of compliance with the WFD as the objective is to clarify the preconditions necessary for implementation of Article 9. For major water users, installation of meters and resulting costs for water use (dependent on national pricing policies) would add to costs, if these are not already in place. While these costs could have knock-on impacts on welfare and competitiveness (if these are significant), they only occur due to the need to close the existing implementation gap of the WFD. Thus the options can be viewed as not imposing additional economic costs over and above existing EU law. Furthermore, if mandatory options were to be taken forward and a WFD amendment proposed, a specific subsequent IA would be undertaken.

When assessing the economic impacts of option 2c, the most significant type of economic impact to be looked at concerns the additional costs of the inclusion of Article 9 in the scope of Cross Compliance. This is specifically targeted at the agricultural sector. At a general level, it was estimated that across the EU the costs for reaching full compliance brought to a reduction of the agricultural welfare of 0.6% upon full compliance being achieved which can be considered as a marginal income reduction[98]. The inclusion of an additional basic requirement, in this view, is unlikely to add a significant burden on the sector, but rather to have a very marginal effect on the total agricultural welfare. Additional costs attributable to

96 EUREAU (2012). EUREAU Position on the Water Blueprint. Also EUREAU (2010). Position Paper on the post-2013 Common Agricultural Policy.

97 Birdlife et al. (2012). Briefing. Reform proposals for the Common Agricultural Policy. Common Briefing of Birdlife Europe, the European Environmental Bureau, the IFOAM EU Group and WWF.

98 CCAT (2010) in: Jordbruks verket (2011). “Environmental Effects of Cross Compliance”. Report 2011:5eng.

the policy option, in fact, can be tracked down only to some possible additional transaction costs, as one more basic requirement would involve more paper work from the farmers' side. These additional costs, however, would be very limited, and would add up to the already marginal overall compliance costs borne by farmers.

In addition, it was observed that the current costs of Cross Compliance seem to have a minimal impact on competitiveness, as the latter is influenced also by other factors such as physical conditions and infrastructures, human capital, financial aspects and markets[99]; in this view, the impact on competitiveness of possible (limited) additional costs due to the inclusion of the WFD to SMRs can also be expected to be minimal. The inclusion of an additional basic requirement, in this view, is unlikely to add a significant burden on the sector, but rather to have a very marginal effect on the total agricultural welfare. In conclusion, the policy option is expected to deliver a very limited negative economic impact on the agricultural sector, which can be considered negligible. Article 9 of the WFD would be included in Cross Compliance as a SMR, and thus it would not represent and additional obligation posed specifically by Cross Compliance, but rather an overarching provision. Therefore, although metering obligations themselves can involve additional costs for farmers, this cannot be attributed to Cross Compliance and, in the same way, possible impacts on competitiveness cannot be tracked back directly to Cross Compliance. In other words, the inclusion of metering in the Cross Compliance mechanism would not have an additional impact as compared with simple full implementation of Article 9.

Some additional transaction costs for farmers, however, can be expected, as the addition of an extra SMR can involve additional time to gather information and to fill out the application forms. It is difficult, however, to quantify transaction costs involved in Cross Compliance and, as a consequence, to quantify additional costs connected to the introduction of new SMRs. In a study on transaction costs in the French Pyrenees, for example, it was reported that transaction costs are highly dependent on the capacity of farmers to become acquainted with the procedures, i.e. on the profile and background of each farmer[100]. The inclusion of one SMR in Cross Compliance, however, is likely to impose very limited additional costs to the application procedure.

99 IEEP, 2007. "The possible impacts of Cross Compliance on Farm Costs and Competitiveness – Deliverable 21". The Cross Compliance Network, Sixth Framework Programme, Project Number SSPE-CT-2005-022727.

100 Ridier, A., Képhaliacos, Ch., and Carpy-Goulard, F., 2008. "Cross Compliance of CAP First Pillar Measures: a Transaction Costs Assessment". Unversity of Toulouse. EAAE 2008.

A further cost which might affect farmers is the cost of non-compliance, or more precisely the reduction of CAP payments following non-compliance to the basic requirements[101]. This type of cost, however, is extremely difficult to quantify: compliance levels differ not only from country to country, but also from one requirement to another; the number and frequency of inspections is also another component, especially because inspections were evaluated as insufficient and ineffective[102].

The inclusion of additional SMRs to Cross Compliance might imply some very limited additional costs for national authorities in charge of administering Cross Compliance. In Sweden it was reported that Cross Compliance has implied additional administrative costs, in terms of additional administrative labour, for County Administrative Boards and Municipal Governments, although in the case of Municipalities these costs could not be attributed directly to Cross Compliance[103]. In the UK, the policy costs of Cross Compliance were calculated to be around £ 8.3 million (about 9 million €), against public benefits from the policy estimated to be between £ 24-40 million (about 25-45 million €)[104]. Therefore, even limited additional administrative costs due to the inclusion of new SMRs can be seen as negligible as compared to the public benefits obtained though Cross Compliance.

Social impacts

Metering can face rejection because of additional costs and additional controls which are not accepted by farmers. For the latter, a shift to metered systems may be difficult, especially in specific situations with area-based systems, no history of metering (e.g. in situations where there is abundant water availability), gravity-fed systems (difficult to attribute the water quantity to individual farmers) or from a cost-perspective (difficulty of approximation of quantities for groups of farmers in certain situations).

Several studies[79] have highlighted how conditionality has promoted the growth of Farm Advisory Services, consulted by farmers to get help with the application procedure; as the inclusion of WFD in SMRs might involve a slightly higher complexity in the application process, the demand for these services might experience a little growth, ultimately leading

101 IEEP, 2007. "The possible impacts of Cross Compliance on Farm Costs and Competitiveness – Deliverable 21". The Cross Compliance Network, Sixth Framework Programme, Project Number SSPE-CT-2005-022727

102 Bird Life International (2009). "Through the green smokescreen – How is CAP cross compliance delivering for biodiversity?" Brussels, Belgium, 2009.

103 Jordbruks verket, (2011). "Environmental Effects of Cross Compliance". Report 2011:5eng

104 ADAS (2009). "Evaluation of Cross Compliance". Report prepared for Defra Agricultural Change and Environment Observatory, UK.

to a larger labour demand form the side of Advisory services. The impact on the labour market as a whole, however, is expected to be marginal.

At a more general level, the costs of conditionality were reported to be disproportionate for small farms[105]. However, the inclusion of an additional SMR, is not expected to have a significant additional impact as compared to the current situation.

Some studies[106] reported that Cross Compliance has resulted in an increased awareness of existing legislation and of the role of agriculture in protecting the environment. In this sense, the inclusion of WFD in the scope of Cross Compliance could result in better knowledge of the legislative framework as well as an increased awareness on the importance of an efficient use of water resources and its beneficial effects on the environment. In this light, a positive impact on public awareness and participation is expected.

The implementation of Article 9 of the WFD through the metering options is expected to bring about a more efficient use of water resources, resulting in more water available for the environment and, ultimately, in better environmental and health conditions for EU citizens. The inclusion within Cross Compliance, however, it is not expected to bring additional benefits in this sense, as compliance with Article 9 is already mandatory, with or without Cross Compliance.

Environmental impacts

The implementation of Article 9 of the WFD is expected to lead to a more efficient use of water resources, reducing water use and resulting in more water available for ecosystems, as well as in an enhanced preparedness to water scarcity situations. The effect of WFD amendment or inclusion of metering as an SMR, however, is not expected to deliver large scale additional benefits, over those which might occur in case this inclusion accelerate full implementation of the WFD in some Member States.

In considering the environmental impact of SMRs in Cross Compliance, it is important to stress that a large number of these basic requirements have had, so far, minor actual environmental benefits, as they were already included in pre-existing legislation; as observed, for example, in Sweden[79]. This is also likely with conditionality, as the WFD is pre-

105 Jordbruk verket, (2011). ADAS (2009). "Evaluation of Cross Compliance". Report prepared for Defra Agricultural Change and Environment Observatory, UK.

106 ADAS (2009); Nitsch, H., and Osterburg, B., (2008). "Criteria for an efficient enforcement of standards in relation to cross compliance". Johann Hienrich von Thunen-Institut / Institut of Rural Studies, Braunschweig, Germany. 12th Congress of the European Association of Agricultural Economists – EAAE, 2008.

existing legislation, and inclusion of metering as an SMR would not generally be a new obligation.

However, there may be additional environmental benefits of conditionality compared to the baseline:

- Cross Compliance has resulted in higher legislative and environmental awareness among farmers studies[107];
- In addition, the inclusion of Article 9 in Cross Compliance might promote and speed up full implementation of the Article in those Member States which are not yet fully compliant.

For this reason, conditionality is expected to deliver a slight but positive environmental impact and, in particular, a positive impact on some key environmental issues:

- Preparedness to climate change, due to a more responsible attitude towards the use of water resources;
- Biodiversity and landscape (marginal impact);
- Environmental consequences of agricultural enterprise, due to an improved awareness on the real value of water.

Article 9 is aimed at reducing water use, which is normally accompanied by a reduced energy use, for example avoiding the implementation of expensive and energy-consuming technologies for capturing water resources (e.g. desalination plants); at the EU level, however, this impact is expected to be marginal as compared to overall energy use in Member States. Minor additional benefits are expected from increasing the acceleration of full implementation of the WFD in some Member States by legal amendment. A marginal reduction in energy use (see above) will in turn lead to a marginal improvement of air pollutant emissions, but again this positive impact would be due to accelerated implementation of the WFD.

Conditionality, however, could lead to an increased awareness on the real value of water by farmers, which might lead to an increased overall environmental awareness and to a more responsible attitude toward water resources and the environment resulting, in the long-

107 Nitsch, H., and Osterburg, B., 2008. “Criteria for an efficient enforcement of standards in relation to cross compliance”. Johann Hienrich von Thunen-Institut / Institut of Rural Studies, Braunschweig, Germany. 12th Congress of the European Association of Agricultural Economists – EAAE, 2008. And ADAS (2009). “Evaluation of Cross Compliance”. Report prepared for Defra Agricultural Change and Environment Observatory, UK.

term, to more environmental-friendly practices benefiting ecosystems and landscape. In any case, it is not possible to estimate the likelihood and magnitude of such impact.

4.8 Conclusions

This section has explored a range of different options to address various aspects of enhancing the use of metering in the EU.

The objectives set out earlier are for:

- Member States to sufficient metering as a precondition for charging for water supply which provide adequate incentives to increase water efficiency.
- Illegal abstraction should be reduced.

The GMES option (2a) explicitly focuses on the second objective. It is clearly strongly effective and efficient and builds on current initiatives. There is, therefore, a strong case to take this forward in the Blueprint.

The options amending the WFD explicitly address the first objective, but would have a knock-on impact on the second objective. The options have the potential to enhance metering in Member States and improve WFD implementation. However, there is no opportunity immediately within the Blueprint to progress a WFD amendment, but the issue could be returned to when the WFD is reviewed in several years time.

The conditionality option also contributes to both objectives. However, the current state of revision of the CAP and Cohesion regulations mean that there is not an immediate opportunity to progress such an option. However, this option has the potential to be effective and is supported by a range of stakeholders. Thus it could be returned to at a future opportunity when the respective regulations are revisited.

Table 8. Overview of the impacts concerned with addressing the problem of metering

Note 1: The option for GMES (2a) is treated separately below the initial table as the scope of its analysis is limited to issues of effectiveness, efficiency and coherence.

Note 2: for ease of comparison, the two options for legal amendment are treated together in the table. Magnitude of impact as compared with the baseline scenario (the baseline is indicated as 0): ++ strongly positive; + positive; – – strongly negative; – negative; ≈ marginal/neutral; ? uncertain; n.a. not applicable.

Description of the option	Option 2b1 consists of amending the WFD to make it explicit that Art.11 includes mandatory metering. Option 2b2 consists of amending the WFD to require metering of individual water consumption and/or use in these cases where metering is a cost-effective solution.	Option 2c consists of making CAP and Cohesion Policy funding for irrigation projects conditional upon the installation of metering devices for individual users (this option cannot be taken forward at present but integrated for sake of completeness and comparison).
Effectiveness towards sectoral integration	+ mandatory metering requirements pave the way for water pricing as they are a prerequisite to water pricing	++ stimulates metering by means of an economic instrument + Metering is a prerequisite to water pricing
Effectiveness towards other specific objectives	++ Transparency and measurement are essential tools for effective water management + Metering is key to ensure a legal framework + Metering is a prerequisite for monitoring and controlling	+ option might promote collaboration between authorities in charge of administering CAP payments and water agencies + likely to raise farmers' awareness on Art. 9 of the WFD and on the real value of water + Stimulates metering which is a prerequisite for monitoring
Efficiency	-- high administrative burden for EC, Member States, industry and farmers - WFD options would entail unnecessary costs if it is obliged in specific situations with low cost-effectiveness of metering - administrative burden for water users/ Member States where metering problem is less existing	+ RD and CP funding is limited in time and to eligible regions - inclusion needed of the new rules in the Fund proposals (administrative burden for EC) - applications for funding will need to prove conditionality (administrative burden for farmers)
Coherence	+ aids coherence in approach between Member States which can provide a firm basis for other policy interventions	+ option is coherent with EU policy objectives and Cohesion Policy - metering option may not be coherent with current proposal for Rural Development Policy

Acceptability	Opinion is divided on regulatory options: for amending Article 11 of the WFD, 42% of respondents to Public Consultation are in favour and 41% opposed. A broader amendment to the WFD receives only 34% in favour and 46% opposed.	50% of respondents to Public Consultation are in favour of a requirement for irrigation projects funded (19% respond negatively)
Ecological Status	≈/+ to the extent that water quantity affects quality	≈/+ to the extent that water quantity affects quality,
Water Stress	≈/+ a WFD amendment would impact by speeding up implementation in some Member States, reducing some water pressures	≈/+ conditionality would impact by speeding up implementation in some Member States, reducing some water pressures
Vulnerability to extreme events	≈ a WFD amendment would not impact on this issue	≈/+ conditionality would impact by speeding up implementation in some Member States, reducing some water pressures and allowing some adaptation response
Other impacts	+ Reduced water use also results in lower energy consumption and lower GHG emissions ≈ No other direct impacts as option seeks to ensure WFD implementation	+ Reduced water use also results in lower energy consumption and lower GHG emissions + The option could also deliver improved awareness by farmers, leading to knock-on benefits on e.g. biodiversity and landscape
Functioning of the internal market and competition	+ a WFD amendment on metering assists implementation and ensures a level playing field +/- a WFD metering amendment would benefit those paying for water currently against those that do not. The latter would lose economic benefits.	+ conditionality of existing pricing and metering requirements ensures an equal playing field for the agriculture sector across the EU - Farmers would lose benefits where they do not currently use meters
Specific regions or sectors	+/- Impact will be on all sectors which are significant water users. However, most sectors already meter water, with some exceptions for some agriculture and households in some regions of Europe. Metering would both raise and lower costs to these users depending on levels of water use and the implementation of pricing policies	- some implementation costs, particularly for farmers, will arise. However, SMRs on metering largely reflect what farmers already need to do, so additional cost would be minimal
SMES	≈ WFD amendment on metering implies no additional costs over current requirements	- some additional costs of metering for farmers (potentially SMEs) which might affect their competitiveness.
Administrative burdens on	-- high administrative burden for EC, MS, industry and farmers - WFD options would entail unnecessary costs if it is obliged in	- costs associated with demonstrating compliance with SMRs, etc. However, not expected to be much additional over current

businesses	specific situations with low cost-effectiveness of metering - administrative burden for water users/ MS where problem is not significant	requirements
Other	≈ no impact on e.g. competitive position of EU agricultural firms, as it would involve only very marginal extra costs for farmers	≈ no impact on e.g. competitive position of EU agricultural firms, as only very marginal extra costs for farmers can be attributed to SMRs - Compliance checking required by public authorities. However, likely to be very small given that compliance checking already has to take place and conditions in the option are easy to check.
Employment and labour markets	≈ a WFD amendment would not impact on this issue	+/- this is difficult to predict, but given the potential SMRs are already required, there should be little net impact of the option.
Social inclusion and protection of particular groups	+ other businesses/consumers would benefit from sectors meeting their obligations	+ other businesses/consumers would benefit from the agriculture sector meeting its obligations
Public health and safety	≈ a WFD amendment would not impact on this issue	≈ the option does not impact on this
Other	Not relevant	Not relevant

Description of the option	Option 11.3: Mapping all EU large irrigated areas via the GMES initiative and match these areas with water abstraction permits to help Member States enforce them and tackle illegal abstraction.
Effectiveness towards specific Objective	++ The option is specifically aimed at providing a new tool and information base to support the enforcement of existing abstraction regulations.
Effectiveness towards other specific objectives	++ Strong information system, also for local/regional governance + integration: Promote a stronger focus on water within GMES, and use GMES to address water issues for key abstraction sectors + The creation of a geographical database on irrigation water use can support use of economic instruments ++ The option would enhance water governance at the river basin and local level. Moreover, this information base might also benefit communication between institutions
Efficiency	+ New governance structure will be needed. Investment costs are expected to be outweighed by benefits in terms of effective water management. The approach is expected to be more effective and efficient compared to ground-based inspections alone.
Coherence	++ The option would fall within the already existing GMES Programme (and would be funded within the Programme).
Acceptability	++ Public consultation: GMES: 58% of respondents support this option with 13% opposed.

5 GLOBAL ASPECTS

5.1 Introduction and problem definition

Though the major part of the Blueprint is focused on the EU's water bodies, it is also important to consider how policy development in this area may affect, or be affected by, countries outside of the EU. The EU's policies should promote sustainable water management that is coherent with the EU-internal development and promotes synergies. Furthermore, the EU policies and consumption patterns should not negatively affect sustainable water management in non-EU countries due to the footprint of virtual water embedded in imported goods. Development policies should also support improved water management in developing countries.

Water scarcity is not only an issue for the EU but is a global concern. This stems not only from the potential impacts of scarcity on the environment, but also the wider risks to businesses and national economies in terms of food security and the sustainability of their production activities[108]. By 2030, under an average economic growth scenario and if no efficiency gains are assumed, global water requirements would grow from 4,500 billion m^3 today to 6,900 billion m^3 and competing demands for scarce water resources may lead to an estimated 40% supply shortage[109]. Mismanagement and wastage of water in water scarce countries could have very negative consequences on local development and even be the cause of migration flows from developing countries.

Global water scarcity issue is relevant in the frame of the EU water policies, as significant EU consumption is based on imports from other regions/countries. Its production patterns and the associated virtual water flow can impact significantly on regional/local water resources and (freshwater) ecosystems (the so called water footprint)[110].

Globally many countries face major problems meeting water objectives and contributing to water-related Millennium Development Goals (MDGs). The EU holds a very high level of water expertise that should be utilised in practice in order to achieve the MDG on basic sanitation and on other water-related sustainable development goals[111]. Different EU initiatives are either investing directly in water aspects in non-EU countries or driving changes in water bodies by investing in water-using developments. This includes the EU Water Initiative (EUWI), European Neighbourhood Policy (ENPI), and other EU processes,

[108] Morrison et. al (2009): Water scarcity and Climate Change: Growing Risks for Investors. CERES. http://www.ceres.org/resources/reports/water-scarcity-climate-change-risks-for-investors-2009/view and several other reports

[109] 2030 Water Resources Group, 2009:5

[110] RPA (2011). Assessment of the efficiency of the water footprinting approach and of the agricultural products and foodstuff labelling and certification schemes. Report for DG ENV.

[111] European Parliament (2012). Report on the implementation of EU water legislation, ahead of a necessary overall approach to European water challenges (2011/2297(INI)).

procedures and projects on external aid, as well as International Conventions. MS have also established bilateral agreements or working collaboration.

The EUWI was launched at the 2002 WSSD in Johannesburg. Its aim is to co-ordinate the financial support policies of the Member States towards water development projects in third countries (as well as the EU's own support projects within the EU Water Facility launched in 2004). The purpose of this policy is to achieve water outcomes outside of the EU. The EUWI has the following five specific objectives:

- Strengthening political commitment to action and innovation-oriented partnership.
- Promoting better water governance, capacity building and awareness.
- Improving the efficiency and effectiveness of water management through multi-stakeholder dialogue and co-ordination.
- Strengthening co-operation by promoting river-basin approaches in national and transboundary waters.
- Identifying additional sources of funding and mechanisms to ensure sustainable financing.

The EUWI operates through different working groups. Four of these have a regional focus – Africa; Eastern Europe, Caucasus and Central Asia (EECCA); the Mediterranean; and Latin America.

A recent SWOT analysis of the EUWI lists as strengths "…the multi-stakeholder feature of the EUWI, …the diversity and flexibility in the way that EUWI can (potentially) be responding to demand… Related to this, the national policy dialogues are an example of successful engagement by the EUWI, especially in the MED and EECCA regions. Last but not least, the EUWI embodies an active water network of collegial and responsive water experts, creating a unique platform for knowledge exchange and linking to other global players". Main weaknesses are "…that the EUWI has been slow or delayed in responding to the changing environment in the water sector, … governance…like the lack of a shared vision and 'grand' strategy, low impact and visibility of the EUWI… [and]… below-standard monitoring and reporting mechanisms…"[112].

The European Commission (DG DEVCO with DG ENV) has also published a major assessment of the benefits of improved environmental management in ENP countries, including for water management[113],[114]. These demonstrate the significant economic benefits that would

[112] EUWI (2011). Towards an EUWI Thematic Strategy. Situation Analysis and its implications. Multi-Stakeholder Forum Version, July 2011.

[113] Ten Brink, P., Bassi, S., Farmer, A., Hunt, A., Lago, M., Larsen, B., Spurgeon, J., Tucker, G., Van Acoleyen, M., Doumani, F. and Van Breusegem W. (2011). Analysis for European Neighbourhood Policy (ENP) Countries and the Russian Federation on Social and Economic Benefits of Enhanced Environmental Protection. Regional

arise from improved water management. Furthermore, a recent evaluation[115] of EU development assistance for drinking water supply and basic sanitation in sub-Saharan countries.

Though the initiatives are streamlined with sustainable development goals, including the Millennium Development Goals, it remains unclear if the initiatives are (fully) coherent with the principles of the EU water policy, e.g. setting and achievement of environmental objectives, addressing pressures, active public involvement, cost recovery, IWRM and IRBM, etc.

It is furthermore unclear if and how the good practices in implementing these principles (and other principles derived from global sustainability targets) are shared between the EU, its institutions and society and the non-EU countries and their institutions and society to foster sustainable water management.

Awareness of the issues of virtual water is increasing, and it can be expected that the changes in behaviour of individuals can contribute to a reduction of impacts, though there is also a risk for a behaviour-impact gap[116]. There are furthermore an increasing number of initiatives globally aimed at developing certification standards for application across commodity supply-chains[117]. In order to increase consistency, water footprints should be considered as elements of overall (company) footprints, considering more resources than only GHG emissions[118].

Synthesis Report: ENPI South. A synthesis report on Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, occupied Palestinian territory, Syria and Tunisia.

[114] Ten Brink, P., Bassi, S., Farmer, A., Hunt, A., Lago, M., Larsen, B., Spurgeon, J., Tucker, G., Van Acoleyen, M., Doumani, F. and Van Breusegem W. (2011). Analysis for European Neighbourhood Policy (ENP) Countries and the Russian Federation on Social and Economic Benefits of Enhanced Environmental Protection. Regional Synthesis Report: ENPI East. A synthesis report on Armenia, Azerbaijan, Belarus, Georgia, Moldova, Russia and Ukraine.

[115] European Court of Auditors (2012): Special Report No 13/2012: European Union development assistance for drinking water supply and basic sanitation in sub-saharan countries. ISBN 978-92-9237-826-4. Available at: http://eca.europa.eu/portal/pls/portal/docs/1/16800740.PDF. Please note also that the Commission is of the view that care must be taken in drawing any general conclusions, in particular regarding the following points: 1) A lot of projects were very ambitious and some needs, mainly secondary ones, were not fulfilled. 2) Most of the audited projects were approved before the establishment of quality support groups (QSG) effective as from 2005.

[116] Csutora, M. (2012). One More Awareness Gap? The Behaviour-Impact Gap Problem. Journal of Consumer Policy, 35, 145-163. DOI: 10.1007/s10603-012-9187-8l. Summary published at: http://ec.europa.eu/environment/integration/research/newsalert/pdf/292na6.pdf

[117] RPA and Cranfield University (2011). Assessment of the efficiency of the water foot printing approach and of the agricultural productions and foodstuff labelling and certification schemes. Study for the European Commission, DG Environment.

[118] Ecorys (2012). Study on Incentives Driving Improvement of Environmental Performance of Companies. Under FWC ENTR/29/PP/2010FC Lot 1for the European Commission – DG Environment.

This issue is relevant in the frame of the EU water policies, as significant EU consumption is based on imports from other regions/countries. As discussed in the UN's World Water Development Report[119], rich nations are tending to maintain or increase their consumption of natural resources by exporting their footprints to producer, and typically, poorer, nations[120]. For example, 62% of the United Kingdom's water footprint is virtual water embedded in agricultural commodities and products imported from other countries (38% originates from domestic water resources[121]), transferring water consumption and pollution as well as uncertainty and risk to developing nations less prepared to deal with these impacts. Similar studies have been developed for other Member States of the EU[122].

Its production patterns and the associated virtual water flow can impact significantly on regional/local water resources and (freshwater) ecosystems (the so called water footprint). The issues of embedded water are complex and not possible to review here, except to note that the embeddedness of water in itself is not a problem (unlike embedded carbon), but whether there are water issues where products are produced (thus adding to the complexity). Furthermore, any actions to highlight the issue or address it in relation to imports of products to the EU, raises the issue of embeddedness of water within the EU and issues of trade, WTO, the single market, etc.

The problem facing EU policy is, therefore, not only to identify whether one can address embedded water, but also how this can be done that makes environmental sense and is consistent with the trade and market systems in which the EU operates, as well as ensuring a kind of level playing field that is coherent with (local) sustainability and does not rely (only) on National regulations, that might distort a sustainability approach.

In conclusion, global water management is a significant problem that represents a major threat to the achievement of development objectives. Actions (commercial and policy) by the EU interact strongly with these water management challenges and, therefore, EU policy needs to be considered not only as to how it impacts on water resources within the EU, but also those of 3rd countries.

5.2 Baseline and justification for EU level action

Work by UNEP, UNDP, WHO and others all stress the fact that while some progress is being made with water management in developing countries (institutionally and in technical developments), serious challenges remain. Population increases are a serious threat not only for water abstraction but for increasing agricultural, urban and industrial pollution and

[119] WWAP (World Water Assessment Programme) (2012). The United Nations World Water Development Report 4: Managing Water under Uncertainty and Risk. Paris, UNESCO.

[120] WWF (World Wide Fund for Nature) (2010). Living Planet Report 2010: Biodiversity, Biocapacity and Development. Gland, Switzerland, WWF.

[121] Chapagain, A. K. and Orr, S. (2008). UK Water Footprint: The Impact of the UK's Food and Fibre Consumption on Global Water Resources. Volume 1. Godalming, UK, World Wide Fund for Nature (WWF).

[122] Germany, Netherlands and Spain (http://www.waterfootprint.org/?page=files/NationalWaterFootprint).

leading to the desire for hydromorphological changes through hydropower. Furthermore, economic developments will outweigh the environmental efforts made by the EU. Climate change will worsen the situation in many places and put additional threats on water resources. A review[123] of the EUWI was undertaken from 2006 to 2007. It concluded that 'the Initiative has failed to meet the high expectations that accompanied the launch in 2002', noting that there has been 'an increasing belief that the EUWI was constrained by a lack of clarity surrounding its objectives as well as cumbersome governance arrangements'. In 2011, another review was carried out (EUWI, 2011) in order to define a 2nd Generation of EUWI and its Thematic Strategy. The EUWI is evolving, but it is difficult to identify how rapid change will be and how far assistance provided within the EUWI will address the increasing challenges that developing countries face.

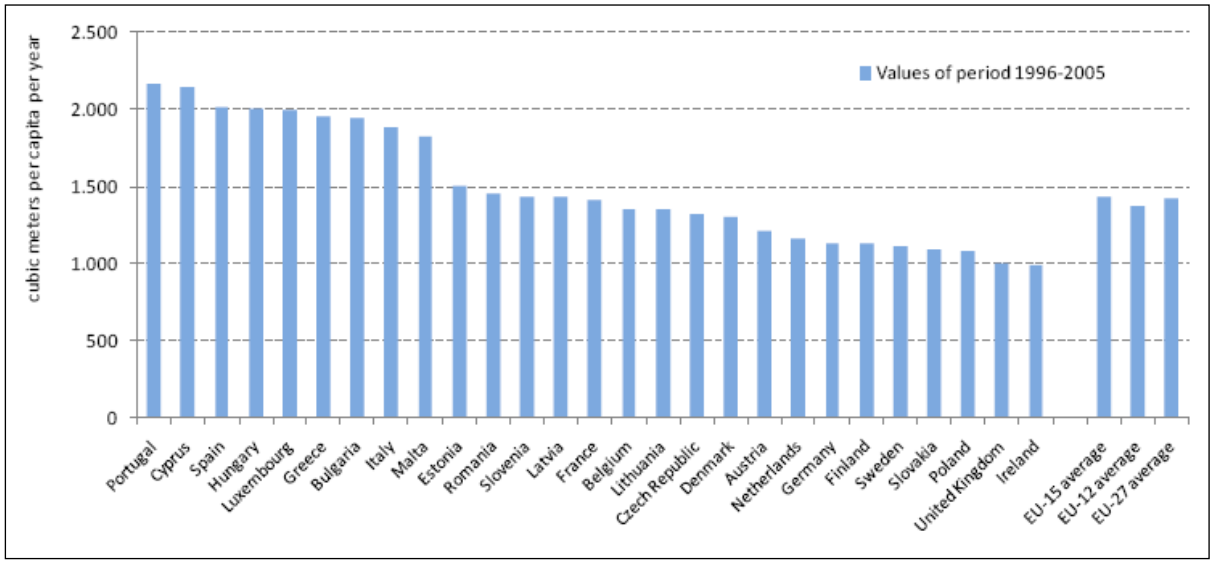
In order to reduce the EU's pressure on 3rd country water resources, measures around the concept of virtual water might have an impact. However, this concept is not expected to be taken up enthusiastically by consumers because of its complexity and the lack of simply and understandable message to the consumers. So consumers' awareness of water imports and shipping water from one region to another will remain limited. Nonetheless, it is expected (WWAP, 2012:279) that a global water footprint measure will likely be available and published widely on an annual basis between 2020 and 2030.

In fact, the Water Footprint Network (WFN) has already released significant methodological guidance and result documents, reflecting e.g. the water footprint for nations[124].

[123] EUWI (2007). Review of the European Union Water Initiative: Volume I: Main Report, http://www.euwi.net/files/euwi/926_tmpphpgO1rFo.pdf.

[124] Figure taken from BIO Intelligence Service, Institute for Social Ecology and Sustainable Europe Research Institute. (2012) Assessment of resource efficiency indicators and targets. Final report prepared for the. European Commission, DG Environment, referring to Mekonnen, M.M. and Hoekstra, A.Y. (2011) National water footprint accounts: the green, blue and grey water footprint of production and consumption, Value of Water Research Report Series No. 50, UNESCO-IHE, Delft, The Netherlands: Annexes VIII and IX.

Figure 11. Per capita water footprints for European countries



At EU level, the EU's Resource Efficiency Roadmap defined the future role of the environmental footprint methodologies, stating that the Commission will:

- Establish a common methodological approach to enable Member States and the private sector to assess, display and benchmark the environmental performance of products, services and companies based on a comprehensive assessment of environmental impacts over the life-cycle ('environmental footprint') (in 2012).
- Ensure better understanding of consumer behaviour and provide better information on the environmental footprints of products, including preventing the use of misleading claims, and refining eco-labelling schemes (in 2012).

DG Environment has worked together with the Joint Research Centre and other Commission services towards the development of a technical guide for the calculation of the environmental footprint of organisations (including carbon). The methodology has been developed building on the Reference Life Cycle Data System Handbook, as well as other existing methodological standards and guidance documents including on water footprints. The first draft of the organisational environmental footprint methodology was discussed in detail during a workshop in 29-30 November 2011 and subsequently revised[125]. The final methodological guide will be available by the end of 2012.

A proposed basket for indicators includes two resource-oriented indicators for water use (domestic water use: water abstraction, ideally changed in the medium-term towards water

[125] JRC (2012). Organisation Environmental Footprint (OEF) Guide. Deliverable 2 and 4A to the Administrative Arrangement between DG Environment and Joint Research Centre No. N 070307/2009/552517, including Amendment No 1 from December 2010.

consumption; and global: water footprint) and two environmental impact-oriented indicators (domestic: WEI, and global: Global Water Consumption Index[126]).

Without action in the field of certification and labelling, the baseline for further evolution can be established in the following way[127]:

While a small number of retailers and food product manufacturers have begun to promote water efficiency and water stewardship activities to take water efficiency into account throughout their supply-chains, most firms often lack the means or know-how. The uptake of certification/labelling therefore remains low. Furthermore, barriers to market entry would vary between companies and may be substantive for some SMEs. Therefore, it is likely that uptake of schemes as currently established would be slow.

There are an increasing number of initiatives globally aimed at developing certification standards for application across commodity supply-chains[128], e.g. the forthcoming ISO standard 14046 expanding the scope of the water footprint to life cycle analysis, the European Water Stewardship (EWS[129]) part of the global Alliance for Water Stewardship (AWS), etc. There are different approaches in this field[130], and they are increasingly converging in order to ensure robustness and coherence of the approach[131].

However, for companies, the use and application of water footprint methodologies continues to be inconsistent. Water footprint assessments are used for reporting and communication purposes, with communication becoming increasingly consumer-facing over time. There is the potential for consumer confusion and misinterpretation. Over the short to medium term, consumers continue to lack the information needed to make more sustainable purchasing decisions and eco-label schemes remain largely ineffective with

[126] BIO Intelligence Service, Institute for Social Ecology and Sustainable Europe Research Institute (2012): Assessment of resource efficiency indicators and targets. Final report prepared for the. European Commission, DG Environment: 44. Global Water Consumption Index (WCI). Definition: Annual direct and indirect consumption in a water shed of blue and green water divided by the longterm average freshwater resources in the water shed. Unit of measurement: index (in %). Data: not yet available. Methodology: not yet developed. Decomposition: in the future: by blue/green water; by geographical region, where water uptake takes place. Strengths: Includes blue and green water, Includes direct and indirect consumption, thus considers effects of international trade, Assesses water consumption, not only water abstraction, Water shed level, not only national level, Includes global perspective. Weaknesses: Indicator very difficult to calculate with high data requirements, Considerable effort in setting up accounting principles and creating data, Possibly not available in the next 5 years.

[127] RPA & Cranfield University, 2011:91-93

[128] RPA & Cranfield University, 2011

[129] http://www.ewp.eu/activities/water-stewardship/

[130] Ruth Segal & Tom MacMillan (2009): Water labels on food: Issues and recommendations. The Foods Ethical Council: 5-8. http://www.sustainweb.org/pdf/water_labels_on_food.pdf

[131] Alliance for Water Stewardship Frequently Asked Questions (FAQs). Section 8. http://www.allianceforwaterstewardship.org/assets/documents/AWS_FAQs_March12_FINAL.pdf

respect to water consumption. Therefore, without further clarification, it is not evident that significant progress on certification/labelling would be made.

In the short term, businesses practicing water efficiency and stewardship gain a competitive advantage but take-up of water efficiency and stewardship remains limited. Those who are already involved, or who become involved, in labelling/certification schemes gain a slight competitive advantage, but in the long term eco-label/certification schemes remain largely ineffective due to lack of consumer understanding/awareness and the lack of a consistent scheme, so that these business advantages are currently limited. The uneven playing field between the relatively small number of companies that have already undertaken water footprint assessments and the relatively large number of companies that have not remains.

Certification/labelling does not yet impact significantly on trade decisions and trade flows. There is some cross border trade in environmentally friendly technologies, and a degree of innovation and knowledge transfer. There is some international partnership, co-operation and support in the area of sustainable development under the EUWI. As such there is a move toward better water governance, capacity building and awareness of water issues at the international level. Support for increased water efficiency measures in third countries from the EU is, therefore, expected to increase, not least learning from lessons in taking improved water efficiency measures within the Union itself.

Many companies continue to face problems including water shortages and rising prices for abstraction. Industry bodies continue to support the development of freely available tools to assist businesses in assessing and managing their water related risks but this work continues to be driven by the larger corporate organisations. Larger corporate organisations have begun to assess and manage their water related risks, the majority of businesses continue to be exposed to risks associated with water scarcity and drought. Many small and medium sized businesses remain unaware of the potential importance of water supply and demand imbalances to their activities. SMEs struggle to meet the stringent requirements of some certification/labelling schemes and so uptake among SMEs remains low. There are several initiatives aimed at developing standards for certification of water stewardship, with some focusing on global coverage and products and others focusing on agricultural production activities. Although all of these schemes are voluntary, as a wider number of schemes come into being it will become increasingly difficult for businesses and agricultural producers to identify those schemes that are most appropriate to their activities and business objectives. A lack of incentives to subscribe to such schemes will remain, unless there is a growing demand for water stewardship certification across supply-chains. An increasing number of small operators may also have to comply to several certification schemes to stay in business with bigger partners, thus facing increases in certification costs. It is likely, therefore, that where firms identify water efficiency as an important business security issue, that they will engage more in auditing and development of appropriate responses.

Regarding Innovation and research, water footprint methodologies continue to be developed independently of one another and a lack of consistency in their use remains. There is some technological progress with regard to water efficient technologies, but take-up is slower than desirable. Over the long term, the level of knowledge and understanding of water use increases as measures are taken to monitor resource use at the catchment level under the WFD.

EU level action is justified because action taken within the EU to influence the market (e.g. via labelling) would influence not only the single market but also external trade policy. Therefore, elaboration of options of this type would need to be consistent with these general policies and is appropriate at EU level because of the Union's competence in these areas. There is limited or no evidence of possible individual MS efforts in promotion new water labelling, certification and environmental footprinting[132].

Furthermore, EU level action on virtual water is justified as it is important for the internal market policies to be consistent with the EU development policy, such as via the EUWI.

5.3 Objectives

Mismanagement and wastage of water in water scarce countries could have very negative consequences on local development and even be the cause of migration flows from developing countries. There are two principle areas where action within the EU can contribute to meeting the objectives of sustainable water management linked to the achievement of the Millennium Development Goals of halving by 2015 the proportion of the population without sustainable access to safe drinking water and basic sanitation. These are:

- That the EU (EU institutions, Member States, civil society, etc.) can contribute, through shared experience and finance, to improved water management in third countries, building on the existing experience of collaboration and the EU Water Initiative.
- That actions (e.g. by consumers) in the EU can add to the pressures on waters in third countries through the impact of virtual or embedded water within imports of agricultural and industrial products into the EU.

However, current reviews of the EUWI, etc., mean that policy action on bilateral support is to be taken forward separately from the Blueprint. Therefore, the primary policy objective for the Blueprint concerns virtual water:

- To improve the understanding of policy makers and consumers of the virtual water embedded within imports to the EU in order to develop improved assistance policies and improved consumer choice.

[132] ACTEON (2012): Gap Analysis of the Water Scarcity and Droughts Policy in the EU. Final Report:53

In taking forward this objective regarding global water issues in the Blueprint it is important that there are SMART indicators for monitoring their progress and, therefore, whether the objectives have, or have not, been achieved. This will enable the success of policies to be determined and potential barriers (if they occur) to be addressed as policies are reviewed.

For the objectives regarding global water issues, the following SMART indicators are proposed:

- The number of products for which virtual/embedded water has been robustly determined.
- The number of countries for which virtual water studies have been undertaken which relate accurately to real water resource challenges.
- The number of EU companies which have determined their risks to water resource challenges and have reduced embedded water as a result.
- The adoption of EU policies (soft or hard) that take forward the concept of virtual water.

5.4 The options and their elaboration

The EU supports the achievement of the Millennium Development Goals (MDGs) on access to drinking water and sanitation and it will take into account relevant outcomes of the Rio+20 Conference (June 2012). The EU also contributes to sustainable and integrated water management in developing countries. For the public consultation an appropriate option for this issue is to help developing countries to put in place integrated sustainable water management through EU development cooperation. This would need to be taken forward within the framework of the EU Water Initiative, which is an on-going process with its own funding and review processes. A 2nd generation initiative with a focus on "Water for Growth and Development" is under development[133].

Regarding embedded water, options addressing virtual water represent alternative approaches on this issue. Virtual water is of concern and, therefore, should be considered further, such as for further research and soft and hard policies.

Table 9 describes the options as originally developed in the project and submitted for the public consultation together with the final elaboration of options included within the IA, following further discussion with the Commission. The option to keep footprinting under review was not considered appropriate for IA as such analysis would underpin the two retained options in any case. Finally, while assisting third countries with sustainable water management is important, it was considered that this is already the role of the EU Water Initiative and this has its own review process, so that separate analysis within the Blueprint IA is inappropriate.

[133] EUWI (2011). Towards an EUWI Thematic Strategy. Situation Analysis and its implications. Multi-Stakeholder Forum Version, July 2011.

Table 9. The options originally considered and final options to address global issues

Options originally considered	Final options for the IA
• Help developing countries to put in place integrated sustainable water management through EU development cooperation • Raise consumers' awareness of the water footprint of products • Keep under review water foot printing tools with a view to test their usefulness for voluntary product labelling (e.g. as part of EU Ecolabel). • Mandatory labelling of most embedded water intensive products.	• Option 3a: Raise business and consumers' awareness of the water footprint of products. • Option 3b: Mandatory labelling of most embedded water intensive products.

Option 3a is focused on business and consumers, increasing their awareness of the water footprint of products and subsequently promoting coherent acquisition behaviour.

The term "water footprint" (WF) has been used as a measure of a nation's actual appropriation of global water resources and has been defined as the "sum of the domestic water use and net virtual water import"[134], or as a concept to refer to water appropriation by individuals and other well-defined groups of consumers, (e.g. a city, a region or a state) and producers (e.g. a public organization, private enterprise or economic sector). The WF of an individual, business or nation has, therefore, been defined as the total volume of fresh water that is used to produce the goods and services consumed by an individual, business or nation[135]. Somewhat confusingly, the term WF has also been used to describe the virtual water content of a range of commodities and products (e.g. cotton, tea and bio-energy) summed over their life cycle[136], which is the focus chosen for this option.

There are several concerns with regard to the use of water footprinting. These lie mainly with the inconsistent use and application of the competing methodologies[137] and the failure of the methodologies to provide a reliable indicator of the environmental impacts of water consumption. These issues can be categorised as being conceptual, methodological or interpretation related; and include e.g. the reduction of a water footprint to a single number; differences in the distinctions that are made between the different water types; assumptions of equality across blue water sources; and failure to consider the efficiency of

[134] Hoekstra AY & Hung PQ (2002): *Virtual Water Trade: A Quantification of Virtual Water Flows Between Nations in Relation to International Crop Trade*

[135] Hoekstra & Chapagain (2008): *Globalization of Water: Sharing the Planet's Freshwater Resources*, UK, Blackwell Publishing.

[136] RPA & Cranfield University (2011):iii; "...used to refer to the sum of water used or incorporated in the various steps of the production processes of a commodity…"

[137] Morrison et. al (2009): Water scarcity and Climate Change: Growing Risks for Investors. CERES. http://www.ceres.org/resources/reports/water-scarcity-climate-change-risks-for-investors-2009/view

the production activities being assessed. Not all authors or stakeholders would agree with the above views and it is clear that businesses have found that the detailed layer of information which is embedded in the composite WF indicator can provide the information needed to develop strategies for more sustainable water use and for identifying risks. This is one of the key drivers underlying corporate interest in the use of these techniques across their supply-chains.[138]

Option 3b is consists of a mandatory certification and labelling scheme for products to provide assurance that specified production methods or product characteristics have been met. The idea of such schemes is to make the history of products more transparent, thereby enabling consumers to express their environmental and social values through their purchasing decisions. Schemes currently in operation in the EU address a myriad of different issues and function at different stages of the food supply-chain - including the business-to-business (B2B) and business-to-consumer (B2C) level. While some labelling and certification schemes cover a single criterion, many are multi-dimensional covering a range of environmental and/or social criteria.

Certification standards have emerged as powerful tools for influencing both business practices and for responding to consumer preferences, because consumers have proper information to make the choice of acquiring a product that has a relatively low water footprint or that has its footprint in an area that doesn't have high water scarcity [139]. In this regard, two key purposes for water certification have been identified[140]:

- encouraging water efficiency or water management more generally; and
- bolstering corporate reputations in relation to social responsibility and sustainability, with this having knock-on effects in terms of attracting investors and gaining new consumers.

It should be noted, though, that the meaning of labels linked to certification is not always clear and that standards differ greatly in terms of their level of quality control. This is one of the reasons why the European Commission makes an important distinction between "certification schemes" which, by definition, necessitate a third-party attestation procedure and those "voluntary schemes" which operate on the basis of a label or logo (often registered as a trademark) without involving any certification mechanism[141].

[138] RPA & Cranfield University (2011):vi

[139] http://www.waterfootprint.org/?page=files/FAQ_Why_act_and_how

[140] Richter B (2009). *Sustainable water use: can certification show the way?,* Innovations, Vol. 4, Issue 3, pp. 119-139.

[141] European Commission (2010e). *EU best practice guidelines for voluntary certification schemes for agricultural products and foodstuffs.*

5.5 Effectiveness, efficiency and coherence of the options

Actions on awareness and/or labelling of virtual water and/or water footprint can influence drivers of consumption (food, goods, and thus water) and can have positive effects in the field of sustainable consumption, water efficiency and – if adequately considered in planning – vulnerability to droughts, water stress and ecological status. These effects can be seen in the EU and globally, in particular in those basins where EU consumption patterns drive significant water consumption or produce water stress or deterioration of ecological status.

The selected options foster integration (and coherence) between water policy and sectoral policies not only inside the EU but also at a global level. Therefore, a kind of level playing field has to be established to compare production processes and local situations not only on a regulatory basis but under sustainability thresholds that recognise environmental, social and economic aspects[142]. This issue is already a concern of certification processes; e.g. the AWS International Water Stewardship Standard is designed to be an international, ISEAL-compliant, standard that defines a set of water stewardship principles, criteria, and indicators for how water should be stewarded at a site and watershed level in a way that is environmentally, socially, and economically beneficial[143]. The Standard will involve an assessment of local and national laws. In cases where laws are absent or deemed inadequate to ensure responsible water stewardship, the AWS Standard will provide a minimum level[144].

If adequately promoted, consumers can make use of labels as economic instruments of recognising water efficiency, and business can get more involved in water governance by applying water stewardship programmes. Knowledge is gained about the drivers and pressures of water consumption in basins globally.

As an action targeted on consumers and/or on water-intensive producers, the most relevant impacts can be identified in their fields. Consumers can increase their critical thinking and awareness about embedded water they are consuming. Producers and retailers can be aimed to ensure either more water-efficient production or shift the production to less stressed or vulnerable river basins/regions, taking into considerations business risks due to water. These risks might also be considered by investment funding.

In terms of water efficiency, the changes will most likely happen in the field of agriculture, which in the EU accounts for approximately 30% of total water abstractions and around 55%

[142] ARJEN Y. HOEKSTRA, ASHOK K. CHAPAGAIN, MAITE M. ALDAYA, & MESFIN M. MEKONNEN (2011): THE WATER FOOTPRINT ASSESSMENT MANUAL: SETTING THE GLOBAL STANDARD. PUBLISHED BY EARTHSCAN (ISBN: 978-1-84971-279-8) AND HTTP://WWW.WATERFOOTPRINT.ORG/DOWNLOADS/THEWATERFOOTPRINTASSESSMENTMANUAL.PDF

[143] http://www.allianceforwaterstewardship.org/what-we-do.html#water-stewardship-standard

[144] Alliance for Water Stewardship Frequently Asked Questions (FAQs)
http://www.allianceforwaterstewardship.org/assets/documents/AWS_FAQs_March12_FINAL.pdf

of consumptive water uses[145]. However, in southern European countries (Greece, Italy, Portugal and Spain) these rise to 73% of consumptive use and 62% of total use. Research into the potential for water savings within the EU agricultural sector indicates that significant freshwater savings could be achieved as a result of technological improvements, changes in farm practices, use of more drought-resistant crops or reuse of treated effluent among others, particularly in southern European Member States[146]. It has been estimated that implementation of such measures could potentially lead to total water savings in the EU irrigation sector of 28,420 Million m^3 per year (43% of today's withdrawals) and potential water savings of 52,740 Million m^3 per year in 2030[147], although these figures seem optimistic.

Action can change competitiveness patterns between larger companies and SMEs. Larger companies may be better able to take up stewardship-based certification and labelling, and make better gains when communicating improvements to the public.

The success of any labelling/certification scheme will depend to a large degree on the level of consumer awareness of environmental issues, and vice versa, as it is not yet possible for consumers (whether business or end-consumer) to accurately compare products on the basis of their water footprint.

A Working Group of the Sustainable Consumption and Production Round Table identified a number of costs and benefits to improved sustainability. Although not focused on water specifically, the areas for which costs and benefits were identified would also largely apply to options to improve water efficiency in third countries.

Box, the main costs and benefits from improved sustainability[148].

The mains costs will generally include:

- Human resources
- Awareness raising and gaining consensus (communication, promotion, consumer information/education...)
- In some cases, lower yields and/or higher raw material cost
- Life-cycle assessment studies
- Investment costs to adopt new technologies (water treatment, energy…)
- Inefficiencies led by multiple standards
- Certification costs and related costs, including:
    - Verification processes

[145] Krinner, W. et al. (1999). Sustainable Water Use in Europe. Part 1: Sectoral Use of Water. European Environmental Agency, Copenhagen.

[146] Ecologic (2007):. EU Water saving potential (Part 1 –Report). DG ENV.

[147] idem

[148] Sustainable Consumption and Production Round Table. Report of Working Group 4 Non-Environmental Aspects of Sustainability. December 2010.

    - Training
    - Transportation / Logistics
    - Cost of maintenance of the standard
    - Auditing costs
- Legislative compliance costs: e.g. carbon trading costs, eco taxes etc.
- Costs to deliver to different stakeholders‟ needs / requests that may not be aligned to current business strategies or to agreed prioritisation.

The main economic benefits will generally include:

- Economic savings through resource efficiency (e.g. productivity increases, waste reduction, energy savings, savings of natural resources)
- Possibility to communicate on corporate responsibility
- Increased sales (volume and/or price) as result of improved marketing opportunities
- Attracting investments
- Increase the credibility of operators or associations addressing societal challenges.

Potential additional benefits include:

- Promote knowledge economy (Europe 2020 strategy)
- Innovations
- Incentivise companies to increase research and development activities
- Motivation of employees, capacity to incentive staff and stimulate productivity
- Better relation with suppliers and customers
- Operational management; improved knowledge and understanding of the food chain leading to better operational management

Option 3a

Raising the consumers' awareness of the water footprint of products is not directly effective on the ecological status, but can be so with intermediate steps, such as towards a change in level of water stress and resource efficiency. This is a logical expectation - if careful water management and stewardship schemes are promoted to businesses, and consumers are subsequently educated about such schemes, it is probable that some consumers will choose products which are more water efficient. This water efficiency can again impact positively on the availability of freshwater quantity (surface and ground and including drinking water supplies) which is one condition to ensure the ecological status of freshwater ecosystems.

Greater awareness of, and hence attention given to water issues, can address business risks/opportunities associated with water use by SMEs and larger companies, and their level of understanding and knowledge on water use, e.g. the level of sustainable production and consumption of water, as well as to inform future development plans.

This process can have positive impacts on the level of international cooperation/ globalisation of expertise, while it should also have a positive effect in relation to food security issues and the ability to meet local/national demand.

The option can increase awareness on business risks/opportunities associated with water consumption and use (for both larger and smaller enterprises), in for average situation and under climate change trends and drought events, and within the EU and third countries; considering aspects like the level of sustainable production and consumption of water; and the likelihood/scale of environmental risks associated with water stress/drought. These different aspects ensure all a broader consideration of water in sectoral policies and activities; and can improve knowledge generation, collaboration, and better decision-making for sound water management, in particular if water stewardship results from the increased awareness.

But evidence suggests that while consumers are generally interested in sustainability issues, they often fail to consider these when purchasing products[149].

Consumer education can help in this regard by step-by-step developing critical thinking and raising awareness of environmental issues and the environmental impacts of consumption and lifestyle choices; it can enable consumers to become more pro-active and take practical actions to achieve sustainability goals (OECD, 2009). Consumer education campaigns shall provide them with the information needed to make more sustainable purchasing decisions and to encourage consumers and households to take actions to support positive environmental goals. Data from online shopping and price comparison site Kelkoo show that in 2010 European consumers were willing to pay a price premium of 25% for green food and drink items, compared with a price premium of 27.8% in 2006[150], although this willingness to pay such premiums is expected to decrease in the future due to the changing economic climate. However, the price of relatively water-friendly products may decrease as demand for them increases. Related to this, studies have shown that businesses and consumers are more sensitive to prices than to campaigns to change consumption[151].

The success of any labelling/certification or water stewardship scheme will depend to a large degree on the level of consumer awareness of environmental issues, with research suggesting that eco-label schemes are largely ineffective in markets which are characterized by a low degree of environmental awareness[152]. Consumer education can help to develop critical thinking and raise awareness of environmental issues and could be used to raise awareness of water stewardship schemes and drive sustainability through increasing demand for sustainable products.

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[149] OECD (ed.) (2009). Managing Water for All - an OECD perspective on pricing and financing.

[150] Kelkoo (2011). *European consumers pay 46% more for green retail products*, article available from Kelkoo Internet Site: (http://press.kelkoo.co.uk/european-consumers-pay-46-more-for-green-retail-products.html).

[151] Government Office for Science (2011). *Foresight Project on Global Food and Farming Futures, Synthesis Report C8: Changing consumption patterns*, London, Government Office for Science.

[152] Jordan A *et al.* (n.d.). *Consumer responsibility-taking and eco-labelling schemes in Europe*, Report downloaded from University of East Anglia Internet Site: (http://www.uea.ac.uk/env/cserge/research/fut_governance/Ecolabels.pdf).

Option 3b

Assuming that there is some uptake of water-use efficiency and water stewardship, the implementation of (mandatory) labelling of most embedded water intensive products should lead to water savings and benefits in terms of the availability of freshwater resources, with associated positive environmental impacts (which could include reduced pressure on water resources, reduced energy consumption and thus CO_2 emissions amongst others). As food product manufacturers and retailer supply-chains tend to be global in extent, the environmental impacts of this option might become international in scope.

The effects can also vary according to the selected indicator (virtual water or water footprint), and the approach taken for the water footprint calculations (volumetric, stress-weighted, or life-cycle assessment).

Mandatory labelling should also have a positive long-term impact on the likelihood or scale of the environmental risks associated with water stress and drought; they should also have a positive long-term impact on business risks and opportunities associated with water use. This is important as highlighted by the 2010 report by the Carbon Disclosure Project[153]. Over two-thirds of companies responding to a survey replied that they were already facing problems including water shortages and rising prices for abstraction. More than half of the risks identified across all categories (physical, regulatory and „other") were classified as either current or near term (1-5 years) and that 39% of companies have already experienced detrimental impacts (e.g. disruption to operations from drought and flooding, declining water quality, increases in water prices and fines and litigation relating to pollution incidents).

In particular, the exchange of information on embedded water and methodologies can lead to a better integration of water consumption data into planning, and may have a significant positive impact on business risks. According to the CDP Water Disclosure Survey 2010[154], sectors reporting the greatest exposure to water risks are food, beverage & tobacco and metals & mining, all of which are likely to have strong international dimensions. The option should also generate significant widespread benefits in terms of enabling greater international cooperation and greater exchange of information between Europe and third countries. Knowledge, governance and decision-making can gain from this exchange of information.

Larger firms may be better able to take up stewardship-based certification and labelling; so smaller firms may be at a competitive disadvantage, particularly if demand for

[153] ERM (2010). CDP Water Disclosure 2010 Global Report. https://www.cdproject.net/CDPResults/CDP-2010-Water-Disclosure-Global-Report.pdf.
[154] idem

certified/labelled products increases. Firms investing in certification/labelling schemes may want to invest in additional marketing to advertise their newly certified/labelled products (with associated costs/benefits) but smaller firms may not be in a position to invest in additional marketing. When considering food manufacturing businesses (i.e. those involved in processed food as opposed to directly supplying raw materials), large profitable companies are better placed than other businesses to engage in business continuity planning and facilitate communication with other parts of the supply-chain[155]. However, there is some evidence (at least in the food and drinks sector) to suggest that the costs of changing labels are higher for small and micro enterprises than for medium and large companies[156]. The promotion of certification and labelling schemes could therefore put SMEs at a temporary disadvantage, since their response would likely be slower. This could lead to larger companies gaining a competitive advantage, since their labelled products and services would be available on the market prior to those from SMEs. This impact could be particularly significant if the labelling and certification schemes were simultaneously promoted to consumers.

The level of administration required for auditing, monitoring, record keeping, and preparation of management plans, is relevant. Even a supposedly simple activity such as changing a label (for example, to ensure it communicates the water stewardship practices of a company) can involve several administrative steps. Thus any uptake or change in practice or membership of a certification scheme is likely to bring significant administrative costs for businesses, particularly where they wish to communicate this change to their customers. These will be on-going costs, since any scheme will likely need regular record keeping in relation to water usage and/or testing of products.

Public authorities may be involved with the promotion of certification schemes, in particular if they are the organisations with overall responsibility at the national level. This could well be the case if an EU wide certification scheme were implemented. This is important given that one consideration when developing such schemes is the extent to which customers trust the organisations responsible[157].

Given the existence of different water footprinting methodologies, it is not yet possible for consumers (whether business or end-consumer) to accurately compare products on the basis of their water footprint. A critical issue for product labelling – as with corporate sustainability claims and disclosure more generally – is credibility. There is a considerable "trust gap" between green claims and consumers' expressed ability to assess them.

[155] Defra (2010). UK Food Security Assessment, Detailed Analysis.

[156] Campden BRI (2010). Developing a Framework for Assessing the Costs of Labelling Changes in the UK. Report for Defra.

[157] Government Office for Science (2011) Foresight Project on Global Food and Farming Futures, Synthesis Report C8: Changing consumption patterns, London, Government Office for Science.

Standardization means the information in an Environmental Product Declaration can be more readily certified to a public standard and verified by a credible third party[158].

The implementation of research and streamlined methodologies should help to reduce the risk of public confusion when information on water footprinting is reported. (Mandatory) labelling can have a positive impact with regard to the competitiveness of business as they should help level the playing field between the relatively small number of companies that have already undertaken water footprint assessments and the relatively large number of companies that have not. According to the WBCSD, around 300 companies have used the Global Water Tool since its launch in 2007 and so we can assume that a similar number have undertaken water footprint assessments.

Indirect benefits can be expected with regard to: impacts on freshwater quantity; food security issues; the attractiveness of low and high water productivity sectors for investment; and spurring research and development for example into new technologies/water friendly products.

Consultation has indicated that preparing a water footprint assessment for a single catchment could cost in the region of €100,000, with an economic productivity assessment costing significantly more. It has been indicated that one of the greatest issues to overcome would be to map agricultural yields to individual catchment boundaries, as yields are currently only collected and collated by country and region level rather than by catchment.

There is the possibility of either conflicts or improving coherence with/of the currently 441 agriculture-related labelling schemes within the EU, 54 of which relate to the sustainable use of resources. Research into the potential for multi-dimensional labelling schemes may enhance, or reduce, the credibility of some of these schemes. While research into multi-dimensional environmental labelling may involve discussions and co-operation with third countries (particularly given the international nature of the food supply-chain), it is possible that this option may clash with similar schemes in other countries.

For both options there would be considerable costs in establishing a voluntary or mandatory label. The analytical costs of determining a robust assessment of the water footprint of a product would be considerable and between very different types of products with different levels of water use, but which may be “efficient” in its own context. These costs are initially for public administrations to set the framework and then there would be considerable involvement of the relevant businesses, each with its own costs. The operation, etc., of the label in the EU would be similar to other schemes. However, unlike a label for a water efficient product where the manufacturing or performance standard of a product can be readily verified, for footprinting, each new product or product from a new location would

[158] Moffat, Andrea et al. (2010): The 21st century corporation: The Ceres roadmap for sustainability:41.

require separate audits and this would be costly. However, research on footprinting is continuing to refine the methodology and efficiency gains in that methodology are likely to occur.

RPA and Cranfield (2012) in their detailed IA of options concluded that "promotion of supply-chain initiatives to improve water management, and of water stewardship certification could result in significant operating costs and administrative burdens for some supply-chains, particularly agricultural producers and the associated food and drink supply-chains". Some costs may be offset and/or benefits to investors "from companies having addressed water risks and being able to do this through supply-chain based labelling". However, the study noted that "these larger sets of actions may also give rise to competitiveness issues should small companies be left behind; although the inclusion of promotion and dissemination activities could mitigate this and help ensure a level playing field International partnership and support is also key in this regard with respect to global suppliers of agricultural and food products, as well as other goods and services, to the EU."

The RPA and Cranfield study also noted that "costs to authorities (including the European Commission and Member States) will arise from promotion and dissemination activities, as well as overseeing and contributing to benchmarking, establishment of an EC Smart Mark and consumer awareness and education campaigns."

The type of footprinting or other awareness scheme will depend on the type of approach taken. For example, where the assessment is based on practice-based schemes, the costs are lower than for outcome-based schemes[159]. Furthermore, business costs are lower when those in the supply chain are well co-ordinated, which would depend on any scheme adopted[160]. Thus the costs to business would depend heavily on the type of approach adopted.

[159] University of Hertfordshire *et al.* (2010). Effective Approaches to Environmental Labelling of Food Products, report to Defra, Agriculture & Environment Research Unit, Science & Technology Research Institute, University of Hertforshire, UK.

[160] Santacoloma, P. (2007). Organic Certification Schemes: Managerial Skills and Associated Costs, Synthesis Report for the FAO from Case Studies in the Rice and Vegetable Sectors, Executive Summary.

5.6 Acceptability

The public consultation sought views of a range of options to address the global dimension. The results are summarised in Table 10.

Table 10. The results of the public consultation concerning options to address global issues

Option	Yes (%)	No (%)	Do not know (%)
Help developing countries to put in place integrated sustainable water management through EU development cooperation	79	3	18
Raise consumers' awareness of the water footprint of products	60	14	25
Keep under review water foot printing tools with a view to test their usefulness for voluntary product labelling (e.g. as part of EU Ecolabel)	46	22	32
Mandatory labelling of most embedded water intensive products	28	48	24

A high share, almost 80% of respondents, supports a funding approach, i.e. helping developing countries put in place integrated sustainable water management through EU development cooperation. Raising the consumers' awareness about water footprint of products, a voluntary approach, is also positively perceived by 60% of the respondents.

Just under half of the respondents support the idea of keeping under review water foot printing tools with a view to test their usefulness for voluntary product labelling. The policy option that meets the strongest opposition (48% of "no") is a regulatory one, the mandatory labelling of most embedded water intensive products.

In written comments, many stakeholders state that there is no agreement on methodologies for water footprinting and water labelling – thus, these are not ready to be policy measures; many of these replies also underline that water scarcity issues vary considerably across the world. Some respondents from the agriculture sector argue that labelling should not be applied to this sector, while some respondents from industry argue that it should – but not be applied to industrial products.

Association Luxembourgeoise des Services de l'Eau considers that water footprinting tools and related labelling are still an issue for research and would not be currently suitable for taking beyond this. Electricite de France considers that while it is important to consider water efficiency, water footprints are not equivalent to carbon footprints - sound water-management in one region does not have any impact on the availability of water in another part of the world.

Veolia (CZ) in contrast states that water footprinting tools and related labelling are already tested tools applied in the industry. Furthermore, the Country Landowners Association agrees with the proposals. The Consumer Council states that its research has shown that consumers want to make responsible choices about their use of water, but there is a need for more information about how they can do this. The Consumer Council would wish to see more resources being devoted to promoting the more efficient use of water, including water labelling and the establishment of a water efficiency index for domestic appliances. Raising consumers' awareness about the water footprint of products would be one way of providing consumers with knowledge to make choices, but this must be easy to understand.

WWF rejects options concerning footprinting and labeling. It considers that while water footprint methodology has significantly advanced and is useful to understand the role water plays in the economy or "flows" through the private sector supply chains, it is not suitable for mandatory labelling of products. However, the EU should pursue policies based on the promotion of water footprinting that could help reduce water related risks, with benefits for the environment, businesses and national economies.

Verband Kommunaler Unternehmen argues that the real issue is not the water footprint, but water pricing. If water prices in all regions reflected the real scarcity of water resources in those regions where the product is produced, the market would set clear incentives to consumers to buy water intensive products which are produced where enough water is available or to buy less water-intensive products. Furthermore, adequate pricing could not only set incentives for sustainable consumption regarding water quantity but also concerning water quality if all the environmental harm caused during the production process was internalized. Such an approach would be far more efficient than the development of new labeling schemes or restrictions on market-placing.

A number of responses call for greater attention to water issues in EU development cooperation. Several NGOs call for the EU to ratify the 1997 UN Watercourses Convention; one calls for greater cooperation with Mediterranean countries. Other NGOs state that the Commission does not properly recognise the human right to water. Maison Europeenne des Pouvoirs Locaux Francais states that safeguarding water resources is a global issue that must be coordinated international action and EU international financing is important, calling for 1% of EU water tariffs to be allocated for development actions.

The Third Water Conference concluded[161] the EU needs to consider the water challenges beyond Europe and incorporate the global dimension of water into the Blueprint discussions. In this regard it emphasised the importance of the European Water Initiative and the need to review it and continue with it.

[161] http://waterblueprint2012.eu/sites/default/files/Key%20Messages_English_1.pdf

The RPA study[162] provided further views of the food and drink association (CIAA) on the issue of footprinting. The CIAA stated that environment labels based on footprints which do not provide any information on the context of water use would provide a simplified display of information and may help to enhance consumer awareness of environmental problems. However, they would also provide a number of key challenges:

- the margin of error for footprints can be greater than the observable difference between the products;
- water footprint studies are resource intensive and data of sufficient quality and quantity are often lacking;
- if the communication of the footprint to consumers does not include all major aspects/impacts or life stages, it may be misleading with regard to the product's overall environmental performance;
- most consumers will not have sufficient background knowledge to interpret the water footprint; and
- added value for consumers is limited.

5.7 Conclusions

The IA analysis has focused on two alternative approaches to considering virtual water – a soft option to raise awareness for businesses and consumers and a hard option for mandatory labelling. The analysis has clearly shown that the state of knowledge is insufficient at present to ensure embedded water is able to be robustly determined in a way that reflects water stress issues in 3rd countries and, therefore, it is premature for a mandatory instrument. This view is overwhelmingly supported by the stakeholder consultation.

Therefore, within the Blueprint it is appropriate to take forward option 3a. Further research can be supported to enhance the understanding of embedded water and how businesses can benefit from this approach and how consumers can be informed of embedded water in a way which enables them to make sensible consumer choices. The success of this approach can be monitored according to the first three of the SMART indicators set out earlier:

- The number of products for which virtual/embedded water has been robustly determined.
- The number of countries for which virtual water studies have been undertaken which relate accurately to real water resource challenges.
- The number of EU companies which have determined their risks to water resource challenges and have reduced embedded water as a result.

[162] RPA (2011). Assessment of the efficiency of the water footprinting approach and of the agricultural products and foodstuff labelling and certification schemes. Report for DG ENV. http://www.rpaltd.co.uk/documents/WaterFootprintingPartA.pdf

Table 11. Overview of the effectiveness, efficiency of coherence related to options to address global issues

Description of the option	Option 3a: Raise business and consumers' awareness of the water footprint of products.	Option 3b: Mandatory labelling of most embedded water intensive products
Effectiveness towards specific Objective	+ increase of instruments such as water pricing, etc. depend much on the awareness raising process and the elements considered; and further policy measures	+ induces reduction of business risks associated with drought and climate change, when adequately considered in the labelling scheme and in the planning and water allocation strategies
Effectiveness towards other specific objectives	+ integrates water into the business and retail sectors, improves knowledge and tools of public, business and water managers; and can reduce water stress if adequately translated into planning and efficiency gains + awareness and subsequent action on water stewardship can improve significantly the working relationship between institutions	+ leads more directly to water savings in different water-using sectors; and can reduce water stress if adequately translated into planning + awareness and subsequent action on water stewardship can improve significantly the working relationship between institutions
Efficiency	+ develops critical thinking and raising awareness of environmental issues and the environmental impacts of consumption and lifestyle choices; it can enable consumers to become more pro-active and take practical actions to achieve sustainability goals	+, enforces (critical) analysis of resource consumption in the production chain, and can motivate efficiency gains. Several subsequent processes are needed to deliver objectives at the basin level
Coherence	+ raising awareness about consumption drivers that affect the state of water; positive effect in relation to food security issues and the ability to meet local/national demand	+ ensures greater coherence with/of existing labelling/certification schemes and with resource efficiency policies; and co-operation with third countries
Acceptability	++ Public consultation: 46% support the idea of keeping under review water foot printing tools with a view to test their usefulness for voluntary product labelling (22% responded 'No').	-- Public consultation: The option was opposed by 48% of respondents, with only 28% supporting it.

6 LAND USE IMPACTS

6.1 Introduction and problem description

Human activities have profoundly changed the land on which we live and the way land is used can have major impacts on its surrounding aquatic and terrestrial environment, such as pollution, land degradation and loss of natural habitats.

Achieving the environmental objectives of the Water Framework Directive is heavily dependent on proper land use management and on multiple EU policies addressing land use (e.g. Common Agriculture Policy, the Habitats Directive, the Floods Directive and the Directives on Environmental Impact Assessment and Strategic Environmental Assessment). Funding mechanisms (see below) can also play a major role in influencing land use management, including for example the Life+ regulation and Structural Funds. The ability of these policies to address rural and urban land use and in turn aid in the improvement of water bodies in the EU is contigent on syngeristic objectives, cooperation between agencies and most importantly on technical measures. The Directives governing water policy in the EU provide a framework for the implementation of land use measures in the Member States to improve water status. To achieve their targets or environmental objectives, these directives lay down actions to be taken in the MS ranging from mandatory assessments and authorisation procedures to suggestions for further action in the form of technical measures.

The **WFD** requires MS to include various land use measures in their PoMs; a non-exclusive list of recommendations for such measures is provided in Annex VI (e.g. changes in crop management, natural water retention, etc.). While the Directive gives an indication of the types of intervention measures possible, it does not provide an exhaustive list and there is considerable leeway for interpretation. Member States can choose which measures to apply to a water body based on a mandatory assessment of the main pressures in a given basin. Since none of the measures are mandatory, it is unclear the extent to which certain land use measures will be implemented or other approaches (e.g. end of pipe) will be uses. However, it is necessary to take sufficient measures to meet the legal objectives for achieving good status.

The **Floods Directive** requires Member States to carry out a flood risk assessment, and on the basis on these results measures to address the risks should be taken. The Directive explicitly mentions the importance of natural water retention and requires Member States to include sustainable land-use practices and the improvement of water retention in their flood risk management plans. However, as with the WFD, no clearly defined measures are found in the Directive, thus allowing for considerable leeway in implementation. Mandatory measures can be found in the **Nitrates Directive** related to codes of good agricultural practice and specific measures focussing on preventing water pollution through application limits for nitrogen on land and techniques of fertilizer application.

In the field of land-using planning, the **Communication on Water Scarcity and Droughts** emphasises the need to ensure water issues are taken into account in other environmentally related legislation, such as the CAP and the SEA Directive, as well as encourages the implementation of water savings and efficiency measures in water-stressed basins. The strength of the Communication rests on identifying necessary areas where intervention is needed. A detailed list of technical measures is, however, not provided, and Member States are free to define projects and measures to combat WS&D. The focus of the Communication is more to encourage support actions at Member State level that lead to an increased or improved implementation of water saving projects/measures. However the uptake remains an open issue in many places.

Several non-water related policies also provide the opportunity to trigger land use change towards water protection and water efficiency.

The EC **Biodiversity Strategy**[163] aims to halt the loss of biodiversity in the EU by 2020. Green Infrastructure is one of the pillars of this strategy. Target 2 of this Strategy states that 'by 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems'. From the 20 actions foreseen under the Strategy, three are closely related to the target to improve green infrastructure:

- Improve knowledge of ecosystems and their services in the EU (Action 5)
- Development of a Green infrastructure Strategy (Action 6)
- Ensure no net loss of biodiversity and ecosystem services (Action 7)

To this end a working group was established to provide concrete recommendations and take the green infrastructure component of the Strategy forward.

Measures taken pursuant to the **Birds and Habitats Directive** are designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest. The Habitats Directive provides direct support for green infrastructure by requiring that floodplains and wetlands are included in the EU level list under priority natural habitat types are conserved. Article 6 of the Habitats Directive makes provision for the establishment of necessary conservation measures in SACs. Article 6(1) defines necessary measures as "a series of measures required to maintain or restore the natural habitats [….] at a favourable status"; furthermore, these measures have to correspond 'to the ecological requirements of the natural habitat and species' (as listed in Annex I and II). Conservation measures can take at least two forms: appropriate administrative or contractual measures or appropriate management plans. However, the Directive does not specify any specific contractual measures.

[163] EC (2011): Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions. Our life insurance, our natural capital: an EU biodiversity strategy to 2020. {SEC(2011) 540 final} {SEC (2011) 541 final}.

Cross Compliance under **Pillar 1 of the CAP** makes adherence to basic environmental standards a requirement to receive full payments of direct support. At the moment only two water-related Directives (Nitrates and the old Groundwater Directive) are linked to cross compliance. Cross Compliance supports natural water retention through mandatory establishment of buffer strips and compliance with authorisation procedures for water abstraction. However, the direct payment scheme has the potential to hamper efforts to implement floodplain restoration. As farmers receive money per hectare for land under agricultural production, the potential loss of direct payments due to loss of agriculture land for restoration purposes may prevent farmers from taking part in restoration projects.

On the other hand, **Pillar 2** offers considerable support to address water management issues through measures in the rural development programmes. Agri-environmental measures – which must be offered – can significantly influence land use management. While some measures under Pillar 2 support land use management and changes, there are also other measures that can be offered by Member States that may be counterproductive, e.g. modernisation of agriculture holdings[164]. Such measures may result in more intensified agriculture, which may prevent farmers from offering land for permanent changes such as wetland creation or floodplain restoration. In some cases this modernisation also leads to an increase of irrigated area, using the saved water from irrigation efficient projects in other locations instead of returning it to the environment (ibid).

Forestry policy largely rests with the Member States based on national and regional laws and regulations based on long term planning. There is a long history of EU measures supporting certain forest-related activities, coordinated with Member States mainly through the Standing Forestry Committee. The **EU Forestry Strategy**, adopted in 1998, aims to achieve sustainable forest management and the multifunctional role of forests. The Strategy was reviewed in 2005, and the Commission presented an EU Forest Action Plan in 2006. The 1998 Strategy emphasizes the multifunctional role of forests, inlcuding the need to conserve and enhance biodiversity in forests through afforestation measures and identifying conservation for special protection under Natura 2000.

The main goals of **Cohesion Policy** are to reduce regional disparities among the Member States. The Strategic Guidelines governing Cohesion Policy mention nature conservation within compliance with environmental legislation. In 2006 the Commission published guidance on how to make Cohesion Funds water positive. However, the regulations offer only a framework of possibilities to support water protection, to a certain extent leaving it to the "good will" of the Member States how – and indeed whether – they are in fact implemented. In spite of a great focus on environmental issues, when it comes to water management only interventions related to water supply and wastewater infrastructures are

[164] Dworak, T.; Berglund, M.; Vranken,L.; Campling, P.; Kampa, E.; Ribeiro, M; Thaler, T. (2009). Summary report on an in-depth assessment of RD-programmes 2007-2013 as regards water management- Study undertaken for the European Commission – DG Environment.

explicitly included in the listed priorities of Structural and Cohesion funds, while other components of sustainable water management (e.g. “green” infrastructures, support actions etc.) are not given emphasis, although many of the technical measures and support actions analyzed in this document could in principle be promoted by actions under broader, less specific themes (e.g. climate change adaptation). It therefore seems to emerge that an organic, structured vision for water management is currently lacking in the Regional Policy or, in a more simple way, an integrated, sustainable water management itself is not a priority of this specific policy.

The environmental regulations in the EU set the framework for the implementation of measures targeting green infrastructure, water quality and quanity and water efficiency. Despite the policies in place, there are nevertheless barriers to implementation of such measures.

The first key barrier to the implementation of land use measures is the **lack of defined measures** within Member States represents a key barrier. The assessment of RBMPs also shows that there are a lack of concrete measures and expected achievements (indeed, the Commission[165] highlights lack of measures to address agriculture pressures in particular). In other words, in many cases only a very generic list of measures is provided but it remains unclear which of these measures finally will be implemented, to which extent and within which timeframe. This can be explained due to the fact that several MS will only become more concrete before the next implementation deadline in 2012. In addition, the analysis of the RBMPs and PoMs indicate that MS might face problems with the implementation of measures due to the limited coherence (and likely effectiveness) of measures proposed in the PoM[166]. For example, while many RBMPs propose measures to reduce and manage groundwater abstraction, few RBMPs only propose accompanying measures such as metering, pricing/subsidies and water consumption restrictions that would facilitate achieving groundwater abstraction reduction (ibid). Support actions to facilitate the implementation of technical measures are clearly lacking.

Similarly, the Floods Directive does not define any specific actions, in this case with respect to green infrastructure. While the Directive emphasizes including natural floodplain measures into management plans, there is no specific requirement that ensures these measures are indeed implemented within the Member States.

Pillar 2 of the CAP offers a number of water-related measures, such as wetland restoration or improved water efficiency in irrigation; these measures, however, do not have to be offered by the Member States to their land owners and farmers. Articles 3 and 10 of the Habitats Directive give discretionary power to the Member States on whether the measures

[165] Draft Communication from the Commission: Water Framework Directive implementation report.

[166] ACTeon (ed.) (2012). Water Scarcity & Droughts Policy in the EU - Gap Analysis. Study for the European Commission, DG Environment.

are necessary. According to Stella (2012)[167], these statements are not concrete and no further guidance is provided by the Directive on landscape connectivity. While the Commission published guidance document on the maintenance of landscape connectivity features, the guidelines have no legislative character and are not legally-binding for Member States[168]. Finally, Member States are not required to take any action under the Communication on WS&D, as it has no binding mandate.

An assessment of the implementation of the Habitats Directive shows that Member States have had serious problems in implementation, in particular Article 6 on conservation measures[169]. The study found that most Member States had major difficulties in determining the proper legal instruments to implement Article 6 for several reasons. Firstly, this provision is framed in very broad terms, as is the standard for EU directives. Secondly, the provision uses a number of very technical concepts ("conservation status", "site's integrity", "natural habitat types", "conservation objectives", etc.), sometimes without defining them. As a result, Member States have amended their initial implementing legislation a number of times (France, Germany, the UK), and finally replaced these with new legislation[170]. Finally, to support natural water retention measures and thus floodplain restoration, DG Environment published a note on better environmental options for flood risk management in 2011. However, the note does not go into any comprehensive detail.

Coupled with a lack of defined measures is the **lack of concrete rules or definitions for implementation.** Under the WFD, concrete common methodology is lacking to set targets for GES and GEP. Different terms and definitions for measures in general can be viewed as a barrier to implementation, as confirmed by the 2010 study on natural water retention measures[171]. The CAP GAEC standard (good agricultural and environmental condition) on the establishment of buffer strips along watercourses lacks concrete requirements or guidance. The GAEC does not set a minimum width requirement or stipulate production restrictions. This standard only entered into force at the beginning of 2012 so it remains to be seen the extent of the positive impact it has on watercourses and whether ambitious enough criteria have been developed at national level. With respect to the Renewable Energy Directive, it does not include any sustainability criteria concerning the abstraction of water for irrigation purposes. Although a significant increase in biomass production in the

[167] Stella Consulting (2012). Costs, benefits and climate proofing of natural water retention measures. Report for the European Commission, DG Environment. Study for the European Commission, DG Environment.
[168] ibid
[169] Milieu (2009). National legislation and practices regarding the implementation of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, in particular Article 6. Study for the European Parliament's Committee on Petitions.
[170] ibid
[171] Stella Consulting (2012). Costs, benefits and climate proofing of natural water retention measures. Report for the European Commission, DG Environment. Study for the European Commission, DG Environment.

EU will not increase the total irrigation water consumption, stricter water use restrictions are needed in the most water scarce.

Lack of coordination of measures across river basins or administration units represents another barrier to green infrasctructure projects. For example, floodplain restoration requires multi-dimensional coordination between the stakeholders. Difficulties can arise due to the need to coordination across diverse policy fields and actor groups and collaboration across the administrative boundaries of a catchment[172]. The WFD relies heavily on the support of measures from other policies, e.g. under the CAP, the Habitats Directive and Cohesion Policy. While the WFD has taken a natural boundaries approach to RBMPs, these other policies sometimes cover other administrative territorial designations that may not easily marry with those of catchments. For example, administrative units for rural development may not cover the same geographic scope as the Floods Directive and WFD. This can hinder cooperation between water authorities and agriculture agencies. There are no institutional arrangements in either Pillar 1 or Pillar 2 of the CAP that that support measures to be implemented basin-wide. Additionaly, while the Floods Directive mentions the need to address land use and the influence of other policies on flood risk management, no provisions are in place for cooperation across administrations, e.g. working groups at national level addressing agriculture on floodplains. For the most part, agriculture agencies and environment agencies do not co-operate at national level and there is no requirement from the EU level to do so. Stella (2012) found that local and regional authorities might not have the tools to take into account all likely or possible future changes when planning measures today[173]. This makes it difficult when trying to implement green infrastructure projects such as floodplain or wetland restoration.

Member States have had trouble implementing coservation measures under the Habitats Directive because of poor coordination. Several Member States (Spain, Germany, Belgium, the UK, Poland) allocate responsibilities between the federal or governmental and regional levels, which has slowed the implementation process. Instead of having one body with exclusive competence, multiple authorities designate and manage Special Protection Areas (SPAs) and Special Areas of Conservation (SACs)[174]. Additionally, the Habitats Directive's current approach to spatial planning fails to fully address the potential conflicts of different land users[175]; a range of policies, including the WFD, the CAP, the Cohesion policy influence

[172] Moss, T. (2007). Institutional drivers and constraints of floodplain restoration in Europe. *International Journal of River Basin Management*, 5(2), p.121-130.

[173] Stella Consulting (2012). Costs, benefits and climate proofing of natural water retention measures. Report for the European Commission, DG Environment. Study for the European Commission, DG Environment.

[174] Milieu (2009). National legislation and practices regarding the implementation of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, in particular Article 6. Study for the European Parliament's Committee on Petitions.

[175] Stella Consulting (2012). Costs, benefits and climate proofing of natural water retention measures. Report for the European Commission, DG Environment. Study for the European Commission, DG Environment.

land-use and therefore might be barriers for the implementation of no-regret measures through the biodiversity and nature policy.

The implementation of measures is also hindered by the **lack of concrete financing sources**. The WFD has a particular problem as its own financial mechanisms are not fully developed yet (see section on economic incentives)[176]. The Floods Directive also does not provide any EU level funding for the implementation of measures to prevent flooding. The Floods Directive plans on using existing institutional structures and funds for national level implementation. As with the WFD and the Floods Directive, the Habitats Directive does not have its own funding. The Directive relies on cohesion and rural development funds. RDP funding relies on voluntary participation, so it is unclear the extent to which RDP funding helps to achieve the goals of the Habitats Directive. Also, there is a problem that the cohesion fund only focuses on specific areas in the EU that need extra support so not all floodplains, even in nature protection areas, are applicable for cohesion funding, One of the general constraints encountered by the Regional Policy in the period 2007-2013 is that the focus is often on spending the money rather than on what the programmes were actually designed to achieve.

Even with financing and concrete measures, implementation is not possible everywhere due to the **geographic scope** of some regulations. The Habitats Directive focuses on priority habitat areas. This means that the Directive does not cover all floodplains or wetlands. As such, restoration activities are only supported for areas in the Natura 2000 network. This may or may not correspond to areas where floodplain restoration projects are the most necessary, useful or feasible. A similar barrier exists with the use of Structural Funds. The Cohesion Policy mandate specifically focusses on less developed countries and regions in the EU. Therefore, its funding sources can only be used for water efficiency or green infrastructure projects in certain countries. Since the implementation of the Nitrates Directive in 1991, there have been noticeable improvements the levels of nitrates found in many surface and ground water bodies in Europe[177]. Nevertheless, the relative contribution from agriculture remains high.

The **lack of political ambition at EU or national level** is an important concern. Under the WFD, for example, many MS have also decided from the beginning to wait and decide on the implementation of some or all supplementary measures until after 2015; additional technical measures are only foreseen for the 2nd planning cycle. Under the Habitats Directive, Member States have had serious problems in designating sites with special importance for biodiversity and requiring special protection. The process of designating

[176] ibid; Dworak, T.; Berglund, M.; Vranken,L.; Campling, P.; Kampa, E.; Ribeiro, M; Thaler, T. (2009). Summary report on an in-depth assessment of RD-programmes 2007-2013 as regards water management- Study undertaken for the European Commission – DG Environment.

[177] European Commission (2010): The EU Nitrates Directive Fact Sheet. http://ec.europa.eu/environment/pubs/pdf/factsheets/nitrates.pdf

Natura 2000 sites and establishing management measures for their protection has been considerably delayed for a number of reasons, including political unwillingness and public protests, among others[178]. Finally, the loose link between Cohesion Policy and EU priorities affects how useful the policy is in promoting its own objectives.

Traditional water management approaches outweigh more modern approaches. There are currently no provisions in the Floods Directive to reduce the trend of MS to focus on "hard" infrastructure (i.e. dams, weirs) to combat floods, which represent the traditional approaches in water management. This "perception" issue was highlighted by Stella (2012) in its analysis of natural water retention measures: it found that there is still a lack of willingness to implement "soft measures" for flood prevention and reduction and there are no incentives to move thinking away from hard flood defence measures[179]. The analysis of the RBMPs and PoMs in the WaterGap project indicates that MS are still giving priority to water supply measures (proposed in 30-40% of the RBMPs) over measures that impose new restrictions of pressures or that ensure the achievement of the environmental WFD objectives under WS&D conditions[180]. While information pertaining to activities arising out of the WS&D Communication is spotty at best - there is no reporting requirement under the Communication – MS responses to the general questionnaire of the EC indicates very little action regarding the implementation of technical water saving measures[181].

The **voluntary nature of implementation** of several measures does not always bring expected results. For example, while measures offered under the rural development policy have a strong potential to support a wide range of land use management and land use changes, the main problem is that these measures are voluntary in nature[182]. Assessments of the area covered under agri-environmental measures show a wide range of implementation rates; for example in Austria the UAA covered under AEMs is above 80%, whereas in Greece this area is less than 10%. Some measures are less accepted by farmers, especially those related to permanent land use change such as wetland and flood restoration. As floodplain restoration requires long stretches of land along water courses, the voluntary nature of the measures does not guarantee that even if some farmers participate that a coherent floodplain area can be restored, as some farmers in the area

[178] Milieu (2009). National legislation and practices regarding the implementation of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, in particular Article 6. Study for the European Parliament's Committee on Petitions.

[179] Stella Consulting (2012). Costs, benefits and climate proofing of natural water retention measures. Report for the European Commission, DG Environment. Study for the European Commission, DG Environment.

[180] Strosser, P., Dworak, T., Garzon, A., Berglund, M., Schmidt, G., Mysiak, J., Kossida, M., Iacovides, I., Ashton, V. (2012): Gap Analysis of the Water Scarcity and Droughts Policy in the EU. Study for the European Commission, DG Environment.

[181] ibid

[182] Dworak, T.; Berglund, M.; Vranken,L.; Campling, P.; Kampa, E.; Ribeiro, M; Thaler, T. (2009). Summary report on an in-depth assessment of RD-programmes 2007-2013 as regards water management- Study undertaken for the European Commission – DG Environment.

needed for the project may not participate. A number of river basins have clearly stated that they will rely on agri-environmental measures funded under Pillar 2 to address agriculture pressures. Due to the voluntary nature of these measures, it is unknown whether relying on RDP measures alone will be sufficient to achieve WFD objectives[183]

Finally, a potential barrier to measure implementation is the **lack of farmer acceptance or awareness**. A case study in Po, Italy within the project on water savings in agriculture found that the main problem with implementing improved irrigation techniques in the region is "knowledge". While many water management plans have been implementation and many water savings practices have been developed, farmers are rarely aware of their existence, which highlights that good practices need to be disseminated in a more efficient way (Bio Intelligence, 2012)[184].

In conclusion, there is a large range of different barriers to taking forward important technical measures at different levels to address different pressures impacting on Europe's waters. These barriers both arise from the nature of some EU policies, but many EU policies also present opportunities to address those barriers. The challenge for the Blueprint is to take forward actions to 'unlock' the technical measures necessary to safeguard Europe's waters.

6.2 Baseline and the justification for EU level action

The WFD is designed to achieve its objectives through the continued implementation of existing environmentally related directives as well as through the introduction of new legal requirements. Many MS have decided to wait to implement supplementary measures until the 2nd planning cycle (at least). Moreover, the MS have shown that they are still working under older paradigms by continuing to emphasize water supply measures over water demand measures[185]. Increased efforts to step up the process may occur in the 2nd planning cycle when it is clearer the progress water bodies have made towards good status. A potential hindrance is the current economic crisis. MS budgets have been hit considerably and this may impact their ability to implement new measures. On the other hand, this may lead towards a shift away from voluntary, often subsidised measures in favour of mandatory ones. And presents new opportunities, for example prioritizing cost-effective solutions, abandon large and expensive emblematic water projects, and removing harmful subsidies. The danger of not achieving objectives may spark such a change in approach, which could more concretely ensure the achievement of good status. A final consideration is how the not always compatible definitions and methodological approaches at national level will be

[183] ibid

[184] Bio Intelligence Service (2011). Water saving potential in agriculture in Europe: findings from the existing studies and application to case studies. Study for the European Commission, DG Environment.

[185] Strosser, P., Dworak, T., Garzon, A., Berglund, M., Schmidt, G., Mysiak, J., Kossida, M., Iacovides, I., Ashton, V. (2012): Gap Analysis of the Water Scarcity and Droughts Policy in the EU. Study for the European Commission, DG Environment.

addressed at EU level. MS need to be better equipped in developing appropriate mitigation measures and defining GEP; this may also become more clearly present in the 2nd planning cycle.

Similarly, Directive 2007/60/EC on the assessment and management of flood risks requires Member States to carry out a flood risk assessment, and on the basis on these results measures to address the risks should be taken. Under the Directive, Member States had to carry out a preliminary assessment by 2011 to identify the river basins and associated coastal areas at risk of flooding. For such zones they will have draw up flood risk maps by 2013 and establish flood risk management plans focused on prevention, protection and preparedness by 2015. It is expected that due to the Floods Directive and the WFD the future use of floodplain areas will take potential flood risk into account. The establishment of flood risk management plans will result in more efforts at MS level to incorporate natural retention measures into flood defence. There are, however, some concerns that considerable progress is unlikely for two reasons: (1) the EU wide assessment of the RBMPs indicates that "difficulties in obtaining land for restoration and/or natural retention measures" is one of the main reasons for exemptions from achieving good status; and (2) traditional water and flood risk management approaches will continue to outweigh more modern approaches. As mentioned above, the Floods Directive does not give the Member States sufficient (or mandatory) encouragement to move away from traditional grey infrastructures towards green infrastructure. The apparent focus of the MS on "hard" flood defence approaches[186] shows that current Floods Directive is not doing enough; changes are not expected in the near future. While the Floods Directive mentions the need to address land use and the influence of other policies on flood risk management, no provisions are in place for cooperation across administrations, e.g. working groups at national level addressing agriculture on floodplains.

Following the recommendations of the 2010 EU Budget Review, the proposal for the CAP regulation post-2013 present some important changes for the relationship between the agriculture sector and water management. The WFD and the Directive on the sustainable use of pesticides have been proposed for inclusion into cross-compliance, once these Directives are implemented by all Member States and the obligations directly applicable to farmers have been identified.

An important change to the CAP is the so called "green payments" making up 30% of the direct payments. This greening provision supports a range of options from crop diversification to articles that directly support green infrastructure such as permanent grassland (art. 31) and ecological focus areas such as landscape features, buffer strips, afforested areas (art. 32). At the moment, there is no differentiation between semi-natural grasslands that have not been used intensively and those that have been used intensively

[186] Stella Consulting. (2012). Costs, benefits and climate proofing of natural water retention measures. Study commissioned by DG Environment

(but not ploughed and reseeded in the last five years). There is strong difference in terms of the biodiversity benefits of the two. Additionally, there is no final definition of what can be covered by ecological focus areas as the proposal only lists options ("such as"). It is not certain whether GI elements will be covered that these areas are attached in the most vulnerable areas in terms of environmental protection, such as the riparian areas, which have a key ecological role and are crucial in water protection.

The proposal for rural development policy offers several measures of relevance to water protection. These include, *inter alia*: *Agri-environment-climate* (art. 29); *Organic farming* (art. 30); *Natura 2000 and Water Framework Directive payments* (art. 31); Investments in physical assets (art. 18 – this also covers "environmental" on-farm investments); *Co-operation* (art. 36 – for joint environmental projects); and various forestry-related measures. Moreover, the *measure Modernisation of agricultural holdings* can be used in ways which are very positive in this area.

One important "priority" explicitly includes improving the EU farm sector's water-efficiency, and another explicitly mentions "water management". As in the current programming period, support for technical infrastructure investments (including irrigation facilities) would be maintained. This might help in situations where cost recovery rates are not 100%. However, it is important to note that, according to the current proposal, only investments leading to a reduction of previous water use by at least 25% would be considered as eligible expenditure in the old Member States ("EU-15"). Derogation would be possible in the new Member States on condition that the investment would have no negative impact on the environment (see Annex C for further explanation).

The October 2011 Commission draft legislative package on cohesion policy for 2014-2020 emphasises 'multi-level' governance to continue in the next funding period. Within this package it is expected that land-use management will be included in the programme in order to reach the objectives linked to sustainable growth in the EU.

While the current situation shows only a limited impact of bioenergy on water consumption[187] this might change in the future depending on how policies will increase or decrease irrigation. As the current proposals for the CAP and the Cohesion policy which are most likely the main financing instruments for irrigation do not foresee the possibility for expanding the irrigated area, it can be assumed that the impact from biofuels on water use will be limited. Further growing of biofuels will still remain subject to cross compliance regulations, which also limit the use of fertilizer and pesticides. However, review of the Renewable Energy Directive is shortly to take place and consideration of the role of

[187] A 2009 study by Ecologic and Alterra found that bioenergy development in EU will have little impact on water use in the agriculture sector. Dworak., T., Elbersen, B., van Diepen, K., Staritsky, I., van Karaalingen, D., Suppit, I., Berglund, M., Kaphengst., T., Laaser, C., Ribeiro, M. (2009): Assessment of inter-linkages between bioenergy development and water availability. ENV.D.2/SER/2008/003r. Study for the European Commission, DG Environment.

bioenergy and sustainability criteria for bioenergy crops will be considered within this review. Therefore, specific options concerned with bioenergy are not taken forward within this IA for the Blueprint.

The revised EU Biodiversity Strategy aims to halt the loss of biodiversity by 2020 and restore biodiversity given the failure to meet the previous 2010 targets. The goal is to fully integrate the objectives of protected areas into the WFD, although it is not clear how well this has been achieved. However, it is not clear how far pressures on biodiversity will be ameliorated through application of the new policy and, therefore, the potential added knock-on benefits for water outcomes. Moreover, it is not clear whether a concrete strategy on green infrastructure – as championed in the Biodiversity Strategy- will be published by the intended deadline of 2012. More likely, a paper will be published fully defining green infrastructure, as the Commission believes this is a crucial step before a Strategy can be developed. As such, it is not certain when a green infrastructure Strategy will be published, the extent to which it will support (through mandatory or voluntary means) projects financially and administratively and whether green infrastructure projects will increase as a result.

In 2011 the EU Forestry Strategy was reviewed with the aim to publish a new forestry strategy by the end of 2012. The Standing Forestry Committee published an option in September 2012 acknowledging the contribution forestry can make regarding the provision of ecosystem services including the protection of water, social, biodiversity as well as rural development. At the moment it is too early to determine the direction the Strategy will go and the extent to which conservation efforts are enhanced in the sector and how green infrastructure in forests will be supported.

The lack of coordination among these items of legislation is unlikely to change under the current situation. There are no mechanisms in place focussed on this issue, whereas especially the implementation of natural water retention measures needs coordination across polices and administrative units. For the most part, agriculture agencies and environment agencies do not co-operate at national level and there is no requirement from the EU level to do so. Stella (2012) found that local and regional authorities might not have the tools to take into account all likely or possible future changes when planning measures today[188]. This makes it difficult when trying to implement larger land use projects. Therefore, EU action is clearly needed.

As is evident from the analysis above, delivering the objectives of EU water law (WFD, Floods Directive, Nitrates Directive, etc.) requires the implementation of a range of different technical measures. EU level intervention is, therefore, justified on helping to 'unlock' these measures as this is aimed at supporting implementation of EU law.

[188] Stella Consulting. (2012). Costs, benefits and climate proofing of natural water retention measures. Study commissioned by DG Environment

Furthermore, many other EU policies promote or influence land-use measures. These can support or hinder the implementation of EU water law. There is, therefore, full justification for EU level action to improve the design of these policies to aid in coherence with EU water law and to meet the board objectives of the Blueprint.

6.3 Objectives

The problem analysis has highlighted that the agriculture sector is a major pressure on water quality and quantity across much of Europe. There is a wide range of measures to address these impacts, such as more sustainable use of fertiliser and pesticide inputs, maintaining soil organic matter levels, changing crop patterns, enhanced use of buffer strips, improved irrigation practices, wetland restoration, restoration of riparian areas, etc. Some measures are promoted within the Common Agricultural Policy and through implementation of EU water law. However, wider targeted use of these measures has the potential to address many of the problems that remain for Europe's waters.

The overall policy objective regarding the unlocking of land use measures is that the barriers to the implementation of the necessary measures to deliver water management objectives should be overcome and incentives for using those measures should be in place. Given the range of sectors that need to implement a wider range of specific measures, a number of specific policy objectives are identified:

- The agricultural sector should better apply existing available measures to reduce its widespread impact on water bodies across Europe and this should be reflected in EU agricultural policies.
- A higher application of green infrastructure should be achieved as various related measures, such as afforestation and sustaining wetlands, can reduce flood risk and make regions more resilient against droughts.
- EU level action should ensure that NWRM are properly integrated and explicit within the next RBMPs'.

The objectives are SMART: they are specific in that they target individual actions (e.g. tools, removing barriers, use of existing measures) or processes (e.g. efficiency of water use) that are clear and unambiguous. They are measurable in that development of tools or guidance are either successful or not and other objectives, such as uptake of measures by agriculture and application of green infrastructure can be measured. All the objectives are achievable and realistic given the foundation on which they will progress (see also the SWOT analysis). The time dimension is not strictly presented, although most objectives are linked to supporting WFD implementation which has its own time table.

A number of different potential policy options to achieve these policy objectives are explored in the following section.

6.4 The options and their elaboration

Land use planning and management decisions are usually made at local or regional level and are not a core competence of the EU. However, the European Commission has a role to play in ensuring Member States take environmental concerns into account when putting together their land use development plans. This role is mainly based on two main instruments, which are already used to positively influence water:

- To devise methods and environmental tools to analyse the impact of proposed development, the EIA Directive and SEA for plans and programmes are the two main tools used in this task. These make sure significant environmental impacts are identified, assessed and taken into account throughout the decision-making process.
- The two main funds, namely the CAP and the Cohesion funds play a major role in determining how land is used. As set out in the problem analysis the new CAP proposal provides some opportunities (e.g. funding for irrigation efficiency, agri-environmental payment) to positively influence the status of water. Also the new proposal for the Cohesion Policy could bring some water related benefits if accepted.

Land use planning processes are often inadequate in including the objectives of water management. Therefore, the options include developing a guidance document that provides guidance to local authorities on how to include water protection (qualitative and quantitative) measures into local planning processes. Such guidance would have to consider detailed cause- impact explanations of the interactions between land use and water pollution, flood protection and scarcity. The Guidance would require an EU wide part and national parts depending in the national, regional and local planning processes. It should also give guidance on how to set up a water use hierarchy. Guidance would also address the application of Green Infrastructure requirements consistent with water protection and flood management. There would be significant benefits to integrating water management and land use planning. A range of different guidance documents could be produced and they have the strength of being able to explore different institutional contexts in the Member States. The strengths outweigh the weaknesses of this option.

Several water management problems could be addressed by existing ecosystem services or their enhancement can be helpful. Water-quantity-related ecosystem services, such as flood protection and water regulation (run-off, infiltration, retention and storage), could be provided through water retention measures, wetlands and flood plain restoration. Water-quality-related services, such as reducing water pollution, could be provided through extensification of (agricultural) land use, integrated pest management; buffer strips beyond the current Cross Compliance requirements and conversion or restoration of natural land cover. These services often have a multiple benefit to the non-water environment, for example, water-related services of forested land can be bundled with carbon sequestration; and services of wetlands and flood plains can be bundled with biodiversity services of these forms of land use. PES are often mentioned as an appropriate tool for triggering the

establishment of such services. (see also results from the CIS workshop in on WFD-economics in Liege 2010)[189]. PES requires significantly clear methodologies for effective payments, which are not currently available.

In some cases Cohesion funds may promote the relocation of economic and human activities to areas and territories where water ecosystems are less vulnerable. This policy option (option 4c) recommends undertaking a "water vulnerability" assessment in the development of MS operational programmes for the use EU structural and cohesion funds to ensure the environmental sustainability of projects and to target priority projects. This approach would go beyond a strategic environmental assessment and bring together efforts made under other directives to identify problem areas. This could include information on floods risks identified under the Floods Directive, on basins facing quasi or permanent scarcity identified from the Communication on WS&D and information pertaining to the significant water management issues gathered under the RBMPs. The information from the assessment could help to determine whether new supply projects would further exacerbate scarcity problems in an area. Unlocking the structural and cohesion funds has merits, not least in that it would ensure moneys are targeted at critical issues. However, the option is only applicable in areas where these funds are spent and it would require amendment to the basic regulations which is no longer possible. Influencing the implementation rules of the CAP and cohesion funds is strong option, although the regulations are still to be adopted. The rules will need to be elaborated and Member States are already familiar with conditionality's, etc., in implementation.

Several policy options to address the problem of land use measures were developed to be considered within the Blueprint and subject to IA. These options were subject to a SWOT analysis (see Annex D). Table 12 describes the options as originally developed in the project and submitted for the public consultation together with the final elaboration of options included within the IA, following further discussion with the Commission.

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http://www.circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/implementation_conventio/workshop_economics/wfd-economics-workshop-o/_EN_1.0_&a=d

Table 12. The options originally considered and final options to address land use issues

Options originally considered	Final options for the IA
• The Commission to develop guidance clearly defining and providing an EU framework for green infrastructures that promotes natural water retention measures such as floodplains and wetlands restoration; sustainable drainage, the restoration of riparian areas and the re-meandering of rivers • The Commission to develop guidance for integrated water – land use management, bringing together spatial planning and River Basin Management Plans in co-ordination with other areas of EU environmental policy (Biodiversity, Nature, Soil) • Develop guidance through the agriculture working group under the WFD Common Implementation Strategy on the effective application of measures by farmers to deliver water quality and quantity objectives at catchment level. These measures include changing crop patterns, buffer strips, restoring riparian areas, increase irrigation efficiency, etc. In that respect, particular emphasis will be put on the use of the Farm Advisory System set up under the CAP • The European Innovation Partnership on Agricultural Productivity and Sustainability and the European Innovation Partnership on Water develop and disseminate innovative solution to ensure agriculture's negative impact on water are removed or minimised and beneficial effects are maximised • Enhance the application of Environmental Impact Assessment to irrigation projects. • The Commission to ensure that the implementing rules for the post-2013 CAP Pillars I and II support and target the necessary measures to deliver water quality and quantity objectives.	• Option 4a. Developing tools and guidance on an EU framework for NWRMs including support for Payments for Ecosystem Services (PES) and an effective application of NWRM by land users • Option 4b. Amending the WFD to require mandatory application of NWRM • Option 4c. Ensuring NWRM are mainstreamed into CSF funds, including through conditionality on their spending • Option 4d. To promote application of NWRM by prioritising it in the use of Cohesion and Structural Funds

Land use impacts and in particular the agriculture sector's impacts threaten water quality, quantity and hydromorphology across much of Europe and deregulate water flow, leading to increased water scarcity and flood risks. To address this problem, three policy options have been identified that target multi-objective natural water retention measures.

Option 4a focuses on better supporting the implementation of NWRMs by developing guidance for administrations on a) how to plan catchment scale projects, b) funding opportunities at EU level (e.g. Life+, CAP (to a certain extent at MS level), Cohesion, MS and from private initiatives promoting natural retention through payments for ecosystem

services and c) best practice examples across the EU regarding planning and the use of payments for ecosystem services (PES). Similar guidance has been developed under the WFD framework contract in the form of handbooks, one on integrating water management into farm advisory services and another on assisting river basin management authorities on how water-related agriculture measures can be made operational at the farm level.

Payment for ecosystem services is defined as "a voluntary transaction whereby a well-defined ecosystem service, or a land-use likely to secure that service, is being bought by at least one buyer from at least one provider, if, and only if, the provider secures the provision of the service"[190]. For PES schemes to reach their full potential, they need to be carefully designed, taking into account the socio-economic and environmental conditions as well as the institutional framework in place. A recent policy brief on the use of PES to protect Mediterranean forests highlighted the essential steps needed to help realise sound PES schemes[191]:

Awareness-raising on PES issues among policy makers, decision-makers, landowners and other relevant stakeholders;

- Improved knowledge base through assessment of effective schemes, i.e. exchange of best practice; and
- Guidelines for supporting the design and implementation of PES, acknowledging the roles of the different actors involved in their implementation.

The guidance envisaged under Option 4a would focus more specifically on natural water retention measures, as they as associated with additional barriers compared to crop management practices, i.e. catchment size scale, land rights issue etc. The focus of the guidance would be on the role of different stakeholders in implementing larger scale projects and how to improve coordination among local agencies, e.g. bringing together water agencies, nature protection agencies and agriculture agencies. Additionally, it would bring together examples of PES schemes among the Member States, focusing more on the great potential of private and public-private partnerships that has already been demonstrated in pilot programmes (e.g. partnership between farmers and Nestle in France, Cooperative agreements between drinking water companies and farmers in the Germany, protection of peatlands in northwest Germany, etc.).

Option 4b takes a more mandatory approach to supporting NWRMs through amending WFD to require their mandatory application near water bodies that have not reached good status. Similar to the requirement to include agri-environmental measures into rural

[190] Wunder, S. (2005). Payments for Environmental Services: Some Nuts and Bolts. CIFOR, Occasional Paper No.42

[191] Prokofieva, I., Wunder S., Vidale, E. (2012). Payments for Ecosystem Services. A way forward for Mediterranean Forests? EFI Policy Brief 7. http://www.efi.int/files/attachments/publications/efi_policy_brief_7_eng_net.pdf

development programmes, this option would require that PoMs include natural water retention measures. Flexibility would remain in terms of which measures to offer and in application. A mandatory approach would reduce some of the institutional barriers to NWRM implementation, as at the moment most of the current policies do not establish binding targets and only voluntary measures (Stella Consulting, 2012).

Further along the spectrum of intervention is **Option 4c** on ensuring the implementing rules of the Common Strategic Framework (CSF) Funds are "water friendly". The Common Strategic Framework Funds relevant for land management include, among others, the European Regional Development Fund (ERDF), the Cohesion Fund, and the European Agriculture Fund for Rural Development (EAFRD). An applicant for ERDF or Cohesion funds must only explain whether the project is consistent with a sectoral/integrated plan and programme associated with Community water legislation.

To better incorporate water management issues into the implementing rules, Option 4c suggests including a section in the implementing rules for ERDF and Cohesion on the conditionality for implementing flood defence or water supply projects. This section would prescribe a water balance approach to future water supply projects, taking into account environmental minimum flows, as well as emphasize the implementation of natural retention measures over flood defence. Applicants would, therefore, have to justify grey infrastructure over green infrastructure as well as detail how the project would not increase water scarcity issues in an area. A full assessment of a project's impact on a water body's status would have to be carried out per the implementing rules.

Option 4d is to promote MWRMs by prioritising them in the use of Cohesion and Structural Funds. The spending of EU Regional Funds has, and can, contribute significantly to achieving the objectives of EU water policy. General Regulations and strategic orientations of Regional Policy are set out at EU level, but the responsibility of setting specific project priorities is at MS level. On 6 October 2011, the European Commission proposed its legislative package for new Regulations for Regional Funds under the next MFF (COM(2011)516, COM(2011)614, COM(2011)607, COM(2011)612). The Common Provisions Regulation establishes the main principles, objectives and rules governing the funds. Eleven new thematic objectives are introduced, four of which are of relevance for the environment. This option does not seek to interfere with either the proposals for the next MFF set out by the Commission in October 2011 nor with the development of this legislation through the adoption procedures within the Council and Parliament. Rather it aims to encourage Member States to identify leakage reduction as a priority in the Partnership Contracts that will need to be developed subsequently.

6.5 Effectiveness, efficiency, and coherence of the options

The three options on NWRMs seek to improve the support conditions surrounding the implementation of natural water retention measures in order to alleviate the impact land use – especially agricultural land use – has on the water environment. They are all effective to varying degrees regarding achieving the operational objectives of the Blueprint.

With respect to the objective on fostering the integration of water into sectoral policies, both guidance options would help to improve the integration of water objectives into agriculture and nature conservation policy. Given their voluntary "soft" nature neither option would lead to considerable support but they can be viewed as necessary companions to other more mandatory approaches. Option 4a would more positively increase the use of economic instruments by providing guidance on payments for ecosystem services. Similarly, Option 4a would have a positive effect on governance by providing guidance to administrators. The option would strongly improve knowledge and tools by spreading best practice and promoting economic tools to support changes in land use management.

Option 4b is the most stringent option as it suggests an amendment to the WFD to require river basins to implement NWRMs as part of their programme of measures. The option has the potential to promote economic instruments if local agencies work with companies to promote cooperative agreements to implement certain measures but its impact is not high. Governance would not necessarily be improved, however, as an amending making some supplementary measures mandatory does not denote increased cooperation at catchment level. However, the mandatory inclusion of NWRMs would promote innovation as water agencies would have to come up with plans on how to include them in their programmes. As such pilot projects and research could be carried out to see which retention measures fit the best within a given river basin.

Option 4c would have a strongly positive impact on fostering the integration of water into sectoral policies by requiring that CSF funds to more concretely take impacts on water ecosystems into account in project design and implementation. The better integration of water into the environmental impacts assessment of structural funds will help to better take into account the costs and benefits of projects. Additionally, conditionality of water savings for agriculture modernisation projects will safeguard water objectives related to quantity issues. Whereas structural funds do not necessarily support market based instruments by providing direct funding for projects, agri-environmental measures funded under the rural development policy are a type of PES. Water governance (see below) would be positively enhanced as "water-friendly" implementing rules will force stakeholders to work together to better design successful projects. Sectoral experts will have to exchange ideas to ensure projects are designed that can be financed. This in turn would positively improve knowledge and tools within all relevant sectors (see below).

In terms of efficiency, the ability of guidance documents (option 4a) to encourage MS to implement natural water retention measures depends on the timing of when the guidance is finished. Official CIS guidance takes around 2 years to develop so such a document would only create an impact starting at the end of 2nd cycle but more likely for the 3rd cycle. A less official guidance, on the other hand, could be ready in about 6 months to a year. This could lead to enough time for MS to take the guidance into account for the 2nd planning period. Guidance is in general relatively cost-effective as their budgets are not significantly; however their impact may be low depending on the level of ambition of the MS:

On the other hand, Option 4b would more likely ensure the implementation of NWRMs in the MS compared to the options on guidance as it would take a mandatory approach. However, the time horizon of this measure is even more long-term, as a review of the WFD is not expected before 2019-2020. Its impacts, therefore, would not be realized until at least the 3rd planning cycle commences. A big issue with amending the WFD, however, is the significant administrative burden attached. While a revision of the WFD is foreseen, an amendment would nevertheless require changes to national legislation as well as training on the ground.

Option 4c for the mandatory inclusion of water criteria in the CSF funds is an efficient way of ensuring water management is taken into account in regional and agricultural policy. It is also cost-effective as implementing rules are already required; the addition of articles on water criteria would thus not pose considerable administrative burden.

Regarding the effectiveness of option 4d, by ensuring that impact of socio-economic activities and regulations on the state of water resources is fully taken on board projects for Regional Funding will help to integrate water objectives into sectoral policies affected by these funds by prioritising spending in this area. EU funds are able to unlock measures where there are resource constraints in Member States eligible for those funds. Lack of resources can be a significant barrier and this option addresses this barrier without imposing any undue administrative burdens.

In terms of policy coherence, all four options would contribute greater unity between agriculture, water and nature conservation policies, option 4b more so due to its mandatory nature.

6.6 Acceptability

The public consultation sought views on whether the Commission should develop guidance clearly defining and providing an EU framework for green infrastructures that promotes natural water retention measures such as floodplains and wetlands restoration; sustainable drainage, the restoration of riparian areas and the re-meandering of rivers. 58% of respondents supported this approach, while 23% opposed it and 19% did not know. **Therefore, overall the public consultation supported development of guidance relating to green infrastructure and natural water retention measures**.

On whether the Commission should develop guidance for integrated water – land use management, bringing together spatial planning and River Basin Management Plans in co-ordination with other areas of EU environmental policy (Biodiversity, Nature, Soil), 62% of respondents supported this approach, while 24% opposed it and 14% did not know. **Therefore, overall the public consultation supported development of guidance on integrated water and land-use management**.

The consultation further examined whether the Commission should develop guidance through the agriculture working group under the WFD Common Implementation Strategy on the effective application of measures by farmers to deliver water quality and quantity objectives at catchment level. 63% of respondents supported this approach, while 8% opposed it and 29% did not know. **Therefore, overall the public consultation strongly supported development of guidance on the application of measures by farmers**.

The consultation asked for views on whether the European Innovation Partnership on Agricultural Productivity and Sustainability and the European Innovation Partnership on Water should develop and disseminate innovative solution to ensure agriculture's negative impact on water are removed or minimised and beneficial effects are maximized. 63% of respondents supported this approach, while 11% opposed it and 26% did not know. **Therefore, overall the public consultation strongly supported the role of the EIP in developing and disseminating innovation**.

The consultation sought views on whether the application of Environmental Impact Assessment should be enhanced with regard to irrigation projects. 39% of respondents supported this approach, while 26% opposed it and 35% did not know. **Therefore, overall the public consultation expressed more support than opposition to increased EIA for irrigation projects, but there was a large proportion of 'do not know' responses'**.

The consultation sought views on whether the Commission should ensure that the implementing rules for the post-2013 CAP Pillars I and II support and target the necessary measures to deliver water quality and quantity objectives. 62% of respondents supported this approach, while 8% opposed it and 30% did not know. **Therefore, overall the public consultation strongly supported greater use of both Pillar I measures and Pillar II measures of the CAP to deliver water objectives**.

Around 60% of the respondents support each of the four voluntary approaches, i.e.: the development of guidance on green infrastructure; on integrated water and land-use management; on the effective application of measures by farmers to deliver water quality and quantity objectives at catchment level; and the development and dissemination of innovative solutions in the frame of the European Innovation Partnerships. A similar share, 62%, of the responses are also in favour of a measure relating to funding: ensuring that the implementing rules for the post-2013 CAP Pillars I and II support and target the necessary measures to deliver water quality and quantity objectives. By contrast, regulatory measures

receive much less support: 39% of responses are in favour of enlarging the scope of the Environmental Impact Assessment to apply to irrigation projects.

For most of these options, a high number of respondents (up to 35%) indicate 'do not know'. The shares are lower for options on guidance for green infrastructure and land-use management.

In their written comments, several respondents underline the importance of land use issues for water management in general. Many respondents highlight the importance of the link between agriculture policies and water use, and call for the CAP to take into account water-related priorities. Replies from NGOs, industry and national authorities state that a reformed CAP should support water quality and quantity objectives. A number of these comments also highlight the importance of the local context, which needs to be addressed in any guidance or requirements.

One reply, supporting voluntary measures, states that an on-going process of dialogue with the agricultural sector is needed and this will take time. Another response predicts that agricultural production in Europe will increase in the face of growing world food demand.

Finally, several respondents call for better water pricing as a mechanism to address water use in agriculture and other sectors. Others highlight the role of green infrastructure in addressing land use problems.

The Third European Water Conference concluded[192] that stronger policy integration is needed between water, agricultural and energy policy as well as key relevant policy reforms (e.g. in the CAP). Furthermore, the European Commission can play a key role in further promoting integration, and providing further instruments and practical guidance on the improvement of water management at a local level. The conference also concluded that it is essential to have a good set of both mandatory and voluntary measures for the agricultural sector. At the same time, we should not rely on regulation only to reinforce policy. Reliable funding (public and private) is fundamental for implementing measures. Agreements between farmers and water companies are a successful concept and should be further promoted. For the protection of water ecosystems, there is a need to further promote win-win measures, such as wetland restoration (win-win for the WFD, flood prevention, Habitats and Birds Directives). More attention should also be given to strategic approaches such as green corridor strategies at river basin level.

Published positions of organisations also provide views on the options concerning land use. However, with regard to conditionality under the CAP, it is important to note that this report is being finalised in the middle of the adoption procedure of the proposed new CAP Regulations. This is not the place to summarise the ongoing (and moving debate), except to note that the issue is controversial. Positions with regard to water policy include The

[192] http://waterblueprint2012.eu/sites/default/files/Key%20Messages_English_1.pdf

European Federation of National Associations of Water and Waste Water Services (EUREAU)[193] which argues for a strong Pillar I, for its greening and application of cross-compliance, but that measures should be decided at national level to avoid a one size fits all approach at EU level. A group of environmental NGOs makes a strong statement[194] that elements of the WFD should be added to cross compliance so as to lift the environmental baseline of farmers.

For Pillar II, EUREAU supports continued payments for farmers, but these should be targeted at specific local water issues, such as combatting water scarcity, drinking water protection, etc. The environmental NGOs also support further Pillar II funding with a specific emphasis to support full implementation of the WFD.

With regard to financing, EUREAU[195] notes the importance of grants and loans to support water infrastructure. However, it does not consider these sources to be realistic in the long-term and that such aid 'should be reserved for transition periods and specific conditions'. Overall, EUREAU considers that such financing is not consistent with the principle of sustainability of water services and that investment and running costs should be covered by prices paid by users, not least because this is consistent with the cost recovery principle of the WFD.

6.7 Economic, social and environmental impacts

Economic impacts

The impacts of each option are tightly linked to project level impacts, i.e. the implementation of natural water retention measures. Whether natural water retention projects are implemented at national or regional level due to guidance or due to a mandatory requirement, their implementation costs are the same; depending on the policy option driving such projects, however, their timing and the extent to which they are applied may vary.

The costs of implementing green infrastructure projects and natural water retention measures have been estimated by a number of recent studies. An IEEP study[196] identified the costs of green infrastructure schemes at project level based on an analysis of 50 initiatives. The range of project costs varies considerably, depending on the scope and local

[193] EUREAU (2012). EUREAU Position on the Water Blueprint. Also EUREAU (2010). Position Paper on the post-2013 Common Agricultural Policy.

[194] Birdlife et al. (2012). Briefing. Reform proposals for the Common Agricultural Policy. Common Briefing of Birdlife Europe, the European Environmental Bureau, the IFOAM EU Group and WWF.

[195] EUREAU (2010). Position Paper on Requirements for Financing Investment in the Water Sector.

[196] Mazza L., Bennett G., De Nocker L., Gantioler S., Losarcos L., Margerison C., Kaphengst T., McConville A., Rayment M., ten Brink P., Tucker G., van Diggelen R. 2011. Green Infrastructure Implementation and Efficiency. Final report for the European Commission, DG Environment on Contract ENV.B.2/SER/2010/0059. Institute for European Environmental Policy, Brussels and London

conditions. For freshwater and wetlands management and restoration the average project costs was 575.5 € million, with a minimum cost of about 128,000 € and a maximum cost of over 4€ billion. Multi-functional farmland and forestry projects tend to be much cheaper with an average cost of 115.5€ million and a minimum cost of only 50,000 €.

The Stella Consulting[197] study looked at costs at national level and aggregated the information to costs for the EU-27 based on modelling results of scenarios simulating the potential surface area covered by the measures by 2030 within each MS. The study assessed the following costs of each measure:

- Land requirement: Some NWRM require land acquisition, and some can be supported by a land compensation scheme or service payments. These two approaches imply different types of costs. Land acquisition costs vary greatly from site to site, and depending on the amount of land required, as in urban areas, for example, land must be set aside for both grey and GI. In urban conditions, bio-retention areas and swales can be incorporated into landscaping, in rights-of-way along roadsides, and in or adjacent to car parks. Agriculture and forest land occupy a large part of watershed areas. Therefore, stakeholders such as farmers are key actors in the implementation of a combination of practices consistent with natural water retention objectives. The adoption of these types of agricultural practices requires financial incentives and investments in extension networks.

- Construction and rehabilitation costs (investment, design and contingency): The base capital costs refer primarily to the cost of constructing/implementing the NWRM. Capital costs include new investments, their depreciation allowance and the opportunity cost of capital. Construction costs also cover rehabilitation costs if needed. As most of the NWRM require careful planning, design costs should also be taken into account.

- Construction and rehabilitation (operation and maintenance): According to Wateco (2003), operating costs are incurred to keep an environmental facility running (e.g. material and staff costs) while maintenance costs are incurred for maintaining existing (or new) assets in good functioning order until the end of their useful life. Differences in maintenance requirements should also be considered when comparing costs. Following USEPA, 1999, maintenance can be broken down into two primary categories: aesthetic/nuisance maintenance and functional maintenance. Functional maintenance is important for performance and safety reasons, while aesthetic maintenance is important for public acceptance.

[197] Stella Consulting (2012). Costs, benefits and climate proofing of natural water retention measures. Final Report. 11 June 2012. European Commission, DG Environment

- Administrative costs, such as enforcement costs, monitoring and advisory services. Monitoring and enforcement includes monitoring and inspections by enforcement authorities as well as incentives (tax reduction and/or subsidies). Local agencies may also provide extension (advisory) services to landowners on implementing NWRM projects.

- Other costs including productivity losses (e.g. loss of agricultural production that would not otherwise be compensated), environmental risks (e.g. risk of ground water contamination in high percolation areas or risk of mosquitoes and pest breeding) and cost savings including reducing grey infrastructure, energy savings and material with increased life cycle.

The largest impact of these costs would be potentially on the affected land users, mainly farmers. They would need to go through a learning process and adapt their land practices, decreasing operating income and potentially increasing operational costs or they could sell their land and relocate. The extent of these impacts and the impact on the internal market will depend on the availability of support from a land compensation scheme or service payments. The increased adoption of green infrastructure could negatively impact the construction sector, by shifting away from grey infrastructure.

The aggregated costs are not precise estimates but are rather intended to provide information for decision-making on which measures to pursue (see Table 13). The study concludes that the annualised costs of the NWRM range from €0.85 million (€0.002 per person) for buffer ponds, to €180,460 million (€360 per person) for the urban measures; this is primarily due to very high unit investment and operation and maintenance costs (O&M)[198]. The crop practice scenario is the second most expensive, primarily because of a very large increase in surface area (more than 100 million hectares). On a per person basis, the grassland and wetland scenarios are the least expensive with an annual cost below €1[199].

[198] ibid
[199] ibid

Table 13. Cost comparison of scenarios at EU level.

Scenario	Increase in surface area (Ha)	Increase/ EU Surface area (%)[200]	Present value of costs (2011 € billion)	Annualised cost (2011 € million)	Annualised cost/GDP (%)	Annualised cost per person (2011 €)
1.1 Riparian forests	1,119,970	0.27%	11.02	911.90	0.01%	1.82
1.2 Afforestation	3,021,807	0.72%	22.19	1,836.37	0.01%	3.67
2. Urban	3,423,078	0.81%	2,180.92	180,460.34	1.47%	360.20
3.1 Grassland	782,718	0.19%	2.87	237.71	0.002%	0.47
3.2 Buffer strips	2,191,506	0.52%	11.95	988.88	0.01%	1.97
3.3 Grass waterways	3,957,266	0.94%	21.16	1,750.68	0.01%	3.49
3.4 Crop practices	111,254,423	26.39%	100.55	8,320.06	0.07%	16.61
4. Buffer ponds	295.20	0.00007%	0.01	0.85	0.00001%	0.002
5.1 Wetlands	120,470	0.03%	1.56	129.42	0.001%	0.26
5.2 Re-meandering	91,447	0.02%	5.42	448.78	<0.01%	0.90

Source: adapted from Stella Consulting (2012). Costs, benefits and climate proofing of natural water retention measures. Final Report. 11 June 2012. European Commission, DG Environment.

[200] EU Surface area in hectares = 421,510,000

According to Stella Consulting (2012), the implementation of NWRMs upstream to reduce run-off can reduce the need for grey infrastructure projects downstream, thus saving costs as Green Infrastructure measures are often low cost solutions[201]. In France, the economic benefits of natural water storage were calculated in terms of the replacement costs of building grey infrastructure like dams. Several studies indicate benefits ranging from € 37/ha/year to € 617/ha/year[202].

A number of case studies have shown the benefits of natural water storage in floodplains and wetlands in terms of economic value. A cost-benefit analysis found that natural measures lead to flood protection benefits of around €740 million (all actualised benefits 2010-2100), recreational benefits of around €22 million and provide ecosystem services to the tune of around €130 million[203]. Morris and Camino[204] estimated the marginal value of flood protection due to wetlands at 505€ (£407)/ha/year for inland wetland and at 4,000€ (£ 2498) /ha/year for coastal wetlands.

A case study in the Uckermark area, Denmark, shows that reduced tillage was driven by the cost reductions to farmers (e.g. fuel, equipment, and labour reduction). Experts have calculated cost savings of €28-70/ha/year or an average of €49/ha/year (€51.4/ha/year in 2011 prices)[205].

Green Infrastructure projects increase the recreational benefits of an area, which enhances a region's ability to attract tourism. A green infrastructure initiative in central England targeting has resulted in 20 new tourism attractions, and attracts 8.7m visitors annually, bringing tourism revenues of €321 million to the local economy[206].

Option 4d would provide financial support from EU funds to support implementation where spending might otherwise be difficult or not available. The exact nature of the economic impacts will depend upon the extent of Regional Fund spending and the particular circumstances of the locations where those investments are made. Funding through Cohesion Policy would deliver economic benefits from NWRM only in the Member States eligible for such funding. It is, therefore, not possible to set these out in detail.

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[201] ibid

[202] Schéhérazade et al., 2010 in IEEP, 2011

[203] Broekx, S., Smets, S., Liekens, Bulckaen, D. and Leo De Nocker. Designing a long-term flood risk management plan for the Scheldt estuary using a risk-based approach, Natural Hazards, 2011, Volume 57, Number 2, Pages 245-266 http://www.springerlink.com/content/e43138836415t02n/fulltext.pdf

[204] Morris, J. and Camino, M (2011). UK National Ecosystem Assessment Working Paper. Economic Assessment of Freshwater, Wetland and Floodplain (FWF) Ecosystem Services. Cranfield University.

[205] Stella Consulting (2012). Costs, benefits and climate proofing of natural water retention measures. Final Report. 11 June 2012. European Commission, DG Environment.

[206] Naumann, Sandra, McKenna Davis, Timo Kaphengst, Mav Pieterse and Matt Rayment (2011). Design, implementation and cost elements of Green Infrastructure projects. Final report to the European Commission, DG Environment, Contract no. 070307/2010/577182/ETU/F.1, Ecologic institute and GHK Consulting.

Depending on the policy instrument used, the economic costs and benefits will be different. Option 4b would most likely lead to the most economic benefits, given its mandatory nature, although the timing of these benefits are long term. Requiring river basins to implement NWRMs would lead to more efficient spending as such measures are multi-beneficial, not only preventing floods but also reducing nutrient pollution in water ways and reducing scarcity in areas by helping to retain water. This would reduce the costs of addressing these pressures.

Through the voluntary Option 4a, Member States will decide themselves whether to implement NWRM, based on issues such as cost-effectiveness.

Option 4c would have an impact on the EU budget. However, it does not impact on the level of that budget, but rather the priorities to which that budget is applied. The increased availability of finance (from private sources, EIB, etc.) has the potential for more efficient and effective spending. The timing of spending of NWRM implementation can be an important factor in determining its efficiency and effectiveness. Therefore, increased availability of funds can improve the economic efficiency of the spending, provided the finance is correctly prioritised and targeted.

Administrative costs will be associated with the establishment of requirements of mandatory application of NWRM. This option would lead to the greatest administrative burden on governments and their administrations. National water legislation would have to be amended in order to account for a mandatory requirement to implement natural water retention. Additionally, river basins not currently implementing NWRMs measures would have to revise their programme of measures, which would also result in costs. Public authorities have to face additional costs, on top of the related administrative burden, to control enforcement and for monitoring. The differences in national and regional conditions ranging from site conditions to the organisation of administrative agencies make it hard to assess these costs.

The administrative costs are mainly associated with the costs of developing guidance at EU level. The costs of such, as well as the level at which the burden is placed, is largely dependent on the channel under which the guidance is developed. In case the document is developed in the framework of the CIS process, the majority of the administrative burden falls at EU level but also on the lead Member States that coordinate the guidance document. These start-up costs are one-time payments and few maintenance costs are associated with guidance (unless the document is updated).

Any launch of financial incentives will come from public budgets, which will lead to costs, and will need to be administratively monitored in order to check proper implementation.

Option 4d has consequences for the EU budget as it would prioritise NWRM within the spending of Regional Funds. There are administrative costs for project preparation and

implementation. However, these costs are outweighed by the funds received for project application. The economic impacts of the option all depend on the number of projects funded and the areas of the EU eligible for funding. Furthermore, a key justification for the option is to address resource constraints for taking forward NWRM, which is increasingly relevant during this period of constraint on public and private expenditure. Where NWRM are funded by EU funds, the specific economic benefits of those measures will depend on the nature of the specific measure and would be similar to those that occur with options 4a and 4b.

Social impacts

Social impacts of natural water retention measures arise from an increase in temporary jobs due to project implementation and in full-time jobs for maintenance and from increased tourism opportunities and local recreation opportunities. These impacts are highlighted by anecdotal evidence and serve as an indicator for potential impacts:

- Improved employment and labour markets:
  - The restoration of riverside areas in Lyon, France created between 60-120 temporary jobs in 17 companies[207].
  - In the UK for every €1million spent on agri-environmental measures under the Environmental Stewardship scheme one Full-time job is supported[208].
- An IA of promoting GI over grey infrastructure for flood management found that investments in ecosystem based solutions reduce jobs in sectors focusing on conventional flood management but an increase in jobs through GI projects negatives the loss and overall net effect as neutral[209].
- Improved job quality: According to IEEP (2011), GI enhance labour productivity through improved health as a result of better air quality, green views, and increased outdoor recreational activities. IEEP references a 2009 Study of a forest project in England, which estimated annual net benefits of 24,800€ (£20,000) as a result of reduced sick days, as well as annual cost savings of 16,116€ (£13,000) as a result of improved health through physical recreation. In addition, the study found that better

[207] Naumann, Sandra, McKenna Davis, Timo Kaphengst, Mav Pieterse and Matt Rayment (2011). Design, implementation and cost elements of Green Infrastructure projects. Final report to the European Commission, DG Environment, Contract no. 070307/2010/577182/ETU/F.1, Ecologic institute and GHK Consulting.

[208] Mills, et al., 2010 in Mazza L., Bennett G., De Nocker L., Gantioler S., Losarcos L., Margerison C., Kaphengst T., McConville A., Rayment M., ten Brink P., Tucker G., van Diggelen R. 2011. Green Infrastructure Implementation and Efficiency. Final report for the European Commission, DG Environment on Contract ENV.B.2/SER/2010/0059. Institute for European Environmental Policy, Brussels and London.

[209] Mazza L., Bennett G., De Nocker L., Gantioler S., Losarcos L., Margerison C., Kaphengst T., McConville A., Rayment M., ten Brink P., Tucker G., van Diggelen R. 2011. Green Infrastructure Implementation and Efficiency. Final report for the European Commission, DG Environment on Contract ENV.B.2/SER/2010/0059. Institute for European Environmental Policy, Brussels and London

air quality resulted in net annual benefits at 143,811€ (£116,000) due to less air pollution[210].

- Improved cultural heritage: Green Infrastructure projects increase the recreational benefits of an area, which enhances a region's ability to attract tourism. A green infrastructure initiative in central England targeting has resulted in 20 new tourism attractions, and attracts 8.7m visitors annually, bringing tourism revenues of €321 million to the local economy[211].

On the other hand, there are potential negative impacts in case land users would abandon their land or would suffer from losing operating income/increased operating costs which are not compensated for.

The exact impact of guidance on social issues is not possible to determine. It is likely that guidance will improve the institutional framework to support farmers in implementing such projects, as well as increase farmers' knowledge. This increase in knowledge could lead to an increase in the implementation of NWRMs and thus lead to the social benefits described above such as job creation and preservation of cultural heritage.

The focus of the guidance aimed at administrations would be on the role of different stakeholders in implementing larger scale projects and how to improve coordination among local agencies, e.g. bringing together water agencies, nature protection agencies and agriculture agencies. Additionally, it would bring together examples of PES schemes among the Member States, going beyond agri-environmental measures to focus more on the great potential of private and public-private partnerships that has already been demonstrated in pilot programmes (e.g. partnership between farmers and Nestle in France, Cooperative agreements between drinking water companies and farmers in the Germany, protection of peatlands in northwest Germany, etc.).

The social impacts of option 4d depend on the number of projects funded and the areas of the EU eligible for funding. Where NWRM are funded by EU funds, the specific social benefits of those measures will depend on the nature of the specific measure and would be similar to those that occur with options 4a and 4b.

[210] Regeneris, 2009 in Mazza L., Bennett G., De Nocker L., Gantioler S., Losarcos L., Margerison C., Kaphengst T., McConville A., Rayment M., ten Brink P., Tucker G., van Diggelen R. 2011. Green Infrastructure Implementation and Efficiency. Final report for the European Commission, DG Environment on Contract ENV.B.2/SER/2010/0059. Institute for European Environmental Policy, Brussels and London

[211] Naumann, Sandra, McKenna Davis, Timo Kaphengst, Mav Pieterse and Matt Rayment (2011). Design, implementation and cost elements of Green Infrastructure projects. Final report to the European Commission, DG Environment, Contract no. 070307/2010/577182/ETU/F.1, Ecologic institute and GHK Consulting.

Environmental impacts

NWRMs provide important ecosystem services such as[212]:

- Regulating through controlling water quality, water retention, flood prevention, soil protection and controlling sedimentation.
- Supporting wildlife habitat in riparian areas.
- Cultural and amenity by maintaining landscape aesthetics.
- Provisioning through biomass from riparian forests, agricultural products.

Natural water retention measures not only benefit water resources through improved quality, they also improve the greater ecosystem surroundings by positively impacting soil and biodiversity. NWRMs are also considered 'no-regret' measures in the context of climate change adaptation and can help to mitigate current climate impacts. In terms of the water environment, NWRMs can reduce run-off by trapping water in their soils and thus reducing peak discharge rates and reduce flood risks. NRWMs can also reduce the rate of carbon loss through carbon storage/sequestration.

Based on extensive literature research, it seems that the available information varies considerably in quality and quantity, and from measure to measure[213]:

- Wetlands seem to be the most effective measure; they increase water storage, contribute to groundwater replenishment and attenuate run-off.
- Forests can also reduce or slow down run-off, but it is unclear to which extent. This depends on site-specific conditions and soil properties. They also contribute to water storage. Although it is commonly acknowledged that forests contribute to groundwater replenishment, evidence suggests that they reduce water recharge, in particular in semi-arid catchments during drought periods.
- Sustainable drainage systems (SuDS) attenuate, delay or reduce the urban run-off and decrease the amount of run-off going to drains and sewers and contribute to groundwater replenishment, but to a lesser extent.
- All agricultural measures, except meadows and pastures and soil conversation practices, contribute to reducing or slowing down run-off. Only meadows and pastures and buffer strips increase water storage capacity in the soil.

[212] Dworak, T.; Berglund, M.; Vranken,L.; Campling, P.; Kampa, E.; Ribeiro, M; Thaler, T. (2009). Summary report on an in-depth assessment of RD-programmes 2007-2013 as regards water management- Study undertaken for the European Commission – DG Environment; Stella Consulting (2012). Costs, benefits and climate proofing of natural water retention measures. Final Report. 11 June 2012. European Commission, DG Environment.

[213] Stella Consulting (2012). Costs, benefits and climate proofing of natural water retention measures. Final Report. 11 June 2012. European Commission, DG Environment.

- Basins and ponds contribute to run-off control and promote natural groundwater recharge and they are designed to store water in the landscape.
- Floodplain restoration involving land-use management changes attenuates low to medium peak flows at a local/regional scale and they have a positive impact on groundwater replenishment.
- The effectiveness of re-meandering is unclear.

The environmental impacts of option 4d depend on the number of projects funded and the areas of the EU eligible for funding. Where NWRM are funded by EU funds, the specific environmental benefits of those measures will depend on the nature of the specific measure and would be similar to those that occur with options 4a and 4b.

6.8 Conclusions

This section has explored a range of different options to address various aspects of enhancing the use of NWRM in the EU.

The objectives set out earlier are for:

- The agricultural sector should better apply existing available measures to reduce its widespread impact on water bodies across Europe and this should be reflected in EU agricultural policies.
- A higher application of green infrastructure should be achieved as various related measures, such as afforestation and sustaining wetlands, can reduce flood risk and make regions more resilient against droughts.
- EU level action should ensure that NWRM are properly integrated and explicit within the next RBMPs'.

The option to develop guidance (4a), including for farmers, receives considerable support from stakeholders and has the strong advantage in building on the range of current policy measures and opportunities (WFD, CAP, etc.) without the need for legal change. This would help to overcome barriers of lack of knowledge, etc., but cannot guarantee their implementation. However, this option deserves support as it is also fully compatible with the other options (guidance can be developed to take account of any amendments, etc., that might arise from taking forward the other options).

Option 4b amending the WFD explicitly addresses PES. However, there is no opportunity immediately within the Blueprint to progress a WFD amendment, but the issue could be returned to when the WFD is reviewed in several years time.

The conditionality option 4c also contributes to both objectives. However, the current state of revision of the CAP and Cohesion regulations mean that there is not an immediate opportunity to progress such an option. However, this option has the potential to be effective and is supported by a range of stakeholders. Thus it could be returned to at a future opportunity when the respective regulations are revisited in the future. However, there is less opportunity for it to be taken forward at an early stage in the Blueprint.

The funding option 4d has significant advantages. It is entirely consistent with other EU policies and would address funding barriers, particularly in Member States where public spending is constrained. This option can be taken forward within the Blueprint, alongside similar options regarding the spending of EU funds for re-use of water and leakage reduction.

Table 14. Summary of the impacts of the options to address the unlocking of measures regarding land use

Description of the options	Option 4.1 Developing tools and guidance on an EU framework for NWRMs including support for Payments for Ecosystem Services (PES) and an effective application of NWRM by land users	Option 4.2 Amending the WFD to require mandatory application of NWRM	Option 4.3 Ensuring NWRM measures are mainstreamed into CSF funds, including through conditionality on their spending	Option 4.4 is to prioritise spending of Regional Funds on NWRM.
Effectiveness towards specific Objective	+ improves the integration of water objectives into land use planning, agriculture and nature conservation policy	++ mandatory requirement of NWRM improves the integration of water objectives into land use planning, agriculture and nature conservation policy	++ option requires that water management issues are taken into account in project selection under the structural funds and requires the CAP ensure water concerns are taken into account in rural development programmes	++ Regional Fund investment would be applicable only to those areas eligible for the funds,. Investment would only proceed where it is locally identified as appropriate as part of a scarcity strategy. The option can speed up implementation of NWRM in those parts of the EU and sectors which are currently significantly affected by the economic crisis and public spending and private investment restrictions.
Effectiveness towards other specific objectives	+ option would strongly improve knowledge and tools by spreading best practice and promoting economic instruments (e.g. PES) to support changes in land use management both at an institutional level and in the field + guidance for administrations will help local stakeholders to better work together and thus improve efficiency of governance	+ NWRM option would strongly support changes in land use management both at an institutional level and in the field and thus promote innovation + option would promote the use of economic instruments to finance mandatory NWRMs (e.g. PES)	+ would improve the knowledge in the agriculture and rural development sectors regarding water-friendly projects + implementing rules targeting water issues will force stakeholders to work together better in project design	+ In so far as funding is an economic instrument, the option promotes this objective. It has no impact on governance or knowledge base objectives.
Efficiency	+ guidance is cost-effective however there is no guarantee that NWRMs will be implemented + PES is a cost-effective way to promote measures	- high administrative burden of changes in legislation + well-thought integration of NWRM in PoM will increase overall cost-effectiveness of mix of green and grey infrastructure and lead to more efficient spending	+ cost-effective in ensuring that water issues are included in agricultural policy - for rural development policy, the approach could conflict with the strategic programming system	-/≈ The provision of EU funds is efficient administratively. With regard to specific objectives, efficiency will depend upon detailed project criteria and their assessment.

Coherence	+ guidance supports coherence between use planning, agriculture and nature conservation	++ mandatory requirements increase application of NWRMs which limit trade-offs by targeting multiple pressures	++ would ensure that relevant projects are coherent with water policies	Not relevant.
Acceptability	Around 60% of respondents to Public Consultation support the voluntary approach	Mandatory application of NWRM has not been subject to Public Consultation; however in general regulatory measures have received much less support compared to a voluntary approach.	This option has not been subject to Public Consultation. However, conditionality of funding has been received positively within the public consultation for other specific problems.	≈/+ The public consultation did not include this option. However, there was significant positive support for use of EU funds in the problem on leakage and it can be assumed a similar view would prevail on this issue.
Environmental impacts				
Ecological Status	+ NWRMs provide important ecosystem services such as regulation through controlling water quality, soil protection and controlling sedimentation. Also by potentially substituting grey infrastructure, negative impacts thereof are reduced. The effect will depend on measures uptake of voluntary option	++ NWRMs provide important ecosystem services such as regulation through controlling water quality, soil protection and controlling sedimentation..	+ conditionality would impact by speeding up NWRM implementation in eligible regions, leading to the environmental benefits mentioned	+ The impact is by the same mechanism as option 4.1, but would only occur in areas eligible for the respective EU funds.
Water Stress	+ NWRMs provide important ecosystem services such as regulation through water retention and flood prevention. Also by potentially substituting grey infrastructure, negative impacts thereof are reduced. The effect will depend on voluntary uptake	++ NWRMs provide important ecosystem services such as regulation through water retention and flood prevention. Also by potentially substituting grey infrastructure, negative impacts thereof are reduced	+ conditionality would impact by speeding up implementation in some MS, leading to the environmental benefits mentioned	+ The impact is by the same mechanism as option 4.1, but would only occur in areas eligible for the respective EU funds.
Vulnerability to extreme events	+ NWRMs provide important ecosystem services such as regulation through water retention and flood prevention. Also by potentially substituting grey infrastructure, negative impacts thereof are reduced. The effect will depend on voluntary uptake	++ NWRMs provide important ecosystem services such as regulation through water retention and flood prevention. Also by potentially substituting grey infrastructure, negative impacts thereof are reduced	+ conditionality would impact by speeding up implementation in some MS, leading to the environmental benefits mentioned	+ NWRMs provide important ecosystem services such as regulation through water retention and flood prevention. The extent of impact of the option is in those areas eligible for funding.

Other impacts[214]	+ NWRMs provide important ecosystem services such as supporting wildlife habitat in riparian areas, cultural and amenity services by maintaining landscape aesthetics and provisioning services through biomass from riparian forests, agricultural products. + NWRM aim to contribute to increased resilience of ecosystems to climate change + In case less grey infrastructure is built, less energy is used and depending on the energy sources, this will have an impact on GHG emissions. The effects depend on the uptake of measures. Other environmental impacts: not relevant	++ NWRMs provide important ecosystem services such as supporting wildlife habitat in riparian areas, cultural and amenity services by maintaining landscape aesthetics and provisioning services through biomass from riparian forests, agricultural products. + NWRM aim to contribute to increased resilience of ecosystems to climate change + In case less grey infrastructure is built, less energy is used and depending on the energy sources, this will have an impact on GHG emissions. Other environmental impacts: not relevant	+ conditionality would impact by speeding up implementation in some MS, leading to the environmental benefits mentioned. Other environmental impacts: not relevant	+ NWRMs provide important ecosystem services such as supporting wildlife habitat in riparian areas, cultural and amenity services by maintaining landscape aesthetics and provisioning services through biomass from riparian forests, agricultural products. + NWRM aim to contribute to increased resilience of ecosystems to climate change + In case less grey infrastructure is built, less energy is used and depending on the energy sources, this will have an impact on GHG emissions. The effects will occur in areas eligible for funding and where projects are funded in practice. Other environmental impacts: not relevant
Economic impacts				
Functioning of the internal market and competition	- potential negative impact from decreased operating income/increased costs for land users depends on compensating support should that be available – as this is non-binding it will depend on extent of uptake	-- potential negative impact from decreased operating income/ increased costs for land users depends on compensating support should that be available	≈ the option has little impact on the internal market however may imply negative effects mentioned for the other options	≈ The option has no impact on the internal market.
Specific regions or sectors	- potential negative impact for land users mainly affects farmers and depends on compensating support should that be available – as this is non-binding it will depend on extent of uptake	-- potential negative impact for land users mainly affects farmers and depends on compensating support should that be available + business opportunities in	The option is only applicable to eligible regions	+ This option has a direct regional impact due to the eligibility of regions for access to Regional Funds. ++ The option impacts on the agricultural and water industry sectors in particular (but also potentially other businesses) through project support which

214 The climate, Transport and the use of energy, Air quality, Biodiversity, flora, fauna and landscapes, Soil quality or resources, Land use, Renewable or non-renewable resources, The environmental consequences of firms and consumers, Waste production / generation / recycling, The likelihood or scale of environmental risks , Animal welfare, International environmental impacts

	+ potential business opportunities in environmental services, tourism, forestry sectors depending on extent of uptake	environmental services, tourism, forestry sectors		might not otherwise have taken place.
SMES	- costs to change practices mainly for farmers – potentially SMEs + potential business opportunities in environmental services, tourism, forestry sectors Impacts depend on extent of uptake	- costs to change practices mainly for farmers –SMEs - potential negative impact on construction companies focusing on grey infrastructure + potential business opportunities in environmental services, tourism, forestry sectors	- costs to change practices mainly for farmers – potentially SMEs	+ SMEs and reasons affected same as options 4.1 and 4.2. Impacts will occur for SMEs in regions eligible for funding.
Administrative burdens on businesses	≈ little administrative cost from development of guidance at governance level - costs for affected land users of getting acquainted with technical guidance/information/best practices - costs for RB authorities of getting acquainted with guidance/information /best practices aimed at authorities	-- high costs from need to adapt national legislation and revision of PoM - costs of uptake of requirements by land users	- costs associated with demonstrating compliance. However, not expected to be much additional over current requirements	The option does not impact on this issue.
Other [215]	+ potential cost savings due to low cost green infrastructure in case it is decided to implement NWRM, compared to grey infrastructure + potential economic co-benefits e.g. providing water for drinking, irrigation, industrial use - potential decrease of productivity for land users (mainly farmers) depends on compensating support that is available – as this is non-binding it will depend on extent	++ cost savings due to low cost green infrastructure in case it is decided to implement NWRM, compared to grey infrastructure ++ economic co-benefits e.g. providing water for drinking, irrigation, industrial use -- decrease of productivity for land users (mainly farmers) depends on compensating support that is available	+ Increased availability of finance has potential for more efficient and effective spending + adding water-related criteria as conditionality would help to ensure a level playing field within the EU Other economic impacts: not relevant	+ Increased availability of finance has potential for more efficient and effective spending

215 (Competitiveness, trade and investment flows , Public authorities , Property rights , Innovation and research , Consumers and households , Third countries and international relations , Macroeconomic environment)

	taken up Other economic impacts: not relevant	Other economic impacts: not relevant		
Social impacts				
Employment and labour markets	≈ might adversely affect some firms and benefit others the total level of employment is not expected to change	≈ while mandatory requirements might adversely affect some firms and benefit others the total level of employment is not expected to change	+/- difficult to predict, probably little net impact	+ Regional Fund spending may maintain employment in some sectors such as agriculture. The option would have a strong impact where spending is provided.
Social inclusion and protection of particular groups	≈ it is likely that guidance will improve the institutional framework to increase farmers' knowledge which could lead to an increase in the implementation of NWRMs and thus lead to social benefits such as job creation and preservation of cultural heritage; depending on uptake of measures	≈ it is likely that guidance will improve the institutional framework to increase farmers' knowledge which could lead to an increase in the implementation of NWRMs and thus lead to social benefits such as job creation and preservation of cultural heritage	N/a	Spending of EU funds could lead to an increase in the implementation of NWRMs and thus lead to social benefits such as job creation and preservation of cultural heritage; depending on uptake of measures.
Public health and safety	+ GI have a positive impact on health, depending on level of uptake	++ GI have a positive impact on health	+ conditionality would impact by speeding up implementation in some MS, leading to the benefits mentioned	+ GI have a positive impact on health, depending on areas in receipt of funds
Other [216]	+ GI have a positive impact on cultural heritage, depending on level of uptake. Other social impacts: not relevant	++ GI projects increase the recreational benefits of an area, thus improving cultural heritage Other social impacts: not relevant	+ conditionality would impact by speeding up implementation in some MS, leading to the benefits mentioned. Other social impacts: not relevant	. Other social issues are not relevant.

Magnitude of impact as compared with the baseline scenario (the baseline is indicated as 0): ++ strongly positive; + positive; – – strongly negative; – negative; ≈ marginal/neutral; ? uncertain; n.a. not applicable

216 (Standards and rights related to job quality , Gender equality, equality treatment and opportunities, non -discrimination , Individuals, private and family life, personal data , Governance, participation, good administration, access to justice, media and ethics , Crime, Terrorism and Security , Access to and effects on social protection, health and educational systems , Culture , Social impacts in third countries)

7 WATER EFFICIENCY OF BUILDINGS AND APPLIANCES[217]

7.1 Introduction and problem description

Public water supply represents 21% of the total water abstraction in the EU, and buildings account for the major use. Considering that the 44% of the abstracted water is used for cooling purposes for energy production and is returned to the environment with little to no treatment needed, water abstracted for public water supply appears to be even more significant.

The building sector includes residential buildings and the non-residential buildings, the former comprising 99% of the buildings in the EU. The residential water use represents 72% of the total water use in buildings, and 28% for non-residential buildings.[218]

The majority of water used in residential buildings is for: personal washing (showers and baths, accounting for about 35% of the use), toilet flushing (25%), washing clothes (14%), dish washing (8%), drinking and cooking (5%), room cleaning, garden irrigation and car wash (5%) and other uses (8%). Current water use in the EU is around 160 L/person/day in residential buildings. Significantly lower residential water use of about 120L/person/day or even lower - as currently achieved in Belgium with around 100L/cap/year[219] - are observed in some MS, indicating some reduction capacity for other EU regions. In addition, for certain water using products (e.g. taps and showers), reducing water consumption will also have the significant co-benefit of reducing energy consumption and related CO2 emissions. This is primarily because of reduction in "hot water" consumption and, in part, because of the reduction in energy needed to pump and treat cold and hot water.

An important driver of water use in buildings is the behaviour of its inhabitants. The main water uses are linked to toilets and personal hygiene (in all types of buildings), thus several flushes of toilets or longer showers will have important impacts on the amounts of water used. The use of efficient water devices plays a role in reducing this usage, for instance by choosing dual flushes or by reducing the water flow in showers. Using alternative water sources such as non-potable water sources (rainwater or grey water) is another solution to reducing pressure on water bodies. The quality of such water must be in line with its use. It is important to note, however, that installation of a water-saving device by itself will reduce the water use to a certain extent, but the consumer behaviour plays an important role in achieving its desired potential.

The **WFD** encourages MS to include water efficiency technical measures in their PoMs. As previously mentioned although the WFD give an indication of the types of intervention measures possible, it does not provide an exhaustive list and there is considerable leeway

[217] This problem description, option elaboration and analysis draws on: Bio (2012) Water Performance of Buildings. Final Report.
[218] EUREAU Statistics Overview on Water and Wastewater in Europe 2008 (Edition 2009)
[219] Aquawal, Paper in response to the stakeholder consultation.

for interpretation. Member States can choose which measures to apply to a water body based on a mandatory assessment of the main pressures in a given basin. Since none of the measures are mandatory, it is unclear the extent to which certain measures will be implemented. However, it is necessary to take sufficient measures to meet the legal objectives for achieving good status. The Drinking Water Directive is also important for the use of water in buildings. Water resource efficiency is further supported through Article 9 on cost recovery.

According to the 2011 study from Bio Intelligence Service, there are many initiatives currently in place in the EU and beyond to improve the **environmental performance of the building sector**. Initiatives about green buildings, which aim to label a building according to certain certification criteria, can be found at the national level (the BREEAM scheme in the UK, the DGNB in Germany and the HQE in France)[220]. Several national Governments have announced public procurements to enhance their own buildings, as around 40% of buildings tend to be owned or used by the public sector, the report found those initiatives targeting buildings generally include a mixture of actions such as monitoring leakages more closely, installing high-performance water-using products, reusing or harvesting water, etc. Moreover, current work on EU criteria for Ecolabel, Green Public Procurement (GPP) and Ecodesign in the sector of water use in buildings and/or water-using products has lead the way to promote resource-efficient practices (ibid).

The **Communication on Water Scarcity and Droughts** encourages the implementation of water savings and efficiency measures in water-stressed basins. It also encourages the development of water-efficient technologies and practices to promote water savings. The Communication suggests, among others, that MS incorporate binding performance targets for buildings and for public water networks. The strength of the Communication rests on identifying necessary areas where intervention is needed. A detailed list of technical measures is, however, not provided, and Member States are free to define projects and measures to combat WS&D. The focus of the Communication is more to encourage support actions at Member State level that lead to an increased or improved implementation of water saving projects/measures. However the uptake remains an open issue in many places.

The Commission published its **Roadmap to a Resource Efficient Europe** (COM(2011)571) in 2011. It highlights that 20% to 40% of Europe's water is wasted and water efficiency could be improved by 40% through technological improvements alone. Changes in ecosystems, land use, in production and water consumption and re-use patterns could cost-effectively reduce scarcity and ensure water quality. The Roadmap includes the following milestone: By 2020, all WFD River Basin Management Plans (RBMPs) have long been implemented. Good status – quality, quantity and use - of waters was attained in all EU river basins in 2015. The

[220] Bio Intelligence Service (2012). Water Performance of Buildings. Final Report. Study for the European Commission, DG Environment.

impacts of droughts and floods are minimised, with adapted crops, increased water retention in soils and efficient irrigation. Alternative water supply options are only relied upon when all cheaper savings opportunities are taken. Water abstraction should stay below 20% of available renewable water resources. Amongst the actions the Roadmap states that the Commission will propose are that it will assess and propose water efficiency targets and improved water efficiency measures (e.g. smart metering and mandatory requirements on water using devices.

The Ecodesign Directive 2009/125/EC is a framework Directive. It prevents disparate national legislations on the environmental performance of these products from becoming obstacles to the intra-EU trade. This should benefit both businesses and consumers, by enhancing product quality and environmental protection and by facilitating free movement of goods across the EU. The Directive does not set binding requirements on products itself. These are achieved through implementing measures adopted on a case by case basis for each product group. Which product groups are to be addressed are considered within the periodic Working Plan. On 20 January 2012, the Commission consulted the Ecodesign Consultation Forum on a draft Ecodesign Working Plan for the period 2012-2014. This has considered potential inclusion of selected water using appliances.

Although there are EU policies that take water efficiency into account, there is no EU wide initiative as regards water efficiency in buildings[221]. Although the construction of buildings is often carried out under the authority of local governments, EU level rules on water use to ensure efficiency would be beneficial to consolidate isolated efforts by each MS[222]. In order to reduce obstacles in the internal market, EU action is important so that technical requirements are harmonised, at building level, but also at product level[223].

The analysis of the RBMPs and PoMs in the WaterGap project indicates that MS are still giving priority to water supply measures (e.g. new desalination) (proposed in 30-40% of the RBMPs) over measures that impose new restrictions of pressures or that ensure the achievement of the environmental WFD objectives under WS&D conditions. While information pertaining to activities arising out of the WS&D Communication is spotty at best - there is no reporting requirement under the Communication – MS responses to the general questionnaire of the EC indicates very little action regarding the implementation of technical water saving measures[224].

[221] Bio Intelligence Service (2012). Water Performance of Buildings. Final Report. Study for the European Commission, DG Environment.

[222] ibid

[223] ibid

[224] Strosser, P., Dworak, T., Garzon, A., Berglund, M., Schmidt, G., Mysiak, J., Kossida, M., Iacovides, I., Ashton, V. (2012): Gap Analysis of the Water Scarcity and Droughts Policy in the EU. Study for the European Commission, DG Environment.

A recent analysis of water efficiency initiatives for buildings shows that progress in uptake of such measures is still low[225] considering the efforts made towards water saving technical solutions. Some barriers identified are difficulties in implementation, data gaps and investor-user issues. Additionally, there seems to be a general lack of concern among the public and building stakeholders, probably because water is considered an abundant good, and its price often does not reflect its value. Water is a cheap commodity in most areas of Europe, resulting on longer payback periods even for small investments. This leads to low attention given to water wastage, including through leaks, leaving taps open, or choosing inefficient water using appliances or buildings because of low awareness

There are also specific gaps related to the performance of the buildings approach. Building rating schemes are more complex and expensive to implement. Costs are likely to be higher with a building approach compared to a product level approach due to the need for training and administrative requirements. With respect to the product level approach, barriers are associated mainly with awareness and consumer behavior. Consumers may easily change key water-using fixtures, such as taps of showerheads, if they are not satisfied with the performance. With the buildings approach context, this could be a particular risk if developers have sought to attain a high ranking through specification of ultra-efficient fixtures that do not meet consumer expectations. A fixtures approach could avoid this by specifying both maximum water consumption and user performance standards[226].

7.2 Baseline and the justification for EU level action

Current consumption patterns of water use in buildings across the EU 27 are influenced by different levels of water using products (WuP) efficiency and cultural/behavioural differences that exist within the EU, taking into account existing water efficiency policies. Water use by the buildings sector accounted for about 40,000 Mm^3 in 2010.

The key factors that are likely to influence water use patterns in the future are:

- The number of buildings and building occupants (linked to population projections); Water use per capita is likely to be higher were household size is lower.
- Changes in the demand for water services (e.g., an increase in the typical number of showers taken).
- Changes in the efficiency of water using products (including typical efficiency expectations in the future and typical lifetime of WuPs).
- Behavioural changes in response to greater awareness/desire to make water savings (e.g., not leaving taps running, mending leaks, taking shorter showers).
- Adding voluntary water efficiency measures to “green” buildings' criteria.

[225] Bio Intelligence Service (2011). Water Performance of Buildings. Background Paper – Stakeholder Consultation. Study for the European Commission, DG Environment.

[226] Bio Intelligence Service (2009). Water Performance of Buildings. Study for the European Commission, DG Environment.

- Requirements implemented at national or EU levels (e.g. GPP on HQE buildings in France, extended coverage of water-metering in the UK, etc).

In addition to the factors above, current water efficiency policies in place are expected to lead to a 5% decrease in water use by 2050:

- At horizontal level[227]: 1% of water savings until 2025 and 1.5% of water savings from 2026 to 2050 for all types of buildings.
- At product-level: 15% of savings for residential buildings and 30% of savings for non-residential buildings, with an uptake of 5% for existing buildings and 10% in new buildings.
- At building level: 25% of savings for residential buildings and 40% of savings for non-residential buildings until 2025 (and respectively 10% and 12%, from 2026 to 2050), with an uptake of 0.1% for existing buildings and 1% in new buildings until 2025.

Recent studies show that competing demands for scarce water resources may lead to an estimated 40% global water supply shortage by 2030. Climate change is affecting all MS, and river basins will likely face reduced water availability across the EU. Therefore, to achieve water resources protection and sustainable water management, a more sustained effort is necessary by all decision-makers, users and stakeholders at all levels.

The policies above address water quantity issues at EU level; however, there is no EU wide initiative as regards water efficiency in buildings. Several initiatives in certain MS have been identified that highlight the national actions already in place (raising awareness, requiring efficient WuPs and as voluntary "green" building schemes). While a move towards a common building scheme is said to be occurring, no scheme seems to be achievable in the short term. Efforts to implement an eco-label for buildings also indicate difficulties at present. EU Ecolabel and GPP criteria for certain key water using products (taps and showers, toilets and urinals) are being developed.

A specific river basin approach – possibly based on EU-wide common indicators - is preferred by several stakeholders as some EU regions (e.g. BE, DE) already show a low water use per capita. If a policy is implemented, it is thus important to ensure that local specificities are taken into account. However, at the global level reduced water use will be beneficial throughout the EU, through the knock-on effect on energy, financial cost reductions and reduced pollution by reducing wastewater.

The transboundary characteristics of water and the challenges that lie ahead require a holistic and integrated approach which can best be tackled on the European level. There are few incentives for some to become more water efficient (especially those upstream) if other

[227] i.e. through water metering and pricing

MS do not pursue a similar objective. Additionally, while efforts and initiatives have been progressing with respect to water quality as a result of the WFD, overall insufficient progress has been achieved by the MS regarding water quantity management since the adoption of the WS&D policy. Initiatives at MS level are increasing but are not harmonised and are fragmented across the EU.

EU level action is also justified where product quality is being established. Several directives (including the Ecodesign Directive) exist which establish different aspects of product policy, not least to ensure clarity and a level playing field in the single market. Therefore, common water efficiency design requirements at EU level can be justified to ensure adequate functioning of the market. On buildings themselves, the justification for EU level action is that there may be a need to address extreme water scarcity based on existing EU policies. A parallel approach on energy efficiency in buildings in EU law is already in place.

7.3 Objectives

The problem analysis has highlighted the following:

- Improved water efficiency of appliances and buildings can reduce water demand by domestic and other users. Therefore, uptake of efficiency measures can contribute to demand management in water stressed areas.

Given the problem analysis, the specific policy objective is to increase efficiency of water use by appliances and buildings through better application of improved design and measures.

In taking forward this objective for water efficiency of appliances and buildings in the Blueprint it is important that there are SMART indicators for monitoring their progress and, therefore, whether the objectives have, or have not, been achieved. This will enable the success of policies to be determined and potential barriers (if they occur) to be addressed as policies are reviewed.

For the water efficiency of appliances and buildings, the following SMART indicators are proposed:

- The number of certification schemes in the EU for water efficiency of buildings and the number of construction companies supporting the schemes.
- The proportion of housing built according to an appropriate certification scheme (generally and also specifically in water stressed areas).
- The number of appliances for which water efficiency standards have been produced.
- The number of appliances that meet water efficient product standards.
- The proportion of products on the market and sold which meet the water efficient product standards.

7.4 The options and their elaboration

Several policy options to address the problem of water efficiency of appliances and buildings were developed to be considered within the Blueprint and subject to IA. These options were subject to a SWOT analysis (see Annex D). Table 15 describes the options as originally developed in the project and submitted for the public consultation together with the final elaboration of options included within the IA, following further discussion with the Commission. Within this problem there are two different categories of options: product level options and building level options. All but one option was retained. The option not carried forward concerned the development of BREF-like notes on water efficiency. It was considered that this was best addressed within the context of the other options where technical efficiency measures can be fully considered.

Table 15. The options originally considered and final options to address water efficiency of buildings and appliances

Options originally considered	Final options for the IA
• Voluntary labelling of water using appliances • Mandatory labelling of water using appliances • Establish a WFD Common Implementation Strategy working group on water use efficiency for preparing "BREF-like" notes on water use/conveyance efficiency. • Minimum water efficiency requirements for water using appliances, e.g. under the Ecodesign Directive • Voluntary performance rating for buildings • Mandatory performance rating for buildings • Minimum water performance requirements for buildings • A directive on water efficiency requirements in buildings including a requirement on water companies to reduce final water consumption	• Option 5.1a Voluntary labelling of water using appliances • Option 5.1b1 Mandatory labelling of water using appliances • Option 5.1b2 Minimum water efficiency requirements for water using appliances within the Ecodesign Directive • Option 5.2a Voluntary performance ratings for buildings • Option 5.2b1 Mandatory performance ratings for buildings • Option 5.2b2 Minimum water performance requirements for buildings • Option 5.2b2 A directive on water efficiency requirements in buildings

Product level options

Product labelling better informs the consumers of the water performance of a device and allows the comparison with other products, fostering consumer's choice.

As such, **Option 5.1a** would establish voluntary labelling in the EU like the eco-label, for which work is already under way to define relevant criteria for taps and showerheads. The uptake rates and penetration in the market of the products can be enhanced by voluntary labelling, but this does not necessarily mean that the efficient products will be increasingly

bought. Two types of labelling schemes may be implemented, endorsement labelling, such as the eco-label, where the information given is whether or not the product meets the standard; or comparative labelling, which involves a scale, with products performing better/worse than others.

Option 5.1b1 takes a mandatory labelling approach so that full comparison is ensured in the market. For some of the energy-using products, mandatory labelling has been adopted by the European Commission (ratings from A to F). A similar label for water could be developed. In that case, all products would be labelled, while in the case of voluntary labelling only some products, the better performing ones, will have the option to apply for the label.

Water-efficiency mandatory minimum requirements for different types of WuP could apply to products that will be placed on the market in the future, with the purpose of progressively removing the most inefficient products (**Option 5.1b2**). The efficiency of WuPs is already considered in existing or developing national standards and could be streamlined at EU level and possibly expanded to further categories of WuPs. This would ensure that the least performing products are not able to be placed on the EU market. Taking forward an option within the Ecodesign Directive requires inclusion of selected water using appliances within the work programme of the Directive. The next work programme is currently being finalised and, while shower heads and taps were initially considered for inclusion, water using appliances are not currently included. Therefore, if this option were to be progressed, this might need to be in the subsequent work programme.

Building level Options

A building's performance can be measured compared to the per capita use of the building (most relevant for residential buildings), per square meter (most relevant for non-residential buildings), or according to other indicators. Considering the building level allows a better understanding of the whole system's water use[228] and may be more relevant to target those areas with most potential in a given building or geographic area. This scale leaves flexibility in the implementation of water efficient measures to comply with the requirement and foster synergies throughout the building.

Options 5.2a and 5.2b1 promote rating and auditing as tools that allow communication about performance against defined standards and to compare performances. The implementation of these options would provide a European rating or audit scheme, such as the eco-label, that would include a number of indicators or requirements that a building would have to fulfil, concerning water performance, although this could also be extended to cover other environmental issues. The scheme could be voluntary (Option 5.2a) or mandatory (Option 5.2b1).

[228] The benefits and potential water savings achievable by implementing these options are additional to the benefits on products option

As noted in the problem description many initiatives involving voluntary labelling are already in place at national level. Initiatives are in place to harmonise or investigate potential compatible links and could be further promoted to build a common European scheme[229]. Such a scheme would bring a European added-value, by implementing the same basic improvement requirements throughout the EU. This scheme could build on the methodology and lessons learnt from well-established schemes, for example related to energy, of which scale and indicators could be adapted for water savings purposes. The indicators could be chosen at EU level, to harmonise the rating throughout the EU, with national scales (or river basin scales), which would depend on the building stock (new vs. old buildings, types of buildings) and water scarcity issues in the country.

The aim of **Option 5.2b2** on minimum performance requirements is to set a threshold below which it is considered that a building is not efficient "enough". This policy would result in banning the worst water-performing buildings. It differs from the water rating/auditing approach which encourages water-efficient buildings to be certified and to set the example, with unknown uptake rates (a building owner/constructor can choose to enter the scheme or not, and then to use the data to improve or not). These minimum requirements are still flexible as they allow constructors or owners to choose higher standards that must apply. It thus improves water performance of buildings directly. A definition of the water performance of buildings, linked to the number of occupants, area, or other factors would be required, together with the setting of a target for minimum performance. This target could be adapted for different countries or river basins, depending on the local situations, according to a common system that rates each country/river basin.

Minimum requirements can be difficult to set, as a relevant threshold must be found. It requires a good knowledge of current performance and identification of a timeframe and improvement possibilities. They also in general apply more easily for new buildings than existing ones. While new buildings will add to the total water use of the area (unless the new buildings replaces an existing building), implementing minimum requirements means that the new buildings will use less water than they would have if built with other standards.

Option 5.2b3 would take the mandatory approach further by developing directive on water efficiency requirements in buildings. This would require MS to introduce or amend legislation. Buildings would not be rated as one standard would be defined by the directive. This could hinder private companies from going beyond minimum thresholds set up by legislation.

229 Deutsche Bank Research, 2010, Green buildings A niche becomes mainstream

7.5 Effectiveness, efficiency and coherence

These options promote water efficiency in the domestic supply sector by targeting water use appliances and a building's water performance. They all contribute to achieving the objectives of the Blueprint, as well as achieving objectives under the Communication on Water Scarcity and Droughts.

All 7 options positively foster the integration of water in other policies as labelling and rating systems address water use in all buildings, private or commercial. Therefore, they cover the household sector, the industrial sector, the manufacturing sector and all public sector buildings and the appliances they use. Mandatory labelling/ratings systems are more effectiveness at fostering integration compared to voluntary systems due to their level of intervention. Similarly, minimum requirements for labelling and ratings as well as a directive on water efficiency are also strong effective at integrating water use considerations into different sectors.

The options' influence on increasing economic instruments ranges between marginal to slightly positive. Option 5.1a and 5.1b1 are the options that will potentially have the greatest impact if they are accompanied by a financing mechanism, e.g. for the consumer or the supplier. Minimum requirements for labelling or ratings and a Directive would follow the user-pays-principle, which prescribes that the costs of mandatory requirements (similar to cross compliance in the agriculture sector) are borne by the sector itself.

The voluntary and mandatory options for labelling and ratings (Options 5.1a, 5.1b1, 5.2a, 5.2b1) do not lead to a more efficient water governance. The focus of these options is on the private sector – the suppliers behind WuPs – so the introduction of labelling or ratings would have little effect on public water agencies and their governance structures. On the other hand, a new water efficiency directive (option 5.2b2) or minimum requirements (options 5.1b2 and 5.2b2) would require a link to the Water Framework Directive and its existing institutional framework. This would require enhanced cooperation within agencies and among water agencies and private companies to ensure targets and requirements are being met.

All options would improve knowledge and tools. Especially Options 5.1a and 5.1b1 would increase knowledge not only for water agencies to improve management of domestic supply in their basins but also for consumers who, armed with new knowledge on water use of products, can make better informed purchasing decisions. They two options cover a wider spectrum of stakeholders compared to the other options. Whereas Options 5.1a and 5.1b1 would lead to a label that consumers can see, a minimum requirement for water of appliances may not translate into better information for consumers. Water managers and building contractors would be made aware but their behaviour would not be impacted. Options 5.2a-5.2b2 on performance ratings for buildings would increase knowledge in the construction sector and would improve knowledge on decision-making under public

procurement for public sector buildings. Consumers, however, would not be directly impacted. Option 5.2b3 on a new directive would clearly increase knowledge among river basin authorities on new requirements, and it would offer concrete tools for achieving objectives.

In terms of the efficiency of the different options, none of the voluntary or mandatory options for labelling or ratings can secure a specific outcome. Labelling helps consumers make choices regarding their products in a cost-effective way; however, there is no guarantee their uptake will be significant enough to lead to water saving targets. Their implementation could be relatively short-term, as existing initiatives are in place (e.g. energy labelling) to use as a blueprint for design. The benefit of minimum requirements (Options 5.1b2 and 5.2b2) is that it establishes a clear performance threshold. Therefore, these two options are a very cost-effective way to achieve water quantity goals and outweigh the administrative burden associated with their development. Minimum requirements could be developed in the medium term and would take less time to set up than Option 5.2b3 on establishing a new directive. Option 5.2b3, on the other hand, would require significant time to establish, including reporting requirements and concrete levels of action. As such, a new directive is not very cost-effective and would create significant, additional administrative burden for the MS. Given the complexity and significant time needed to design and implement a new directive, its effectiveness can only be judged with a long term perspective. A combination of voluntary and mandatory labelling and ratings would lead to more immediate results and piggyback on existing initiatives, making this options easier and less costly to implement. Additionally, the impacts of such a directive would be the same as for a minimum requirements as this is how the Directive would address water efficiency as well.

Finally, all options are coherent with other EU policy objectives. They help to refine standards for which project appraisal (e.g. in structural and cohesion funds) would be based on. It would fit well into environmental impact assessments as well. Labelling, ratings systems or minimum requirements would not contradict any other EU policy objectives and would work in synergy with the WFD and especially the Communication on Water Scarcity and Droughts.

7.6 Acceptability

The results of the public consultation for the range of appliance and building options are presented in Table 16.

Table 16. The results of the public consultation concerning options to address the water efficiency of buildings and appliances

Option	Yes (%)	No (%)	Do not know (%)
Voluntary labelling of water using appliances	43	27	29
Mandatory labelling of water using appliances	31	42	27
Establish a WFD Common Implementation Strategy working group on water use efficiency for preparing "BREF-like" notes on water use/conveyance efficiency	30	35	35
Minimum water efficiency requirements for water using appliances, e.g. under the Ecodesign Directive	39	29	32
Voluntary performance rating for buildings	26	42	32
Mandatory performance rating for buildings	21	46	33
Minimum water performance requirements for buildings	34	34	32
A directive on water efficiency requirements in buildings including a requirement on water companies to reduce final water consumption	24	49	26

Opinions on voluntary approaches for the water efficiency of buildings and appliances are quite mixed. The voluntary labelling of water using appliances is supported by 43% of the respondents; a CIS working group to develop 'BREF-like' notes on water-use/conveyance efficiency receives support from 30% of respondents, but 35% are opposed; and voluntary performance ratings for buildings receive only 26% support.

In general, however, regulatory approaches faced stronger opposition from the respondents, although many respondents indicated 'do not know' for these options: the share ranges from 26% to 35%.

In written comments, a number of industry respondents underline their opposition to new legislative instruments, stating that they are burdensome and inefficient: standards may take a long time to be implemented and may not be appropriate in all cases. Some industry stakeholders in particular comment that consumption patterns and water resources vary from country to country and that therefore mandatory EU measures would be inappropriate. Others argue that measures on water consumption are premature as there is no scientific consensus on how to measure consumption. Regarding appliances, one industry reply states that trade-offs between water, energy and chemical use should be considered.

A response from a non-industry stakeholder, however, comments that further action would be valuable across Europe – however, water use in buildings in particular is generally little known and further research is needed.

A number of responses from national public bodies and industry state that they see voluntary approaches as more efficient than additional regulation; some call for measures to be taken at river basin level.

Several NGO respondents (as well as some others including some from the water industry) state their support for mandatory action for this problem area. Some of these responses highlight the need for public information and awareness as a parallel action.

Numerous respondents across different types of stakeholders underline the role of water pricing in encouraging more efficient use, though one reply from a national administrative body warns that issues of affordability should also be considered.

Published positions from organisations also provide views on the acceptability of the options.

The European Federation of National Associations of Water and Waste Water Services (EUREAU)[230] considers that both legislative measures (mandatory standards, etc.) and voluntary standards for water efficiency in buildings are not appropriate as the efficiency of water use in buildings is driven by the efficiency of appliances and consumer behaviour. With regard to appliances, EUREAU considers that a labelling approach 'has to be taken carefully' so as not to impact water rich countries negatively. As a result it is in favour of 'simple and affordable measures which can be easily implemented in Member States facing water scarcity problems'.

In contrast the European Environment Bureau[231] supports mandatory labelling and minimum water efficiency requirements for water using appliances and for buildings and also supports development of a Directive on water efficiency in buildings.

[230] EUREAU (2012). Position Paper on Water Efficiency in Buildings.

[231] EEB (2012). EEB's main priorities of the Blueprint to Safeguard Europe's Water.

7.7 Economic, social and environmental impacts[232]

Economic impacts

Appliances

Changing product requirements can result in costs both for buying the device and for its installation (e.g. by a plumber). Building owners and/or users will variously pay for the installation of fixed fixtures (taps, toilets) and other types of devices (showerheads, washing machines, dishwashers) and bear those capital costs.

Costs will also be incurred to manufacturers who have to develop more efficient products, leading to increased innovation. In case of mandatory labelling and minimum requirements, compliance costs will also arise.

In Germany[233] the replacement of existing showerheads, toilets and taps with more water-efficient ones to achieve 30% water reduction would cost €400 per flat owner, i.e. more than €10 billion for Germany as a whole. Water savings (with cost savings from water use – see environmental impacts section below) and costs of implementation will vary greatly depending on the level of use, the specific water savings measures, the plumbing arrangements and the architectural finishes, etc. The UK Waterwise programme shows a wide variation in the cost of retrofitting per property, which ranges from €46 to €270 per property. This might make the replacement of water-using products by more efficient ones a costly effort for the tenants. The cost efficiency of the measure depends on the associated savings and the payback time.

Once efficient water using products are introduced, after the initial investment cost, the water consumption and consequently the water costs would be reduced. For example, while investment costs will incur (currently simple water saving showerheads cost about £35 (€42), see section on capital costs), in the UK, changing a showerhead and toilet, could result in annual savings of 67 m^3 water, that is £225 (€270) for a household with a standard occupancy of 2.4 persons [234]. Adding to the costs of the water saved, savings in the energy costs will also apply. In the Waterwise programme, the cost of energy saved in the trials range from €1.5 to 50.3/property/year[235].

Calculations for water saving (changing toilet, shower fitting and adjusting behaviour) a normal detached villa in Sweden (2 adults, 2 children) show that 45 m^3 could be saved per

[232] This analysis is based on an IA undertaken in the report: Bio (2012) Water Performance of Buildings. Final Report. 11 June 2012. European Commission, DG Environment.

[233] *economicsnewspaper.com/policy/german/water-consumption-eu-savings-plan-could-cost-billions-of-german-e-18590.html*

[234] *UK Environment Agency, Quantifying the energy and carbon effects of water saving – Summary report.*

[235] *www.waterwise.org.uk/images/site/Policy/evidence_base/evidence%20base%20for%20large-scale%20water%20efficiency%20in%20homes%20-%20phase%20ii%20interim%20report.pdf*

year, which results in 675 SEK (77€) for the water (based on 15 SEK/m^3 (€1.7/m^3)) plus about the same amount for heating of the water, thus in total 1,200 SEK/year (€136/year). The investment cost to obtain these savings would be ca 2,000 SEK[236] (€226), highlighting a payback time of less than 2 years.

Those reductions in costs will benefit the tenants (although the capital costs borne by the tenants in case of replacement of showerheads or washing machines will depend on the renting agreement).

Depending on the policy instrument used, the costs will be different. Indeed, through voluntary and mandatory labelling schemes, the customers decide whether to introduce products in their buildings, deciding whether it is cost-effective for them or not. In the case of minimum requirements, the costs will be imposed to customers, but on the long-term, through the competition occurring between constructors, the costs – initially higher for efficient WuPs than for traditional ones - are expected to decrease over time.

Tax abatements can be used at national level to promote the purchase of water-efficient products. Financial incentives have been tested in the UK, with the Enhanced Capital Allowances (ECA) scheme. The scheme is managed by Defra and enables businesses to claim 100% first year capital allowances (i.e. tax relief) on investments in technologies and products that encourage sustainable water use. Businesses are then able to deduct the whole cost of their investment from their taxable profits of the period during which they make the investment. The objective is to encourage businesses to invest in water-efficient technologies and provide key information to accompany them in their decision process. Indeed, the water-efficient technologies that are supported by the ECA scheme are listed to inform businesses of which efficient fixtures are targeted.

Awareness-raising campaigns will incur costs. They will help the customers decide whether the products are cost-efficient for them, but are not expected to raise customers' costs. Financial incentives will have an important impact on financial return on investment, and will thus highly impact the decisions by customers to introduce products or not, but are also costly.

Administrative costs will be associated with the establishment of certification schemes or labels and/or the determination of performance thresholds. Public authorities have to face additional costs, on top of the related administrative burden, to control the good enforcement of the labels and building certification schemes and ensure the compliance with potential minimum requirements. Those costs will be higher in case of minimum requirements, than for mandatory labelling, and lower for voluntary labelling (which still involves some control). Any launch of financial incentives will come from public budgets, which will lead to costs, and will need to be administratively monitored in order to check

[236] http://www.viivilla.se/Energi/Spartips/Spara-vatten-med-battre-vanor-och-moderna-armaturer-42576

proper implementation. Financial incentives will promote water-efficient products, buildings and certain harvesting and reuse systems, thus balancing the relative prices by promoting environmentally-friendly goods.

Buildings

In addressing the economic impacts for options concerning buildings, it is necessary to consider the relationship between tenant and owner. Usually, landlords pay the capital costs of efficiency measures, while many of improved building standards are received by the tenant – this has been seen with the Energy Performance of Buildings Directive.

Implementing labelling or minimum requirements will incur costs while building or refurbishment, and for the certifier to verify compliance, but also to set up the scheme against which the building is audited (i.e. determining the standards and thresholds). In case of mandatory labelling and minimum requirements, the constructors will bear compliance costs. A water audit for a 10-floor office building in the USA costs around $5,000 (around €3,560). Green Star and LEED cost between €4,000 for buildings smaller than 2,000 m^2 and €24,000 for 50,000 m^2 and more[237].

Costs will also be incurred by setting up a certification scheme. A large-scale rollout allows for certification schemes to capture economies of scale. However, a one-size-fits-all scheme will not be suitable because different types of commercial and institutional buildings have technologies and operating systems that are specific to their activities. This results in the need to adapt the certification systems and therefore additional costs. Several certification initiatives offer building schemes specific to the building usage, e.g. LEED for home (with 15 water credits to be awarded), LEED for new construction (10 water credits), LEED for commercial interiors (11 water credits), LEED for schools (11 water credits), BREEAM New Construction, BREEAM refurbishment, etc). Therefore, a certification programme at EU level would require the development of several parallel schemes that each covers particular types of buildings. The setting up of the different schemes would incur higher costs than a single scheme, but as all schemes would be based on a common broad scheme it would still be less costly than fully developing a scheme for each different types of buildings.

A survey on the UK financial and business services sector showed that tenants would be willing to pay 10% more rent if the building was designed and constructed to increase water efficiency[238]. That is consistent with the fact that green buildings may contribute to economic benefits for the owner with increased occupancy rates (+8%)[239], higher rents

[237] BIO Intelligence Service (2009). Water Performance of Buildings, DG Environment.

[238] Deutsche Bank Research (2010). Green buildings, a niche becomes mainstream.

[239] Fuerst, Franz and Patrick McAllisters (2009). An investigation of the Effect of Eco-Labelling on Office Occupancy Rates. Real Estate and Planning Working Papers. Reading University.

(+6%) and higher commercial building values (+35%)[240]. The EU FP7 project SuperBuildings indicate that value of a building increases to up to 10% if assessed as green. For the moment no evidence of increased rents were identified in real cases. According to real estate stakeholders, this information remains questionable and does not reflect the actual market.

In terms of return on investment, costs premiums for obtaining a LEED certification in silver or platinum levels are respectively around 2 and 6.5% of the life-cycle costs (LCC) (i.e. costs over the whole lifetime of the buildings, including construction, use, refurbishment and end-of-life). The net value of the related savings over 20 years - with a discount rate of 5% - is over 3 times larger than the minimum initial cost of 2% of the LCC[241]. Setting minimum requirements comparable to a silver LEED certification would then be in compliance with adopting a lowest life-cycle cost approach (as promoted in the Ecodesign Directive).

Besides, utility charges, which are usually among the most costly expenses for buildings, are considered lower than usual in green buildings. A study[242] finds overall operating costs to be lower by 8-9% for green buildings compared to conventional ones.

Administrative costs will be associated with the determination of performance thresholds. Public authorities have to face additional costs, on top of the related administrative burden, to control the good enforcement of the labels and building certification schemes and ensure the compliance with potential minimum requirements. Those costs will be higher in the case of minimum requirements, than for mandatory performance ratings, and lower for voluntary performance ratings (which still involves some control). Any launch of financial incentives will come from public budgets, which will lead to costs, and will need to be administratively monitored in order to check proper implementation. Financial incentives will promote water-efficient products, buildings and certain harvesting and reuse systems, thus balancing the relative prices by promoting environmentally-friendly goods.

[240] Fuerst, Franz and Patrick McAllisters (2009). New evidence on the Green Building Rent and Price Premium. Real Estate and Planning Working Papers. Reading University

[241] Building Design + Construction (2009). Green Buildings + Water Performance

[242] McGrawHill Construction (2006). Green Building Smartmarket Report.

Social impacts

Appliances

The implementation of product labels and minimum requirements will increase innovation in products, to provide customers with more efficient products. The impact on businesses will depend upon their ability to address these requirements, with innovators expanding and others that cannot react contracting. Trade opportunities may expand some companies. All these impacts would affect employment – positively or negatively. The strength of the impact would be greater for a mandatory option than a voluntary one. Overall, EU manufacturers may react more quickly to new standards than importers, but this cannot be guaranteed. Overall, the number of manufactured products is not predicted to change and, therefore, although there would be both job creation and job loss, the net social impact is likely to be marginal in the private sector.

Furthermore, public administration would be needed to ensure the good application of the certification schemes and of any accompanying financial schemes, possibly increasing public jobs. Synergies with administrations controlling energy-using products may be fostered.

Improved efficiency of appliances would be expected to provide benefits to households in terms of reduced water bills. This would be particularly important in low income households. The impact would depend on the correct use of metering, the relative pricing of water, etc. Furthermore, where low income groups are in rented accommodation, use of water efficient appliances may be dependent on landlords.

Public acceptance of water saving initiatives highly varies between types of housing. In the UK, the Waterwise programme shows uptake rates between 6% and 22% in general housing whereas social housing (i.e. dedicated to lower-class population) show significantly higher uptake rates (between 45% and 60%). Yet, once involved in a water-efficiency project, 65% and 78% of customers from respectively general and social housing save water. The uptake of water-efficient devices has been shown to depend on the credibility of the body offering the retrofit and the communication about the new water saving equipment. The high uptake rates noted in social housing areas has mostly been due to the involvement of a housing association in the facilitation, planning and execution of water efficiency retrofitting projects. A 2001 UK assessment of the effectiveness of promotional campaigns on water-use behaviour highlighted the difficulty to engage the public, especially when it does not consider the amount of water as a priority issue due to the absence of noticeable shortages.

The case of renters vs. owners is less clear. Depending on projects, renters are said to be more reluctant and less likely to install water saving appliances or to make significant reductions in their water use compared with owners.

The use of water-efficient schemes can also be perceived as a compromise on the comfort of use and therefore not be well-accepted by the consumers. That could be partly explained

by the use of innovative water using products that did not comply with a multi-criteria performance assessment. Water-efficient showerheads could therefore be associated with customers' dissatisfaction due to pressure issue or to the need to increase the water temperature. As highlighted by the Ecodesign Directive for energy-related products, the promoted products should not have a direct impact on the consumer behaviour.

Where water efficient appliances are used these can help reduce the impact of water scarcity through more efficient use of water overall. In such cases, the necessity to reduce certain types of water use during droughts may be reduced, thus providing additional social benefits. Health impacts from these options are not expected.

Buildings

Building standards would apply to new buildings and to some retrofit buildings. The acceptance of the standards would be largely not one for consumers, but (if voluntary) for construction companies). As with appliances, the ability to accommodate the new standards within construction companies will vary and this would affect their viability. However, the options would not affect the overall levels of construction and, therefore, the overall employment rates.

Low-income households tend to be hit hardest by rising water bills, as they proportionately pay more than twice as much for water usage in the home compared to high-income households[243]. More water efficient buildings should, therefore, result in lower water bills, which would disproportionately favour lower income households.

The use of smart-metering could gender issues related to the use of (and related access to) personal data. Water utilities would have to have clear customer policies and controlled procedure to ensure that any abusive exploitation of such data is banned.

There is the potential for impacts on health arising from these options (which would be stronger with a regulatory approach). These impacts would depend on whether building standards included requirements for re-use of water within the buildings (which would, therefore, need to be subject to subsequent IA if this were proposed). Reduced water flows can result stagnate in pipes, leading to microbial growth, although this concern is largely theoretical at present and currently design and control have reduced this problem. With regard to rainwater harvesting and to grey water reuse health issues are linked especially to installation, maintenance and operation of these sources. Stored rainwater can be

[243] OECD, 2011, Greening Household Behaviour: The Role of Public Policy

contaminated with Enterococci[244]. Also, back-wash systems (as part of the design of a reuse system for maintenance and cleaning) could contaminate drinking water supplies.

Having said this, public perceptions of possible health impacts are a barrier. Actions to control water quality include health codes, procedures for approval of service, regulations governing design and construction specifications, inspections, and operation and maintenance[245] and standards have been adopted in national law (e.g. France, Spain and UK) for rainwater harvesting and grey water re-use to address this issue.

Environmental impacts

Appliances

Through the adoption of voluntary or mandatory appliance standards, options are aimed at saving water, and/or reducing the pressure on water bodies. The level of impact would depend on the degree of uptake, which would be likely to be greater under a regulatory approach and the impact would also depend on the level of local water scarcity.

Water saved may be used by ecosystems and help reach the WFD good status as well as increase availability for other water users.

The level of water savings from the implementation of water efficiency at the product level are summarised in Table 17.

The potential water savings depend on the type of buildings within which water using products are installed. For non-residential buildings, in the USA, water savings are greater for offices and schools than for restaurants (about 40% greater), and much lower for laundries, hospitals and healthcare facilities (for each, about 6% of the water savings from both offices and schools), since offices, schools and restaurants are high water users[246]. Residential buildings are likely to integrate more water using products, as showers or washing machines are less often found in non-residential buildings (apart from hotels).

[244] EUREAU (2011), Working Group Microbiological Quality, Eureau-Commission Position Paper on water re-use and other alternative resources at home: rainwater harvesting and grey water recycling for domestic purposes. July 2011

[245] US EPA, Guidelines for Water Reuse. Chapter 3 Technical Issues In Planning Water Reuse Systems. EPA/625/R-04/108 September 2004. Available at: www.epa.gov/nrmrl/pubs/625r04108/625r04108chap3.pdf [Accessed 23/08/2011].

[246] EPA, WaterSense program. Available at: www.epa.gov/WaterSense/about_us/what_is_ws.html *[Accessed on 01/09/2011]*

Table 17. Water savings potential of water using products

Water Using Product	Water savings
Low flush toilets	• Use of 3 to 4.5 [247], L/flush instead of 6 to 12L/flush; • Water saving of 3087 to 17084 L/property per day • In Australia, 22% of water savings from efficient toilets and urinal compared to conventional ones (in the WELS context)[248].
Water-saving showerhead	• Use of 6 to 7L/min instead of about 25 (6L/min instead of 16 in the UK[249]) • Water saving of 25.2 L/property/per day[250] • Water saving of 8% compared to total household water consumption.
AAA rated dishwasher	• Water saving of 5 000L/yr water saving of 0.2% compared to total household water consumption
AAA rated front-loading washing machine	• Water saving of 90L compared to conventional top loaders, i.e. about 16 000L per family per yr. • Water saving from 0.9% compared to total household water consumption. By 2021 in Australia, 34% of water savings from efficient washing machines compared to conventional ones (in the WELS context
Faucet aerator	• Water savings between 12 and 65L/day at home; reduced flow up to 50% in municipalities[251] • Water saving of 7 to 11.6%[252] compared to total household water consumption.

Water savings lead to potential reductions in the abstraction of water for water supplies, thus reducing drought and scarcity impacts, in particular with knock-on benefits for biodiversity. Reduced water use also results in reduced energy consumption for the movement of water and for its treated, with consequent reductions in GHG emissions and, depending on the energy source, air pollution emissions. However, these impacts are small compared to other policy initiatives in this area. Reductions would be directly proportional to the percentage of water saved (see Table 17).

[247] www.environment.gov.au/settlements/publications/government/pubs/water-efficiency-guide.pdf

[248] www.waterrating.gov.au/products/index.html

[249] UK Environment Agency, Quantifying the energy and carbon effects of water saving – Summary report.

[250] www.waterwise.org.uk/images/site/Policy/evidence_base/evidence%20base%20for%20large-scale%20water%20efficiency%20in%20homes%20-%20phase%20ii%20interim%20report.pdf

[251] www.watergy.org/resources/tipsheets/home.php

[252] Defra, Science Report –- Greenhouse gas emissions of water supply and demand management options

Buildings

Through the adoption of voluntary or mandatory building standards, options are aimed at saving water, and/or reducing the pressure on water bodies. The level of impact would depend on the degree of uptake, which would be likely to be greater under a regulatory approach and the impact would also depend on the level of local water scarcity. Water saved may be used by ecosystems and help reach the WFD good status as well as increase availability for other water users.

Water is currently addressed in several national green building (voluntary) certification programmes. Within the HQE programme in France, the reduction of water use can vary from 5 to 45%. By 2010, 535 buildings or operations (part of a building) had been certified[253]. Since 2008, the aim is to have 20% of its new constructions certified HQE or HPE[254]. The number of certifications in the UK from the BREEAM programme increased from about 500 in 2004 to about 3,000 in 2009 for commercial buildings[255]. BREEAM has also rated more than 100,000 residential buildings[93]. Based on these numbers, Bio estimated that each year 500 commercial buildings and 15,000 residential buildings are rated in the UK. Extrapolated to the EU-27, that would represent a 1% uptake per year in commercial buildings, and a 0.05% uptake per year in residential buildings.

Mandatory rating would be expected to increase the awareness of the public more easily than for voluntary labelling. However, information campaigns may be required to ensure that the public understands the meaning of the scheme. Additionally, negative publicity has decreased public trust in the scheme, resulting in reduced benefits from the scheme than expected.

Minimum requirements would be implemented for new and to be renovated buildings, targeting only a small part of the buildings in the EU, but reducing the water used compared to constructing buildings that are lower performers. In addition, while the improvement may seem low since it targets a low number of buildings, it will increase in time with more buildings being built or refurbished, bringing higher benefits in the longer-term.

The impact these options could have on water use is highlighted in Table 18 (including also the potential savings with an accompanying information campaign and/or financing programme).

[253] *Certivea webpage, www.certivea.fr/ressource/data/presse/Communiqu-de-Presse-Janvier-20_45.pdf*

[254] High Energetic Performance, label from the Code of Construction and Housing that inspired the HQE

[255] Deutsche Bank Research, 2010, Green buildings A niche becomes mainstream

Table 18. The impact of options on water savings in buildings

Building Level Policies			Residential building : 25% savings			Non-residential building: 40% savings			Total Water Savings (%)*
			New	TBR	Existing	New	TBR	Existing	
Voluntary Rating/auditing	Alone	Building Uptake (%)	0.2	0.2	0.2	2	2	2	0.17
		Savings (%)	0.05	0.05	0.05	0.5	0.5	0.5	
	+ info c.	Building Uptake (%)	0.4	0.4	0.4	4	4	4	0.34
		Savings (%)	0.1	0.1	0.1	1	1	1	
	+ info c. + fin. inc.	Building Uptake (%)	0.6	0.6	0.6	6	6	6	0.51
		Savings (%)	0.15	0.15	0.15	1.5	1.5	1.5	
Mandatory Rating/auditing	Alone	Building Uptake (%)	5	5	2	5	5	2	0.52
		Savings (%)	1.25	1.25	0.5	1.25	1.25	0.5	
	+ info c.	Building Uptake (%)	10	10	4	10	10	4	1.04
		Savings (%)	2.5	2.5	1	2.5	2.5	1	
	+ info c. + fin. inc.	Building Uptake (%)	20	20	8	20	20	8	2.08
		Savings (%)	5	5	2	5	5	2	
Minimum requirements	Alone	Building Uptake (%)	100	100	5	100	100	10	1.5
		Savings (%)	10	10	1.25	10	10	2.5	
	+ info c.	Building Uptake (%)	100	100	5	100	100	10	1.5
		Savings (%)	10	10	1.25	10	10	2.5	
	+ info c. + fin. inc.	Building Uptake (%)	100	100	5	100	100	10	1.5
		Savings (%)	10	10	1.25	10	10	2.5	

Info c.= information campaign; fin. inc.= financial incentives

Options would enable to ensure side energy savings and make potential synergies with energy performance schemes. In 2008, a General Services Administration survey revealed that the LEED-certified office buildings performed 29% better on energy use than the national and regional averages from a Commercial Buildings Energy consumption Survey[256]. Buildings would also gain energy and carbon through the water savings, but also would require modifications in existing buildings that would result in energy and carbon costs; for new buildings some carbon costs could be incurred, but are expected to be counterbalanced during the lifecycle of the building. The energy and carbon saved would be linked both to the water saved and the need to introduce new products and systems.

Water savings lead to potential reductions in the abstraction of water for water supplies, thus reducing drought and scarcity impacts, in particular with knock-on benefits for biodiversity. Reduced energy consumption would reduce, depending on the energy source, air pollution emissions. However, these impacts are small compared to other policy initiatives in this area. Reductions would be directly proportional to the percentage of water saved (see above table).

7.8 Conclusions

This section has explored a wide range of voluntary or mandatory options to encourage improved water efficiency of appliances and buildings.

Regarding water using appliances, this IA has examined three options, two of which are mandatory in nature. All of the options have advantages, although of the two mandatory options, that of taking forward common EU standards through the Ecodesign Directive has the advantage of improved coherence with other environmental performance objectives.

The benefit of a mandatory approach is overwhelmingly due to the level playing field it provides within the internal market. Delivering improved water efficiency via products is difficult through Member State action alone as while non-binding standards can be adopted, it is not possible to prohibit the sale of products (e.g. from other Member States) that do not meet those standards. Voluntary approaches could yield benefits, but it is not clear that option 5.1a would deliver sufficient positive outcomes to be worth pursuing.

Having said this, taking forward an option within the Ecodesign Directive requires inclusion of selected water using appliances within the work programme of the Directive. The next work programme is currently being finalised and, while shower heads and taps were initially considered for inclusion, water using appliances are not currently included. Therefore, if this option were to be progressed, this might need to be in the subsequent work programme.

[256] *Building Design + Construction, 2009, Green Buildings + Water Performance, Available at :* http://www.lafargenorthamerica.com/BD&C%20White%20Paper%202009.pdf

Regarding buildings, this IA has examined four options, three of which are mandatory options – for performance ratings or minimum requirements set out in different ways in law. The IA has shown that while mandatory requirements would deliver improvements in the water efficiency of buildings, the negative impacts on the sector would be significant in areas of Europe where water stress is not an issue. Furthermore, the lack of a market in buildings, unlike appliances, means that common EU standards are not needed. Finally, stakeholders have overwhelmingly indicated their opposition for a mandatory approach to water efficiency of buildings.

Therefore, of the four options regarding water efficiency of buildings, the only option that can be justified to be taken forward in the Blueprint is that on taking forward a voluntary performance rating. This would require additional research, which could be undertaken after publication of the Blueprint.

Table 19. Overview of the impacts of the options regarding improved water efficiency of appliances and buildings.

Note that for ease of comparison, two tables are provided – one each for appliances and buildings. Furthermore, the options that are voluntary in nature are considered together as are those which are legislative in character.

Appliances

Description of the option	Option 5.1a Voluntary labelling of water using appliances	Option 5.1b1 Mandatory labelling of water using appliances Option 5.1b2 Minimum water efficiency requirements for water using appliances within the Ecodesign Directive
Effectiveness Towards Sectoral Integration	+ voluntary approaches for appliances would deliver some water efficiency and contribute to sectoral integration.	++ mandatory approaches would deliver some water efficiency and contribute to sectoral integration. The impact would be greater for mandatory design requirements than for labelling.
Effectiveness Towards Other Specific Objectives	+ voluntary approaches for appliances would deliver some benefits regarding knowledge base and governance, by providing new information and public engagement.	+ mandatory approaches would deliver some benefits regarding knowledge base and governance, by providing new information and public engagement, particularly with labelling.
Efficiency	≈ appliance labelling alone does not have a direct pathway to savings if the appliances are not bought.	≈ appliance labelling alone does not have a direct pathway to savings if the appliances are not bought. ++ a minimum appliance design in Ecodesign would ensure some water savings.
Coherence	+ increases coherence by increasing knowledge, which allows a better consideration of water issues in other sectoral policies. Also coherent with WSD policy.	+ increases coherence by increasing knowledge, which allows a better consideration of water issues in other sectoral policies. Also coherent with WSD policy and Ecodesign Directive.
Acceptability	+ Public consultation: Voluntary labelling of water-using appliances was supported by the largest share, 43% of respondents (almost 30% indicated 'do not know').	Public consultation: -/+ 41% of respondents opposed mandatory labelling of water-using appliances, while only 32% supported this. Support was stronger for minimum requirements under the Ecodesign Directive where 39% were in favour and 29% against – and a

		further 32% responded 'don't know'.
Environmental impacts		
Ecological Status	≈ The option is not directed to this issue, but improved water efficiency could lead to more efficient management of water resources, leading improved ecological status. The impact depends on the degree of uptake of voluntary measures.	≈/+ The options are not directed to this issue, but improved water efficiency could lead to more efficient management of water resources, leading improved ecological status. The impact would be stronger than the voluntary option given its regulatory nature.
Water Stress	≈/+ The option would lead to improved water efficiency so leading to more efficient management of water resources, reducing water stress. The impact depends on the degree of uptake of voluntary measures.	+ The options would lead to improved water efficiency so leading to more efficient management of water resources, reducing water stress. The impact would be stronger than the voluntary option given its regulatory nature.
Vulnerability to extreme events	≈ The option does not directly address environmental risks, other than, in so far that it impacts on preparedness for water scarcity, it mitigates risks of drought. The impact depends on the degree of uptake of voluntary measures.	≈/+ The options do not directly address environmental risks, other than, in so far that it impacts on preparedness for water scarcity, it mitigates risks of drought. The impact would be stronger than a voluntary one given its regulatory nature.
Other impacts[257]	≈/+ As water efficient appliances use less water, less energy is used to treat and move that water. Depending on the energy sources, this would have a small impact on GHG emissions and possibly air quality. The impact depends on the degree of uptake of voluntary measures. ≈/+ Improved standards for appliances in the EU would impact on exports of products from the EU and quality of products in third countries from manufacturers importing to the EU, resulting in water efficiency savings in third countries. However, being voluntary the impact	+ As water efficient appliances use less water, less energy is used to treat and move that water. Depending on the energy sources, this would have a small impact on GHG emissions and possibly air quality. The impact would occur across the EU given the binding nature of the option. + Improved standards for appliances in the EU would impact on exports of products from the EU and quality of products in third countries from manufacturers importing to the EU, resulting in water efficiency savings in third countries. Importers would be required by law to meet the standards, so

257 The climate , Transport and the use of energy, Air quality , Biodiversity, flora, fauna and landscapes , Soil quality or resources , Land use , Renewable or non-renewable resources , The environmental consequences of firms and consumers , Waste production / generation / recycling , The likelihood or scale of environmental risks , Animal welfare , International environmental impacts

	on importers may be limited. **Other environmental issues**: not relevant.	the effect is likely to be strong. **Other environmental issues**: not relevant.
Economic impacts		
Functioning of the internal market and competition	≈ the adoption of a voluntary approach would affect manufacturers within the internal market. However, being voluntary there is no obligation to change, although it is not clear if the 'level playing field' pay be impacted.	+ the adoption of binding uniform standards would ensure a level playing field for relevant manufacturers within the internal market.
Specific regions or sectors	≈/+ a voluntary approach would probably not be evenly applied across the EU (e.g. potential less uptake by companies and consumer awareness in water rich areas). The manufacturing sector is specifically targeted by the measures.	+ a mandatory approach to water efficient appliances would apply equally across the EU. The manufacturing sector is specifically targeted by the measures.
SMES	-/≈/+ the impact would be on SMEs manufacturing relevant products. Voluntary standards would have a lesser impact than a regulatory option and adoption of voluntary standards would be taken up by SMEs to time with investment decisions for changed manufacturing processes which would not be the case with mandatory standards.	-/≈ the impact would be on SMEs manufacturing relevant products. Where mandatory standards require a change in practice, the costs of re-tooling, marketing etc., would be proportionately greater than for larger companies.
Administrative burdens on businesses	-/≈ For a voluntary labelling approach, companies would need to demonstrate compliance and there would be costs to register this with relevant certification bodies.	-/≈ manufacturers would need to ensure mandatory standards are complied with. However, once manufacturing procedures are changed, this would impose little further cost
Other [258]	**Competitiveness:** ≈/+ A voluntary approach would have a reduced impact on competitiveness compared to a mandatory approach. **Public authorities**:	**Competitiveness:** + the adoption of mandatory standards would ensure a level playing field for manufacturers. Some companies are likely to react more easily or have leading market advantage. Thus the

258 (Competitiveness, trade and investment flows , Public authorities , Property rights , Innovation and research , Consumers and households , Third countries and international relations , Macroeconomic environment)

	- the operation of a voluntary system of standards would require oversight by public bodies to ensure compliance. This would increase costs to bodies currently providing similar product oversight. **Third countries**: ≈/+ it is probable that voluntary standards adopted by the manufacturing sector in the EU would apply equally to exports from the EU, thus benefiting third countries. Manufacturers in third countries may change to meet EU standards. The impact of this option is likely to be lower than regulatory options. **Research and innovation**: ≈/+ voluntary standards may stimulate new research into further efficiency savings to drive innovation for future development of standards as companies seek market advantage. **Other economic impacts**: not relevant.	options would deliver competitive advantage to some companies. **Public authorities**: -/≈ the operation of a mandatory system of standards would require oversight by public bodies to ensure compliance. A mandatory approach would require all manufacturers/importers to meet standards and this would reduce the likelihood of products not meeting standards being on the market. Thus the cost to public authorities is likely to be lower with mandatory approach. **Third countries**: + it is probable that mandatory standards adopted by the manufacturing sector in the EU would apply equally to exports from the EU, thus benefiting third countries. Manufacturers in third countries may change to meet EU standards. The impact of these options is likely to be greater than the voluntary option. **Research and innovation**: ≈/+ mandatory standards for appliances may stimulate new research into further efficiency savings to drive innovation for future development of standards as companies seek market advantage. **Other economic impacts**: not relevant.
Social impacts		
Employment and labour markets	≈ The option does not have a direct effect on employment, although impacts via competitiveness (see economic impacts) would affect employment in some companies – positively or negatively.	≈ The options do not have a direct effect on employment, although impacts via competitiveness (see economic impacts) would affect employment in some companies – positively or negatively.
Social inclusion and protection	-/≈/+ The impact would depend on whether application of improved design standards altered the price of the	-/≈/+ The impact would depend on whether application of improved design standards altered the price of the resulting

of particular groups	resulting products and whether this affected consumers. If this were to be the case, lower income groups might be affected. At this stage the price consequences for such standards is not known as this could be factored into further development of policies on this issue.	products and whether this affected consumers. If this were to be the case, lower income groups might be affected. At this stage the price consequences for such standards is not known as this could be factored into further development of policies on this issue.
Public health and safety	Not relevant.	Not relevant.
Other [259]	Not relevant	Not relevant

259 (Standards and rights related to job quality , Gender equality, equality treatment and opportunities, non -discrimination , Individuals, private and family life, personal data , Governance, participation, good administration, access to justice, media and ethics , Crime, Terrorism and Security , Access to and effects on social protection, health and educational systems , Culture , Social impacts in third countries)

Buildings

Description of the options	Option 5.2a Voluntary performance ratings for buildings	Option 5.2b1 Mandatory performance ratings for buildings Option 5.2b2 Minimum water performance requirements for buildings Option 5.2b3 A directive on water efficiency requirements in buildings
Effectiveness towards sectoral Integration	+ voluntary approaches for buildings would deliver some water efficiency and contribute to sectoral integration.	++ mandatory approaches for buildings would deliver some water efficiency and contribute to sectoral integration. The impact would be greater for mandatory design requirements than for labelling.
Effectiveness Towards Other Specific Objectives	+ voluntary approaches for buildings would deliver some benefits regarding knowledge base and governance, by providing new information and public engagement.	+ mandatory approaches for buildings would deliver some benefits regarding knowledge base and governance, by providing new information and public engagement, particularly with labelling.
Efficiency	≈ Voluntary building ratings does not necessarily lead to uptake.	≈ Building ratings alone does not have a direct pathway to savings if buildings do not respond to a low rating. ++ minimum building threshold would ensure some water savings. – – a Directive would be a very expensive option and would take considerable time to implement; would not necessarily lead to more savings compared to option.
Coherence	+ increases coherence by increasing knowledge, which allows a better consideration of water issues in other sectoral policies. Also coherent with WSD policy.	+ increases coherence by increasing knowledge, which allows a better consideration of water issues in other sectoral policies. Also coherent with WSD policy.
Acceptability	- Public consultation: For voluntary performance ratings for buildings, only 29% of respondents were in favour, while over 40% were against.	Public consultation: - 45% of respondents were opposed to a mandatory performance rating for buildings. For minimum water performance requirements for buildings, responses were evenly mixed, with almost equal numbers (about 34%)

		responding yes and no. A possible directive on water efficiency requirements in buildings received a high level of opposition, with 49% of respondents indicating 'No'.
Environmental impacts		
Ecological Status	≈ The option is not directed to this issue, but improved water efficiency could lead to more efficient management of water resources, leading improved ecological status. The impact depends on the degree of uptake of voluntary measures.	≈/+ The options are not directed to this issue, but improved water efficiency could lead to more efficient management of water resources, leading improved ecological status. The impact would be stronger than the voluntary option given the regulatory nature.
Water Stress	≈/+ The option would lead to improved water efficiency so leading to more efficient management of water resources, reducing water stress. The impact depends on the degree of uptake of voluntary measures.	+ The options would lead to improved water efficiency so leading to more efficient management of water resources, reducing water stress. The impact would be stronger than the voluntary option given the regulatory nature.
Vulnerability to extreme events	The option does not directly address environmental risks, other than, in so far that it impacts on preparedness for water scarcity, it mitigates risks of drought. The impact depends on the degree of uptake of voluntary measures.	≈/+ The options do not directly address environmental risks, other than, in so far that it impacts on preparedness for water scarcity, it mitigates risks of drought. The impact would be stronger than the voluntary option given the regulatory nature.
Other impacts[260]	≈/+ As water efficient appliances use less water, less energy is used to treat and move that water. Depending on the energy sources, this would have a small impact on GHG emissions and possibly air quality. The impact depends on the degree of uptake of voluntary measures. **Other environmental issues**: not relevant.	+ As water efficient appliances use less water, less energy is used to treat and move that water. Depending on the energy sources, the options would have a small impact on GHG emissions and possibly air quality. The impact would occur across the EU given the binding nature of the option. **Other environmental issues**: not relevant.
Economic impacts		

260 The climate , Transport and the use of energy, Air quality , Biodiversity, flora, fauna and landscapes , Soil quality or resources , Land use , Renewable or non-renewable resources , The environmental consequences of firms and consumers , Waste production / generation / recycling , The likelihood or scale of environmental risks , Animal welfare , International environmental impacts

Functioning of the internal market and competition	≈ the adoption of voluntary standards would have a limited impact on the internal market. Given that buildings are not traded, that the construction industry can react to location/MS differences and the standards are voluntary, the impact of voluntary standards is likely not to impact on the market.	≈/+ the adoption of binding standards would have some impact on the internal market. However, buildings are not traded and the construction industry can react to different requirements in different MS. Thus the impact of mandatory requirements would be limited.
Specific regions or sectors	≈/+ a voluntary approach would probably not be evenly applied (e.g. potential less uptake by construction companies and consumer awareness in water rich areas). The construction sector is specifically targeted by the measures.	+ a mandatory approach to water efficiency in buildings appliances would probably apply equally across the EU (although an instrument could allow for exceptions in water rich areas). The construction sector is specifically targeted by the measures.
SMES	-/≈ SME construction companies may be less able to alter practices to meet voluntary standards. Other SMEs might have greater flexibility to react to the changes. It is not evident that SMEs would be more or less affected than larger companies.	-/≈ SME construction companies may be less able to alter practices to meet mandatory standards. Thus while some costs to SMEs are likely (see previous and following section), it is not evident that SMEs would be more or less affected than larger companies.
Administrative burdens on businesses	-/≈ construction companies would need to ensure voluntary standards are complied with. Inspection of buildings would impose some costs, although inspections would take place for other reasons.	-/≈ construction companies would need to ensure mandatory standards are complied with. Inspection of buildings would impose some costs, although inspections would take place for other reasons.
Other [261]	**Competitiveness:** ≈/+ A voluntary approach would have a reduced impact on competitiveness compared to regulatory approaches. **Public authorities**: -/≈ the operation of voluntary standards would equally require oversight by public authorities. MS already have a range of compulsory building standards, so that the	**Competitiveness:** + the adoption of mandatory standards would result in market advantage for some construction companies either already able, or readily able to react, to address those standards. **Public authorities**: -/≈ the operation of mandatory standards would equally require oversight by public authorities. MS already have a

261 (Competitiveness, trade and investment flows , Public authorities , Property rights , Innovation and research , Consumers and households , Third countries and international relations , Macroeconomic environment)

	necessary institutions are in place and inspection can be undertaken alongside existing inspections. Costs would not be significant. **Third countries**: ≈ While some manufacturing spill-over to third countries may occur as with appliances, this would be likely to be limited. The impact is most likely through the EU construction industry developing innovation in water efficiency and diffusion of experience to third countries. **Research and innovation**: ≈/+ voluntary standards for buildings may stimulate new research into further efficiency savings to drive innovation for future development of standards as construction companies seek market advantage and/or cost savings to deliver those standards. **Other economic impacts**: not relevant.	range of compulsory building standards, so that the necessary institutions are in place and inspection can be undertaken alongside existing inspections. Costs would not be significant. **Third countries**: ≈ While some manufacturing spill-over to third countries may occur as with appliances, this would be likely to be limited. The impact is most likely through the EU construction industry developing innovation in water efficiency and diffusion of experience to third countries. **Research and innovation**: ≈/+ mandatory standards for buildings may stimulate new research into further efficiency savings to drive innovation for future development of standards as construction companies seek market advantage and/or cost savings to deliver those standards. **Other economic impacts**: not relevant.
Social impacts		
Employment and labour markets	≈ The option does not have a direct effect on employment, although impacts via competitiveness (see economic impacts) would affect employment in some companies – positively or negatively.	≈ The option does not have a direct effect on employment, although impacts via competitiveness (see economic impacts) would affect employment in some companies – positively or negatively.
Social inclusion and protection of particular groups	≈/+ Improvements in building standards may have a specific benefit for local income groups. Voluntary standards would have a lower impact than the regulatory options. Social housing, etc., would be built to these higher standards, with knock-on benefits to residents in terms of lower water bills.	+ Improvements in building standards may have a specific benefit for local income groups. Mandatory standards would have a larger impact than the voluntary option. Social housing, etc., would be built to these higher standards, with knock-on benefits to residents in terms of lower water bills.
Public health and safety	-/≈ The impact would depend on the standards adopted. Where standards are limited to water efficiency measures (e.g. of appliances in the home) per se, then	-/≈ The impact would depend on the standards adopted. Where standards are limited to water efficiency measures (e.g. of appliances in the home) per se, then there would be little

	there would be little impact. However, if the standards include grey-water re-use, etc., then issues for health can arise with the storage and use of such systems is not properly maintained. The impact of S1 would be lower than the regulatory options and the impact of both would depend on the nature of any specific requirements in the standards and, if taken forward, assessed within a subsequent IA.	impact. However, if the standards include grey-water re-use, etc., then issues for health can arise with the storage and use of such systems is not properly maintained. The impact of these options would be greater than the voluntary option and the impact of both would depend on the nature of any specific requirements in the standards and, if taken forward, assessed within a subsequent IA.
Other [262]	**Individuals:** -/≈ Use of smart-metering (if part of building standards) could raise issues concerning the use of (and access to) personal data. Water utilities would have to have clear policies and controlled procedures on this issue. **Other social issues:** not relevant.	**Individuals:** -/≈ Use of smart-metering (if part of building standards) could raise issues concerning the use of (and access to) personal data. Water utilities would have to have clear policies and controlled procedures on this issue. **Other social issues:** not relevant.

262 (Standards and rights related to job quality , Gender equality, equality treatment and opportunities, non -discrimination , Individuals, private and family life, personal data , Governance, participation, good administration, access to justice, media and ethics , Crime, Terrorism and Security , Access to and effects on social protection, health and educational systems , Culture , Social impacts in third countries)

8 EFFICIENCY OF WATER DISTRIBUTION SYSTEMS: REDUCING LEAKS

8.1 Introduction and problem definition

As much as 50% of water abstracted by water service providers for public supply is lost through leakage from water distribution networks, although it is generally in the range of 20-30%. In water stressed areas the loss of such water cab exacerbate water efficiency concerns, affecting water bodies. Addressing leaks is, therefore, an important part of addressing the challenge of improving water efficiency within the EU.

Water resource inefficiency by water services providers, i.e. excessive levels of leakage in distribution networks, is one component of the wider inefficient management of water resources that contributes to reduced water availability, which in areas of water scarcity and drought, has a direct negative impact upon EU citizens and economic sectors such as agriculture, tourism, industry, energy and transport. This may in turn affect competitiveness and the internal market. Climate change will exacerbate these negative impacts in the future with more frequent and severe droughts expected across Europe and neighbouring countries. In addition, high leakage levels in water distribution networks are generally interpreted by the general public as waste and inefficiency on the part of the water service providers and damaging to the environment; in particular if users of those same water distribution systems are asked to reduce their own consumption of water in order to maintain continuity of supply during times of drought or water scarcity.

There are significant differences in the levels of leakage both between and within Member States, and even between water services providers operating within the same river basin and abstracting from the same water body. EUREAU[263] states that the reasons for this variation include "the age and maintenance of the system; the total length of mains; the number of connections; the local topography and thus hydraulic/pressure characteristics; the soil and climatic conditions; the water price at the point of abstraction and consumption and also the manner in which water is valued by society".

Efficiency is the elimination of wastage, and a water distribution network is considered efficient when it is achieving its Sustainable Economic Level of Leakage where environmental, social and resource costs are fairly included. Where the technical level of leakage is above or below the sustainable level of leakage, then the system is not efficient. However, the sustainable level of leakage of a water distribution network is dependent both upon the efficiency of the water services provider and upon the national or basin administrative body responsible for the administration, management, protection and sustainable development of the raw water resources at a basin and water body level.

[263] EUREAU (2011). Leakage reduction in addressing water scarcity and drought. EUREAU Common Position Paper. European Federation of National Associations of Water and Wastewater Services.

Optimal water resource efficiency occurs when both the water services provider and the administrative body responsible for the management of water resources prior to abstraction are both achieving their quantity and quality service objectives most cost effectively. If the management of water resources by the national or basin administrative body is inefficient or ineffective then this inefficiency is passed on to the water services providers who then have to compensate for these shortcomings and vice versa.

Therefore, water resource efficiency in water distribution networks is a problem, which requires water services providers' to:

- Implement best practices in leakage reduction through active leakage control, pressure management, asset renewals and good system design to achieve the Sustainable Economic Level of Leakage for their respective distribution networks where environmental, social and resource costs are fairly included in the calculation of the sustainable level of leakage;
- Carry out their operations in compliance with limitations / targets imposed upon them with respect to abstractions from and discharges to water bodies necessary for the overall sustainable management of water bodies; and,
- Carry out their investment and operating activities cost effectively in order to keep water tariffs fair and reasonable.

That requires the administrative body responsible for the management of water resources prior to abstraction, on its part, to:

- Manage water resources well, ensuring that the socio-economic and environmental needs for water and the availability of water is balanced and that drinking water resources are protected from pollution, providing water services providers with reliable, secure and cost effective sources of supply; and,
- Carry out their operations cost effectively ensuring that the 'resource cost', i.e. the cost for the integrated management of water resources in order to achieve society's quantity and quality objectives is reasonable.

In addition addressing leaks requires politicians and society, on their part, to allow water services providers to recover the cost of water services provision, including resource costs, operating costs and asset renewals costs; all necessary to finance and operate an efficient water distribution network.

The problem is further complicated where in practice:

- There is no consistent methodology for calculating the SELL in water distribution networks promoting the implementation of the operational objectives and economic principles of the WFD;

- Water resources management at a basin and water body level, with water allocation mechanisms to achieve water balance for sustainable water management including resource efficiency and for the protection of drinking waters is, for the general part, poor in MS, with situations where poor water resource management is a contributing cause to water stress; but with significant differences in the quality of water management between MS; and
- The principle of cost recovery for water services provision, including the recovery of resource costs, operating costs and asset renewals costs is poorly implemented in MS.

Any sustainable solution to this problem will require the engagement of:

- MS at a river basin management planning level, responsible for water resource management, together with ii. the water industry (water service providers), and
- Politicians responsible for water pricing policy.

As these problems occur at the MS and river basin level, it is not appropriate at EU level to set targets, for example, for specific leakage reduction. Furthermore, issues of costs recovery are already promoted by the WFD. In conclusion, therefore, the main problems that can be addressed from the EU level perspective with regard to leakages are:

- The need for a robust methodology to determine the sustainable economic level of leakage (SELL) to drive investment and environmental decision making.
- Lack of sufficient financial resources to maintain water distribution systems to the required level to address leakages consistent with objectives for water efficiency.

8.2 Baseline and justification for EU level action

The Commission, in its third follow-up report (COM(2011)133) to the Communication on Water Scarcity and Droughts (WSD), noted that leakage reduction programmes had been carried out in a number of MS and are delivering benefits. The focus of the Communication is to encourage support actions at MS level that lead to an increased or improved implementation of water saving projects/measures. However the uptake remains an open issue in many places. Initiatives to address water leakages are found at national level to some extent. MS responses under the Communication on WSD indicate that there are two approaches to address water leakages: one is through governmentally set technical rules; the other is through self-regulation of water supply companies either through action/business plans or through external audits. Thirteen MS (AT, BE, BG, CY, ES, FR, IE, IT, MT, PT, RO, SE, SK, UK) have implemented a range of different measures to address leaks, including periodical maintenance works, updated guidelines, detection, leakage quantification and reduction measures, new legislation binding local authorities to promote

action plans and multi-annual work programmes, integration of measures to restore water networks in RBMPs and National Programmes. Others have not taken action and/or are not planning to due to a lack of water scarcity problems.

The EEA[264] states that "eliminating leakage entirely is an unrealistic goal because of the costs involved", but "optimising leakage reduction is a crucial part of water demand management". The EEA furthermore states "Currently leakage rates are not subject to regulation other than management decisions by utilities. These are often based on considerations such as consumer health and the economic return period for investments in infrastructure maintenance. If such cost calculations do not include externalities and other consequences of expanding water supply using energy intensive and material resource intensive technologies, these decisions will produce suboptimal outcomes for society."

It is also important to note that the costs of pipe replacement vary significantly between MS and on the repair methods. For example, in Sweden active leakage control is not considered to be cost effective and only large visible leaks are repaired as pipe are buried at a depth of 1.6-4m to reduce the risk of winter freezing[265].

Addressing leakage requires significant investment, in some cases simply to ensure leakage rates do not get worse. The current economic crisis is likely to exacerbate constraints on investment, whether from public funds or the ability to pass on costs to consumers. Programmes in some MS currently in place will reduce the problem, but these are currently not sufficient to reduce leakage to a sustainable level. Furthermore, where water tariffs are set below cost recovery levels, the degree of asset replacement of drinking water systems may not be sufficient to reduce leakage to a sustainable level[266]. Therefore, it is appropriate that further support is provided through initiatives at EU level.

It is important to note that ongoing research on leakage issues is currently being carried out[267] and the conclusions of this research may affect the detail of the problem analysis and baseline assessment.

The Water Innovation Partnership is being established. Several of the innovations will be of technical nature and could address problems related to water efficiency (e.g. new methods to detect leakage). The uptake of this innovation by MS and competent authorities cannot be predicted at this early stage, but the EIP has a particular focus on dissemination so that improvements may be expected.

[264] EEA (2012). Towards efficient use of water resources in Europe. EEA Report No 1/2012.

[265] WssTP (2011). Leakage Management. Strategic vision and research needs.

[266] Draft Communication from the Commission: Report on the Review of the European Water Scarcity and Droughts Policy.

[267] ERM (2012). Resource and Economic Efficiency of Water Distribution Networks in the EU. Interim Report. March 2012. DG ENV.

In developing options appropriate at EU level to address leakage in distribution systems it is important to note that it is not appropriate (given the variation in leakage rates, significance for water management and interaction with other public spending and social objectives) for there to be a particular target for leakage reduction to be set at EU level. As EUREAU states "Any targets therefore should be set at the local level, under the principle of subsidiarity." Rather EU level action should support Member States in addressing the problem, not impose obligations.

The development of the knowledge base at EU level and the sharing of best practice between Member States is an appropriate type of EU level intervention, i.e. the Commission acting as a facilitator to enhance the capacity of Member State institutions to meet EU legal objectives (such as those of the WFD linked to improved water efficiency) as well as Member State objectives (which could include specific leakage objectives). Therefore, an appropriate area for EU intervention is the development of appropriate tools to assess leakage levels and actions to address them as well as sharing best practice and exchange of experience.

The problem analysis has identified finance as a constraint on addressing leakage reduction. EU financial instruments and institutions are able to fund infrastructure projects within Member States subject to specific limitations (e.g. eligibility for Cohesion spending). Improved water infrastructure to address leakages, contributing to economic, social and environmental objectives in river basins, could be included within the scope of such instruments and, therefore, some contribution to addressing the financial constraints on investment for leakage reduction is appropriate at EU level. EU financial instruments already fund water infrastructure. It is, therefore, fully appropriate for EU level action to ensure leakage reduction is included within the scope of these instruments as this is consistent both the current approach of these instruments and with their specific goals of supporting EU water policy goals.

In conclusion, these types of appropriate levels of EU level action seek to facilitate and enhance the ability of Member States to take appropriate action to address leakage in distribution systems. These types of intervention do not prescribe any particular targets or actions regarding leakage reduction which would not be appropriate at EU level.

8.3 Objectives

The objectives for the Blueprint regarding leakages, based on addressing the specific problems identified above, are:

- To support the development of a robust methodology to determine the sustainable economic level of leakage (SELL) to drive investment and environmental decision making.

- To help overcome the barrier of insufficient financial resources to maintain water distribution systems to the required level to address leakages consistent with objectives for water efficiency.

These objectives contribute to the four operational objectives of the Blueprint as follows:

Foster integration of water into sectoral policies, by ensuring that impact of socio-economic activities and regulations on the state of water resources is fully taken on board.

The objectives on leakage reduction are not aimed at changing sectoral policies, but they are aimed at enhancing the efficiency of water users and utilities. This aids in the integration of water objectives into these areas of decision making.

Increase the use of economic instruments for a better allocation of resources and internalisation of external costs.

The objectives for leakage reduction are not focused on the use of market-based instruments per se, but they include an emphasis on the need to overcome funding barriers for more efficient water use and the prioritisation of leakage reduction within the EU's own funding instruments. Furthermore, a methodology for SELL has to include consideration of infrastructure provision and revenue raising, which interacts with economic instruments for water management.

Achieve a more efficient water governance and effective working relationships between institutions, and fully integrate water quality, quantity and hydromorphology issues in management actions.

Leakage reduction is a potentially appropriate water management in water scarce areas. Ensuring more effective control of leaks is achieved through improved decision making such as use of SELL methods and full involvement of stakeholders in that process directly supports improved governance.

Improve knowledge and tools available to water managers, enabling effective decision making and reducing administrative burden.

The development of a robust methodology for SELL is a direct enhancement of the knowledge base for water managers.

In taking forward these objectives for leakage reduction in the Blueprint it is important that there are SMART indicators for monitoring their progress and, therefore, whether the

objectives have, or have not, been achieved. This will enable the success of policies to be determined and potential barriers (if they occur) to be addressed as policies are reviewed.

For the leakage reduction objectives, the following SMART indicators are proposed:

- The adoption of a harmonised methodology for SELL agreed within the CIS (or similar).
- The degree to which relevant utilities/authorities use the SELL methodology to assess leakage issues locally and develop strategies for leakage reduction.
- The total number and value of grants and/or loans from EU funding instruments which contribute significantly to investment in leakage reduction.
- The investment needs for treatment for leakage reduction across the EU (based on SELL assessments) and how these are changing (taking account of EU funded investments, Member State investment and private investment).

8.4 The options and their elaboration

Several policy options to address the problem of leakage in water distribution systems were developed to be considered within the Blueprint and subject to IA. The conclusions of ongoing research for DG ENV has also been taking into account, such as the conclusion that it would be inappropriate at EU level to set specific leakage reduction targets (ERM, 2012). These options were subject to a SWOT analysis (see Annex D). Table 20 describes the options as originally developed in the project and submitted for the public consultation together with the final elaboration of options included within the IA, following further discussion with the Commission. The options concerning funding were retained, although elaborated to fund all sustainable water management needs as set out in the Blueprint. The option of a methodology was retained, but that on best practices was not taken forward into the IA as it was considered that best practice promotion would be part of the evidence base for a robust harmonised methodology and a separate option was not needed.

Table 20. The options originally considered and final options to address the problem of pricing

Options originally considered	Final options for the IA
• Promote leakage reduction in water stressed/potentially water stressed areas by prioritising it in Cohesion and Structural Funds spending. • Promote leakage reduction investment on the basis of public/private partnerships and European Investment Bank loans. • Develop guidance on best practices in leakage reduction. • Develop a harmonised method for determining the level of water leakage under the WFD Common Implementation Strategy at EU level and encourage Member States to integrate it into their water management practices.	• Option 6d1: Promote sustainable water management (including leakage reduction) in water stressed/potentially water stressed areas by prioritising it in the use of Cohesion and Structural Funds. • Option 6d2: Promote sustainable water management (including leakage reduction) investment on the basis of public/private partnerships and/or European Investment Bank loans. • Option 6a: Develop a harmonised method for determining the Sustainable level of water leakage under the WFD Common Implementation Strategy at EU level and engage Member States and the water industry in a process to integrate it into their water management and share best practices on leakage reduction.

Three options are presented for EU level action to support the management of leakage in water distribution systems. Two of the options are not necessarily limited in scope to leakage reduction, but can also support other objectives of sustainable water management. Therefore, these two options have been expanded to include these wider objectives. It is important to note that the options are not mutually exclusive – one or all could be taken forward.

Option 6d1 is to promote sustainable water management (including leakage reduction) in water stressed/potentially water stressed areas by prioritising it in the use of Cohesion and Structural Funds. The spending of EU Regional Funds has, and can, contribute significantly to achieving the objectives of EU water policy. Current planned Cohesion Policy spending on water/waste water for 2007-2013 is €22 billion. This option seeks to prioritise projects for sustainable water management including the reduction of water leakage within these spending programmes. General Regulations and strategic orientations of Regional Policy are set out at EU level, but the responsibility of setting specific project priorities is at MS level.

On 6 October 2011, the European Commission proposed its legislative package for new Regulations for Regional Funds under the next MFF (COM(2011)516, COM(2011)614,

COM(2011)607, COM(2011)612). The Common Provisions Regulation establishes the main principles, objectives and rules governing the funds. Eleven new thematic objectives are introduced, four of which are of relevance for the environment. EU Structural and the Cohesion Funds will underpin two new goals: (1) 'Investment in growth and jobs' and (2) 'European territorial cooperation' with the majority of funds concentrated in poorer regions. The Cohesion Fund will continue to support MS where Gross National Income (GNI) per capita is less than 90 per cent of the EU average. It supports interventions under the 'Investment in growth and jobs' objective with a total budget of €68bn. €10bn however are 'ring-fenced' for support to large scale transport infrastructure (TEN-T) under the new Connecting Europe Facility. The total budget for the European territorial cooperation goal is €11.7bn.

This option does not seek to interfere with either the proposals for the next MFF set out by the Commission in October 2011 nor with the development of this legislation through the adoption procedures within the Council and Parliament. Rather it aims to encourage Member States to identify leakage reduction as a priority in the Partnership Contracts that will need to be developed subsequently.

It is important also to recognise the interaction with other options addressed in this IA. Delivering sufficient investment, to which Regional Funds contribute, can require raising sufficient additional resources at local level. Pricing of services is one way to achieve this and options to deliver improved pricing therefore interact within this option.

Option 6d2 is to promote sustainable water management (including leakage reduction) investment on the basis of public/private partnerships and/or European Investment Bank loans. Public/private partnerships are contractual agreements between governmental bodies and private organisations to deliver a service (e.g. water services). The EIB provides loans to invest in a range of projects, including water infrastructure, which require co-finance, which may include public/private partnerships.

Promotion of investment requires a robust decision making basis and, therefore, it is important to consider this option with option 6a which seeks to develop and promote a harmonised methodology.

The EIB is an important source of funding support for environmental projects. The bulk of EIB environmental lending goes to EU countries. In 2011, the EIB provided direct financing for a total of EUR 25.6bn in the EU. These figures do not include environmental components of projects where the overall objective is not directly related to the environment. On average its lending makes up 30% of the investment cost of water projects. The EIB Operational Plan[268] states that there are four major public policy goals to which its lending

[268] EIB (2012a) The EIB Group Operational Plan 2012-2014.

will contribute. Two of these are environmental sustainability and projects that specifically contribute to climate action.

The EIB has been the largest source of loan finance to the global water sector compared with other international financial institutions[269]. Specifically, the EIB states that its focus is to ensure compliance with the principles and recommended practices of EU legislation, including the WFD and related directives. EIB financing can cover investments in the entire water cycle. The 2008 EIB water sector lending policy[270] emphasised water efficiency as a major priority as it plays a " key role to play in the efficient allocation of water resources, addressing water scarcity issues, ensuring the viability of service providers, and increasing the efficiency of their services". This specified four efficiency measures, one of which was "efficiency of the system itself". The 2012 statement on financing in the water sector also emphasises water efficiency as a key objective as well as support for additional water supplies as long as there is proof that water efficiency and demand-side management have been considered and implemented; an options analysis has been undertaken; and the projects are consistent with the Bank's environmental and social policy[271].

Option 6a is to develop a harmonised method for determining the level of water leakage under the WFD Common Implementation Strategy at EU level and encourage MS to integrate it into their water management and share best practices on leakage reduction. In order to understand the extent of water leakage, the factors contributing to it and the economic context for any actions that could be taken, a robust methodology is needed. Without this ineffective or inefficient decisions may be made or no action may be taken because it cannot be justified. Therefore, the benefits (environmental, economic and social) of taking appropriate action will not be achieved. For example, it was reported that, from representatives of six larger MS, that while monitoring of leakage is accepted as best practice, it is 'by no means universally applied'[272].

The option does not propose a mandatory use of a methodology, but rather that the experience of MS, the water industry and others, as appropriate, are brought together to set out a harmonised methodology which should be able to take account of the different circumstances (infrastructure, environmental, market situation, social, etc.) across all MS. Appropriate authorities, MS, etc., will be encouraged to use the methodology. It may also form the basis for assessment of the appropriateness of projects funded through EU funds (e.g. Regional Funds and the EIB – options 1 and 2).

[269] EIB (2012b). The European Investment Bank in the water sector: financing water supply, sanitation and flood protection.

[270] EIB (2008). The EIB's Water Sector Lending Policy. Strengthening the EIB's Support for EU Policy Objectives in the Sector.

[271] EIB (2009). EIB Statement of Environmental and Social Principles and Standards.

[272] WssTP (2011). Leakage Management. Strategic vision and research needs.

The EEA[273] states "Quantifying the combined 'distribution loss' in a water supply network, which includes water used for flushing pipes, unbilled consumption (e.g. fire fighting) and illegal consumption, can only be calculated indirectly as the difference between drinking water produced and end-user metering (or some other estimate of consumption)." There are already international methods for determining leakage that exist as part of water balance calculations. EUREAU[274] states that "any analytical measure should take into account as a minimum the point at which the costs of addressing leakage outweighs the costs of the water lost" and that "the Economic Level of Leakage or ELL provides this methodology". The Association also notes that variations in the use of a methodology are necessary to allow undertakes "to take into account the environmental and societal impacts of addressing leakage – such as the costs of disruption to society from road works or the carbon costs associated with treating or pumping water. In these cases a Sustainable Economic Level of Leakage approach can be taken (SELL). The SELL can result in different acceptable leakage levels than the ELL to reflect more accurately the actual costs of leakage". However, to take forward this option, there are a number of methods that would need to be reviewed[275],[276]. In the UK Ofwat and the Environment Agency is, for example, are currently reviewing the methodology to value the externalities and incorporating them into a SELL[277].

It is important to note that other options being considered in this IA also may play a part in contributing to leakage reduction:

- Delivering pricing that incentivises more efficient water use can alter the estimation of the Sustainable Economic Level of Leakage.
- Improved knowledge and dissemination of information can improve understanding of water distribution and the impacts on consumers, as exemplified by smart meters.

8.5 Effectiveness, efficiency and coherence of the options

The options all aim to improve sustainable water management including addressing leakage in the distribution system and all contribute to the effectiveness of achieving the operational objectives of the Blueprint.

Regarding the effectiveness of meeting the operational objectives of the Blueprint, the funding options contribute to the effectiveness of meeting these objectives in very similar

[273] EEA (2012). Towards efficient use of water resources in Europe. EEA Report No 1/2012.

[274] EUREAU (2011). Leakage reduction in addressing water scarcity and drought. EUREAU Common Position Paper. European Federation of National Associations of Water and Wastewater Services.

[275] Puust, R., Kapelanb, Z., Savicb, D.A. and Koppel, T. (2010). A review of methods for leakage management in pipe networks. Urban Water Journal, Vol. 7, No. 1, February 2010, 25‑45.

[276] OFWAT (2008). RPS Providing Best Practice Guidance on the inclusions of Externalities in the ELL Calculation. OFWAT, London.

[277] Defra (2011). Water for Life. HM Government, UK.

ways given that they are similar options address to different funding sources. Therefore, they will be treated together. On the objective to foster integration of water into sectoral policies, by ensuring that impact of socio-economic activities and regulations on the state of water resources is fully taken on board projects for Regional Funding or EIB loans to promote sustainable water management including leakage reduction will help to integrate water objectives into sectoral policies affected by these funds/loans by prioritising spending in this area.

On the objective to increase the use of economic instruments for a better allocation of resources and internalisation of external costs projects to promote sustainable water management including leakage reduction may promote more efficient pricing to support infrastructure maintenance and so enhance the use of economic instruments.

On the objective to achieve a more efficient water governance and effective working relationships between institutions, and fully integrate water quality, quantity and hydromorphology issues in management actions projects to promote sustainable water management including leakage reduction will have the limited impacts on core governance structural objectives.

On the objective to improve knowledge and tools available to water managers, enabling effective decision making and reducing administrative burden projects to promote sustainable water management including leakage reduction require robust justification to be funded by Regional Funds or receive EIB loans. This justification includes an assessment, setting out the environmental, social and economic case. This requires the improvement of knowledge and tools available and used for those seeking investment.

Regarding the efficiency of water policy, including administrative burden, funding options have a small impact. The options, in reducing problems such as leakage, will help address water efficiency objectives which may have knock-on effects on the impact on businesses and consumers, but the extent of this is unpredictable. The projects themselves only have an administrative burden on the administrations that have to prepare project assessments and proposals. However, these costs are minor compared to the benefits obtained by receipt of the funding or loans.

Overall, funding options also contribute to enhanced policy coherence. Project assessment and appraisal aids consideration of interactions between different areas of EU policy and the projects themselves. The precise nature of these interactions will vary from project to project.

Regarding the effectiveness of meeting the operational objectives of the Blueprint, the option to develop guidance/tool contributes to the effectiveness of meeting these objectives to different extents. On the objective to foster integration of water into sectoral policies, by ensuring that impact of socio-economic activities and regulations on the state of

water resources is fully taken on board the development of a robust method needs to take account of full economic costs and benefits of action. This will help deliver sectoral integration objectives as the costs and benefits to these sectors and policy objectives will need to be taken into account.

On the objective to increase the use of economic instruments for a better allocation of resources and internalisation of external costs the development of a robust method will identify the critical funding and economic issues for leakage management, which may include pricing and other economic instruments to fund infrastructure improvement and maintenance to a level which is economically and socially justified.

On the objective to achieve a more efficient water governance and effective working relationships between institutions, and fully integrate water quality, quantity and hydromorphology issues in management actions, the methodology, if applied, will need input from different institutions responsible for water management, infrastructure maintenance, local government, etc. This will aid co-operation in governance to integrate environment, social and economic objectives.

On the objective to improve knowledge and tools available to water managers, enabling effective decision making and reducing administrative burden, the option specifically aims to provide a robust tool to enhance water managers' decision making. Therefore, the option is aimed at contributing directly to enhancing effectiveness of this objective.

The option should enhance efficiency of water management with regard to leakage reduction. An effective methodology, by integrating economic, social and environmental costs and benefits should avoid unjustifiable burdens. The administrative burden of the development of the option itself is minimal. Its application will be a decision of the Member States and this would not be justified if this were deemed to be inefficient or an unnecessary burden.

The option aids wider coherence objectives. The methodology needs to address all relevant policy issues concerning leakage and, therefore, the option itself acts as a mechanism to deliver coherence.

8.6 Acceptability

The public consultation sought views on whether to promote leakage reduction in water stressed/potentially water stressed areas by prioritizing it in Cohesion and Structural Funds spending and also on whether to promote leakage reduction investment on the basis of public/private partnerships and European Investment Bank loans. 45% of respondents support the use of the Regional Funds, while 32% oppose it and 23% did not know. With regard to the use of EIB loans, 42% of respondents support their use, while 29% oppose it and 29% did not know. **The results for both funding options are similar and overall the public consultation supports their use in leakage reduction**.

With regard to whether to develop guidance on best practices in leakage reduction, 61% of respondents support this, while 19% oppose it and 20% did not know. With regard to developing a harmonised method for determining the level of water leakage under the WFD Common Implementation Strategy at EU level and encourage Member States to integrate it into their water management practices, 43% of respondents support it, while 30% oppose it and 27% did not know. **Therefore, overall, both voluntary approaches of developing guidance and a tool are supported in the public consultation**.

Therefore, while there is some opposition to the use of EU funds, this is approach is generally support, while there is even greater support for voluntary support approaches.

In written comments, many respondents acknowledge that leakage is a crucial issue, but state that it is a local problem, with its own social and economic consequences, and thus should be addressed at local, regional or Member State levels. Several respondents argue that water pricing at full recovery cost would help limit leakages.

The Maison Europeenne des Pouvoirs Locaux Francais notes that local authorities/utilities in France are required to assess the extent of leaks and take action when they exceed specific thresholds. These action plans will become mandatory in 2013 and will require significant investment. Therefore, an option for EU financial instruments to help in this regard would be welcome. Central Europe Energy Partners considers that funding from EU sources should deliver a preemptive approach on leakage avoidance through high quality installations and regular maintenance efforts rather than funding retroactive remediation. The Country Landowners Association considers that the options proposed will help Member States address leakages.

The Royal Institute of Chartered Surveyors recognises the need to address leakage and argues that the financial challenges would be partly addressed by full cost recovery not only of water supply, but also of maintenance and new infrastructure. Attaching a financial value to water will provide all stakeholders with a clear picture of the true worth of their water resource and will likely encourage water conservation. Verband Kommunaler Unternehmen also considers that the strict application of the cost recovery principle is important for infrastructure maintenance. The importance of cost recovery is also stressed by Central Europe Energy Partners.

Severn Trent Water notes that while reducing leakage is important, it should not be considered in isolation, but prioritised within other water efficiency measures. It argues that the company operates well within the UK regulatory framework and there would be no additional benefit by having a harmonised method for measuring leakage at EU level. This is also the view of the Association Luxembourgeoise des Services de l'Eau. Veolia (CZ) also considers that there is extensive guidance on assessing leakage which is already widely used so that there is no need to develop further additional guidance and that which is already

available could be more widely promoted. Such dissemination is also supported by Central Europe Energy Partners.

The Consumer Council highlights the keen interest of consumers in minimising leakage. It considers that leakage targets should be challenging but achievable. At the same time there is a responsibility on consumers to maintain and repair pipes on their property. Italia Nostra supports action to address leaks and that targets should be set for utilities at local level. With regard to project funding, it considers that such projects should be funded only when leaks threatened to cause water shortages. Projects should not be oversized and must be finalized within a short time. WWF does not support the spending of EU funds on leakage control, but rather would prioritise spending on support for green infrastructure.

Published positions of organisations also provide information on the acceptability of the options. The European Federation of National Associations of Water and Waste Water Services (EUREAU) argues[278] that leakage reduction is a 'very important part of the water suppliers' role' and it is one of a suite of tools to address water scarcity, stress and drought. It should be addressed locally, taking full account of economic, social and environmental externalities. Furthermore, it supports the need for international frameworks and methodologies to allow for good decision making and robust comparisons to be made.

With regard to financing, EUREAU[279] notes the importance of grants and loans to support water infrastructure. However, it does not consider these sources to be realistic in the long-term and that such aid 'should be reserved for transition periods and specific conditions'. Overall, EUREAU considers that such financing is not consistent with the principle of sustainability of water services and that investment and running costs should be covered by prices paid by users, not least because this is consistent with the cost recovery principle of the WFD.

8.7 Economic, social and environmental impacts

Economic impacts

Water in the distribution system is a product and its loss is an economic loss to the utilities providing that product. Where leaks are reduced, the economic impacts for utilities include:

- Reduced energy costs to pump the water.
- Reduced costs for chemicals to treat the water.
- Reduced damage and liability costs from fewer disruptive piping failures.
- Reduced abstraction costs.
- Improved customer satisfaction from improve reliability.

[278] EUREAU (2011). EUREAU Common Position Paper. Leakage Reduction in addressing Water Scarcity and Drought.

[279] EUREAU (2010). Position Paper on Requirements for Financing Investment in the Water Sector.

- Improved planning in expenditure programmes due to fewer emergency spends.

Higher costs for water distribution resulting from significant leakage may be met by the utility, but these costs may be passed on. Depending on the financing model, customers may have to meet all of these costs via water bills or public authorities may meet these costs.

Apart from the economic impact on utilities, leakage has other economic costs. Major leaks can cause local flood damage (e.g. with costs to business, insurance companies, etc.) and repairs to these leaks can cause significant disruption to road users. The leaks can undermine the ground into which the water percolates, thus resulting, for example, in costs for road repairs.

Leakage reduction may require the spending of public money (where utilities are public or public spending is otherwise justified) or spending by the private sector (where utilities are in the private sector). The options do not prescribe any level of spending (by defining a level of leakage reduction). However, a robust determination of the economic justification for leakage reduction (e.g. based on the Sustainable Economic Level of Leakage) through the guidance/tool option can justify the allocation of financing (whether from public budgets or from consumer pricing) and it ensure that spending delivers the most appropriate level of spending reduction compared to other alternatives for water efficiency or development of new water supply options. This option, therefore, provides the basis for increased efficiency of spending.

The funding option would provide financial support from EU funds to reduce these impacts where spending is otherwise difficult or not available. Therefore, the option would reduce negative economic impacts of leaks. The exact nature of the economic impacts will depend upon the extent of Regional Fund spending and the particular circumstances of the locations where those investments are made. Funding through Cohesion Policy would deliver economic benefits from leakage reduction only in the Member States eligible for such funding. It is, therefore, not possible to set these out in detail.

The increased availability of financial support from the Regional Funds has the potential for more efficient and effective spending. The timing of infrastructure spending can be an important factor in determining its efficiency and effectiveness. Delays, for example, can result in spending on short-term emergency repairs or smaller projects which are less cost-effective. Therefore, increased availability of funds can improve the economic efficiency of the spending of utilities, provided the finance is correctly prioritised and targeted.

The option clearly has an impact on the EU budget. However, it does not impact on the level of that budget, but rather the priorities to which that budget is applied.

It is not possible to provide a cost for an individual project. These costs would depend on the size and complexity of the distribution network to be repaired, the nature of the system (e.g. depth of pipes), methods of repair (e.g. complete replacement, lining existing pipes, etc.), labour costs and other factors. Furthermore, specific costs would also reflect whether the leakage reduction project was part of a wider project on water distribution.

The increased availability of finance (from private sources, EIB, etc.) has the potential for more efficient and effective spending. The timing of infrastructure spending can be an important factor in determining its efficiency and effectiveness. Delays, for example, can result in spending on short-term emergency repairs or smaller projects which are less cost-effective. Therefore, increased availability of funds can improve the economic efficiency of the spending of utilities, provided the finance is correctly prioritised and targeted.

Social impacts

Water leakage can has significant social impacts. Loss of water and costs of emergency repairs can result in increased costs to consumers. Higher utility costs disproportionately affect those social groups on lower incomes. Where costs are met from the public budget, these costs either have to be met through general taxation (usually local taxes), the distribution of which to social groups varies, or through a diversion of spending from other areas of public expenditure, which could impact on other areas of social welfare. It is important to note that leakage reduction programmes also result in expenditure, but such spending is planned and the impacts can be managed.

Leaks also cause disruption, such as to road users, as this can have negative social impacts, such as for commuters. Local flooding can damage property, causing distress to those affected.

Where leakage allows for bacterial contamination of drinking water supplies this can cause illness to those affected consumers.

For the general public, high leakage levels in water distribution networks are often viewed as examples of waste and inefficiency by utilities (public or private), in particular if consumers are asked to restrict water uses during times of drought or long-term water scarcity. Failure to address leakage can, therefore, be viewed as a governance failure. Addressing leakage, i.e. achieving the required efficiency, can be achieved when the distribution is achieving its SELL - where environmental, social and resource costs are fairly included in the calculation of SELL.

The options addressing leakage in distribution systems can each contribute to addressing these social impacts. The social impacts of the option to provide a robust tool to calculate SELL would depend on the level of those current impacts, the degree to which the tool is used and funding available to apply the results of the tool for changes to distribution systems. The option itself does not result in direct social impacts, in that it is the development of a methodology understanding the extent of water leakage. The option does not mandate any particular actions on tackling leakage or on how this should be funded. However, where utilities have insufficient tools to understand the extent of water leakage, then the option can provide a firmer basis for more efficient and cost-effective decision making for investments in water distribution infrastructure. With more efficient and cost-effective decision making, the following social benefits may arise:

- Robust methodologies to help decision making which are transparent will assist in improved public acceptability of the decisions of utilities.
- A clearer, robust determination of the economic justification for leakage reduction (e.g. based on the Sustainable Economic Level of Leakage) can help acceptability of pricing consequences for consumers.
- More efficient (targeted) use of available funds will ensure that disruption from leakage and leakage repairs is minimized.

Of course, where lack of an adequate methodology to understand the extent of leakages and the economic justification for different levels of investment, investments may not be made and consumers will not be asked to pay for them, which has larger consequences for those in lower income categories. However, in this case communities will still suffer from the negative social impacts of leakage.

For the funding option, the impact would depend again on the level of those current impacts and the size and distribution of the funds available. Funding through Cohesion Policy would deliver social benefits from leakage reduction only in the Member States eligible for such funding. It is, therefore, not possible to set these out in detail. However, the degree to which social impacts are affected by individual project choice could be included in the decision making for project selection through both Regional Funds and EIB loans.

Environmental impacts

Earlier in the discussion of the problem of leakage, the environmental impacts of leakage were described (water loss, energy wastage from loss of treated and distributed water, etc.) and which do not need to be repeated here. Investments in improved infrastructure are needed to deliver the environmental improvements and this option aims to enhance the delivery of investment opportunities.

The impacts of the option to develop guidance/tool would depend upon the uptake of the tool for SELL and how far this differs from current assessments.

For the funding option the exact nature of the environmental impacts will depend upon the extent of which projects are funded by the Regional Funds and the particular circumstances of the locations where those investments are made. Funding through Cohesion Policy would deliver social benefits from leakage reduction only in the Member States eligible for such funding. It is, therefore, not possible to set these out in detail.

It is also important to note that while the option seeks to ensure leakage reduction is a priority for decisions for Regional Fund spending, the precise level of investment will depend on:

- The overall amount of funds available (in which this priority would be set).
- The priorities given to leakage in the planning decisions by Member States to direct the overall spending of eligible funds.
- The availability of co-finance.

The funding option does not seek to displace other important environmental priorities. For example, Regional Funds support other priorities to deliver environmental improvements in the water sector (such as improved waste water treatment or drinking water quality) and, therefore, the extent of funds available for projects for leakage reduction would need to take account of these priorities and this would be reflected in the level of environmental impacts that this option would deliver.

It is also important to note that while the option seeks to ensure leakage reduction is a priority for investment, the precise level of investment will depend on the overall amount of funds available (in which this priority would be set). In the current economic crisis such funds are subject to some constraints at present. Furthermore, the option does not seek to displace other important priorities. For example, the EIB has priorities for funding environmental improvements in the water sector (such as improved waste water treatment or drinking water quality) and, therefore, the extent of loans for leakage reduction would need to take account of these priorities and this would be reflected in the level of environmental impacts that this option would deliver.

8.8 Conclusions

The three options considered in this IA are not mutually exclusive. The options each contribute to one of the objectives for the Blueprint regarding leakages, as set out earlier:

- To support the development of a robust methodology to determine the sustainable economic level of leakage (SELL) to drive investment and environmental decision making. This is addressed by option 6a.
- To help overcome the barrier of insufficient financial resources to maintain water distribution systems to the required level to address leakages consistent with objectives for water efficiency. This is addressed by options 6d1 and 6d2.

The two funding options are, in particular, not mutually exclusive as they address different financial instruments/institutions, each of which has specific scope and limitations for funding projects within the EU. For example, Cohesion funds are limited to specific areas of the EU and provide direct finance, while EIB loans are not limited spatially, but consist of loans rather than grants.

In conclusion, all three options can be taken forward within the Blueprint enhancing the capacity of Member State institutions to address the problems of leakage in water distribution systems.

Table 21. Summary of the impacts of the options to address leakage in water distribution systems

Note that for ease of comparison of the results, the two options concerned with funding are considered together in the table.

Description of the option	Option 6a: Develop a harmonised method for determining the Sustainable level of water leakage under the WFD Common Implementation Strategy at EU level and engage Member States and the water industry in a process to integrate it into their water management and share best practices on leakage reduction.	Option 6d1: Promote sustainable water management (including leakage reduction) in water stressed/potentially water stressed areas by prioritising it in the use of Cohesion and Structural Funds. Option 6d2: Promote sustainable water management (including leakage reduction) investment on the basis of public/private partnerships and/or European Investment Bank loans.
Effectiveness towards sectoral integration	+ A robust method will take account of full economic costs and benefits and so help deliver sectoral integration objectives.	+ Projects will help to integrate water objectives into sectoral policies affected by Regional Funding and EIB loans.
Effectiveness towards other specific objectives	+ A robust methodology identifies critical economic issues, which may include pricing and other economic instruments to fund infrastructure maintenance. A methodology, if used, requires cross-institutional input aiding co-operation The option specifically aims to provide a robust tool to enhance water managers' decision making.	+ Projects may promote more efficient pricing to support infrastructure maintenance and so enhance the use of economic instruments Projects will have the limited impacts on core governance structural objectives Regional Fund projects require robust justification and assessment, which requires the improvement of knowledge and tools available
Efficiency	++ Guidance assists in efficiency of decision making, while a robust and accepted tool is specifically aimed at more efficiency decision making, the impact of which will depend upon uptake by utilities, etc.	++ Properly targeted projects can enhance the cost-effectiveness of investments and reduce the inefficiencies of emergency response spending.
Coherence	+ A robust method needs to take account of full economic costs and benefits of action, this may help deliver sectoral integration objectives and aid coherence between MS to provide a firm basis for other policy interventions.	≈/+ Projects will help to integrate water objectives into sectoral policies affected by Regional Funding. Also aids coherence between all relevant policies in project assessment and appraisal.
Acceptability	++ Public consultation: 61% of respondents supported developing guidance (19% were opposed), while 43% of respondents supported developing a harmonised method (30% were opposed).	+ Public consultation: 45% of respondents were in favour of prioritising actions through the Regional Funds in water stressed areas (32% opposed); 42% were in favour of loans from the EIB for leakage reduction (29% opposed).
Environmental impacts		
Ecological Status	≈/+ The option is not directly aimed at this issue, but improved water efficiency leading to better water body management would deliver some improved ecological status, depending on the application of guidance/tool.	≈/+ The option is not directly aimed at this issue, but improved water efficiency leading to better water body management would deliver some improved ecological status, depending on the extent of funding available. Greater consideration of ecological impacts can be addressed in project appraisal.
Water Stress	+ Guidance and a tool will, if applied, reduce the need for abstraction and so aid in reducing pressures of water bodies, reducing stress in areas of water scarcity.	+ Funding will be targeted to reduce leakage in areas where there is water, thereby contributing to reduction in stress on water bodies. The extent of the impact will depend on the level of funding available.

Vulnerability to extreme events	++ The option, by providing improved investment decision making, can impact on preparedness for water scarcity and so mitigate risks of drought.	++ The option, by providing funding to reduce water loss, can impact on preparedness for water scarcity and so mitigate risks of drought.
Other impacts	≈/+ **Companies' performance**: Guidance/tool would improve the investment decisions of private water companies and their environmental performance. ≈/+ **Waste/energy**: Reduced leakage would have some impact on waste production from emergency repairs and better leakage planning could reduce energy consumption/GHG emissions. + **Third countries**: A SELL tool could have wider applicability in some third countries which would benefit with improved water efficiency. **Other environmental impacts**: not relevant.	≈/+ **Waste/energy**: Reduced leakage would have some impact on waste production from emergency repairs and better leakage planning could reduce energy consumption/GHG emissions. **Other environmental impacts**: not relevant.
Economic impacts		
Functioning of the internal market and competition	Not relevant.	Not relevant.
Specific regions or sectors	≈/+ The direct impact of the option will be on water utilities. However, guidance on more cost-effective decisions on leakage reduction will benefit all users, particularly in water stressed regions of Europe.	≈/+ The direct impact of the option will be on water utilities. However, funding for leakage reduction will benefit all users, particularly in water stressed regions.
SMES	≈ The option supports utilities, which are not SMEs. However, improved distribution systems may help to lower some water supply costs and avoid leakage disruptions affecting users, including SMEs, in proportion to its effectiveness (see above).	≈ The option supports utilities, which are not SMEs. However, improved distribution systems may help to lower some water supply costs and avoid leakage disruptions affecting users, including SMEs, in proportion to its effectiveness (see above).
Admin burdens on businesses	≈/+ The option has no administrative burden on business. Rather an effective tool would help avoid burdens and funding would assist in investments.	≈ The option has no administrative burden on business. Rather funding would assist in investments.
Other	++ **Consumers**: implementation of guidance would reduce loss of water, thereby reducing impacts on consumers' bills as well as reduced disruption. + **Innovation**: the development of the tool may require some further research to generate even more cost effective techniques for leakage reduction. ≈/+ **Public bodies**: for public utilities an effective tool would assist them in making more robust investment decisions. + **Third countries**: the development of a robust tool for leakage assessment would be readily transferable to third countries and provide benefits. **Other economic issues**: not relevant.	++ **Consumers**: project funding would reduce loss of water, thereby reducing impacts on consumers' bills as well as reduced disruption. ≈/+ **Public bodies**: for public utilities funding would help to overcome investment blockages and provide a firmer financial basis for operation. **Other economic issues**: not relevant.
Social impacts		
Employment and labour markets	≈ Repairing leaks affords employment, while disruption from leaks can harm businesses. The development of a tool is unlikely to affect this issue.	≈/+ Repairing leaks affords employment, while disruption from leaks can harm businesses. Funding is likely to allow for refurbishment activities and employment

		not otherwise available. However, the impact would be offset by redistribution within the overall option of Structural Fund and EIB budgets
Social inclusion and protection of particular groups	Not relevant.	Not relevant.
Public health and safety	≈/+ Improved leakage control would be expected to reduce unexpected leaks and improve quality of life and reduce hazards for people. The impact of a tool would depend on acceptability by authorities and available funding.	≈/+ Improved leakage control would be expected to reduce unexpected leaks and improve quality of life and reduce hazards for people. The impact of funding would depend on the level and locations of funds made available.
Other	≈/+ **Culture:** the control of leaks would result in better management of unexpected damage to cultural assets. The impact of a tool would depend both on acceptability by MS bodies. + **Third countries**: the development of a tool could be used in third countries, leading to more robust investment decisions with positive social impacts. **Other social issues**: not relevant.	≈/+ **Culture:** the control of leaks would result in better management of unexpected damage to cultural assets. The impact of funding would depend on the level and locations of funds made available. **Other social issues**: not relevant.

9 SUPPORT TO WATER RE-USE

9.1 Introduction and problem definition

Water from waste water treatment plans can be a valuable resource for water supply in areas where water is limited. Developing such an additional resource can, therefore, be an important contributor to the objectives for water managers in areas subject to water stress. Action on this subject can, therefore, contribute to the objectives of the Blueprint on this issue.

There are two types of water re-use: direct and indirect. Direct water re-use is treated water that is piped into a water supply system without first being diluted in a natural stream or lake or in groundwater. It is then directly used by farmers for irrigation or by industry as process water. Indirect water re-use involves the mixing of reclaimed water with another water supply source before re-use. Indirect water re-use is also accomplished by discharging reclaimed water into a groundwater aquifer and later withdrawing the water for use. Discharge into an aquifer (called artificial recharge) is done by either deep-well injection or shallow surface spreading. In this latter case there is therefore an overlap in water re-use technology with ground water recharge technology.

Direct water re-use can be grouped into the following categories[280]:

- Urban re-use: the irrigation of public parks, school yards, motorway central medians, and residential landscapes, as well as for fire protection and toilet flushing in commercial and industrial buildings.
- Agricultural re-use: irrigation of crops.
- Re-use for aquaculture.
- Recreational impoundments: such as ponds and lakes.
- Environmental re-use - creating artificial wetlands, enhancing natural wetlands, and sustaining stream flows.
- Industrial re-use: process or makeup water and cooling tower water.

Water re-use is addressed by the UWWTD Directive in article 12 which refers to the treatment of wastewater: "*Treated wastewater shall be re-used whenever appropriate. Disposal routes shall minimize the adverse effects on the environment."* Further, the WFD states "The following is a non-exclusive list of supplementary measures which Member

[280] Campling, P., L. De Nocker, W. Schiettecatte, A.I. Iacovides, I. Iacovides, T. Dworak, E., Kampa, M. Berglund, M. Álvarez-Arenas, C. Cuevas-Pozo, O. Le Mat, V. Mattheiß, F., Kervarec. (2008). *Conditions for the Sustainable Development of Alternative Water Supply Options*. Study undertaken for the European Commission – DG Environment. Flemish Institute for Technological Research.

States within each river basin district may choose to adopt as part of the programme of measures required under Article 11(4): (x) efficiency and re-use measures, inter alia, promotion of water-efficient technologies in industry and water-saving irrigation techniques". Water re-use is considered as an effective measure to achieve the WFD's objective of attaining good ecological status.

For water reuse to reach its potential, the main barriers to its uptake need to be addressed. In the FP5 AQUAREC project, a numer of EU water reuse projects were assessed to determine the key barriers[281].

- Lack of awareness and knowledge: In the context of river basin planning, water reuse options tend to be exluded as stakeholders are not well informed about the link between water supply and water treatment. As such, water re-use has not been taken up in practice, especially in areas where water supply and wastewater are managed by different companies or agencies.
- Lack of trust, credibility and confidence: Hand in hand with the lack of awareness in administrations is the often negative impression consumers have regarding reuse schemes.
- Lack of cooperation among stakeholders: Projects where the water and the wastewater sector worked together were successful. Ownership of projects can play a role in terms of acess to financing and cost allocation.
- Lack of guidelines or criteria for water reuse: The absence of an EU regulatory framework presents a significant barrier as standards are the basis for the success of water reuse projects. The project found that "one of the major problems in Europe is the lack of clear criteria to support decision on when reuse is desirable and on quality stanrads for different reuse purposes". The lack of standards has caused adminsitrations to take a rather conservative approach and has led to misstrust and misunderstandings regarding use, especially in the agricultural sector. The lack of EU standards has also been noted by Campling et al. (2008).
- Lack of financing: This is considered the single most significant barrier to wider use of reclaimed water. Only a portion of the start up costs are paid by (local) government grants so water treatement projects have to cover the balance. To reduce the barrier time-bound subsidies have been suggested.

These barriers limit a potentially important alternative water source (especially for water stressed areas), threaten farmers exporting crops within the single market and prevent

[281] Wintgens, T., Bixio, D., Thoeye, C., Jeffrey, P., Hochstart, R., and Melin, T. (2006): AQUAREC Policy Brief. Reclamation and reuse of municipal wastewater in Europe – current status and future perspectives analysed by the AQUAREC research project.

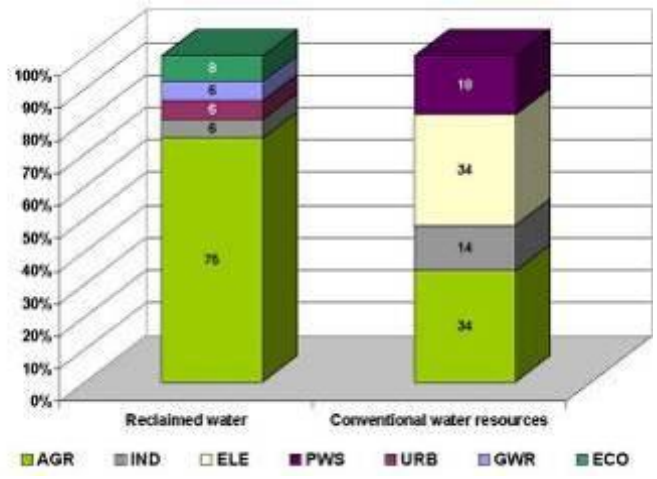
industry from making long-term investment decisions. From an EU level perspective, therefore, the following problems need to be addressed:

- The lack of a common approach to setting standards for water re-use which can lead to mistrust of the technique, potential market barriers and failure to invest.
- Insufficient finance to investment in appropriate treatment, etc. and so deliver the improvements in water efficiency in water stressed areas.

9.2 Baseline and justification for EU level action

According to TYPSA[282] the status of water re-use is evolving continuously in Europe. However, quantitative information on treatment and reuse on the EU level is difficult to obtain. Under the framework of the AQUAREC project, the total volume of reused treated water in Europe was 964 Mm³/yr in 2006. This accounts for 2.4% of the treated effluent. The treated water reuse rate was high in Cyprus (100%) and Malta (just under 60%), whereas in Greece, Italy and Spain treated water reuse is only between 5 % and 12 % of their effluents (although it reached the level of 233 Mm³/yr. and 347 Mm³ /yr respectively, been dedicated mainly to agricultural uses). Nevertheless, the amount of treated water reused is mostly very small (less than 1%) when compared with a country's total water abstraction.

Figure 12. Water use and reuse of European countries by application, being AGR: agricultural irrigation, GWR: groundwater recharge, IND: industrial use, ELE: electricity generation, PWS: public water supply, ECO: ecological/environmental enhancement, URB: urban and domestic uses (Source, Wintgens, et al., 2006)

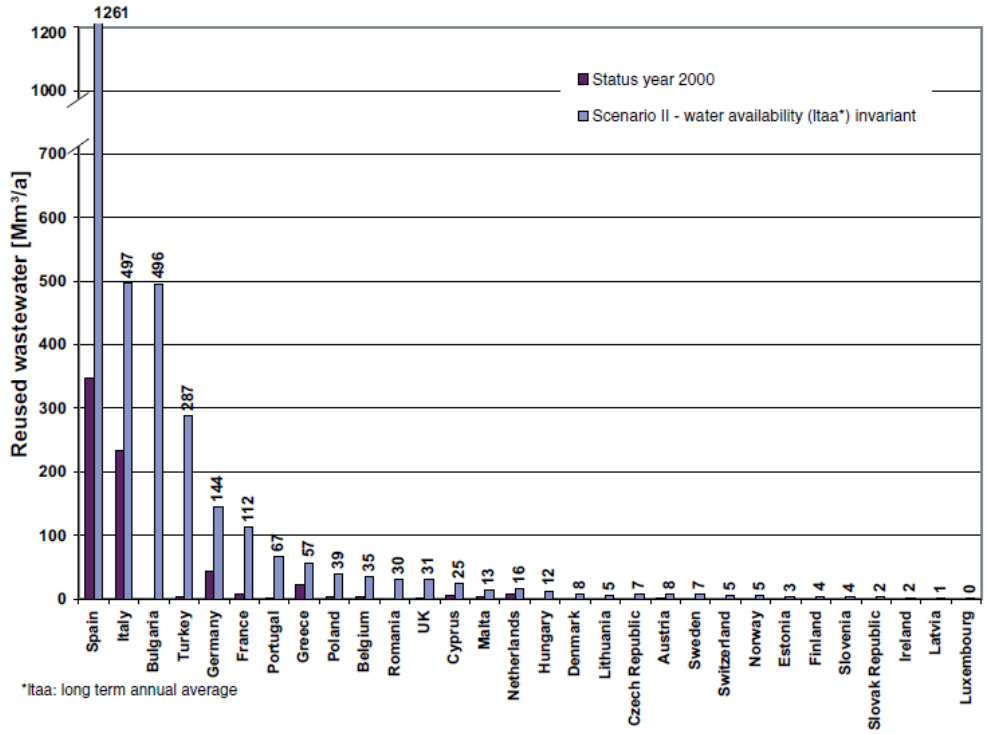


Water reuse has significant potential in the EU given the total amount of wastewater produced. In the context of the AQUAREC project, a model was developed to quantify the potential for water reuse using effluents from wastewater treatment plans by the year

[282] TYPSA (2012). Industrial Desalination and Water Reuse: Ultrapure water, challenging waste streams and improved efficiency.

2025. The results – as shown in the figure below – show that water reuse has considerable potential in Spain, Italy and Bulgaria.

Figure 13. Model output for water reuse potential of European countries; projection horizon 2025. Source: Wintgens, et al (n.d.)



It is expected that increased concern with water scarcity, including pressure from future climate change, will increase the amount of water derived from waste water sources in water scarce areas of Europe. It is not appropriate to set specific targets for water re-use at EU level, rather the WFD sets objectives for water bodies, including in water scarce areas, and it is up to MS authorities to determine the appropriate measures to meet these targets. However, a principle barrier to expansion water re-use which are appropriate to address at EU level is the lack of common standards for re-used water in agriculture leading to a potential resistance to agricultural products within the EU single market leading to lack of enthusiasm to invest in this measure. While guidelines for agricultural water re-use have been defined by the World Health Organisation[283], and by different countries, such as the USA[284] and Australia, a uniform solution for Europe is lacking. Establishing standards for the functional operation of the single market is an appropriate EU level response.

[283] WHO (2006). Guidelines for the Safe Use of Wastewater, Excreta and Greywater, vol.II Wastewater Use in Agriculture. World Health Organization.

[284] http://www.epa.gov/nrmrl/wswrd/dw/smallsystems/pubs/625r04108.pdf

It is also important to stress that the baseline for development of water re-use is strongly influenced by how other problems set out in this document are addressed. The need for secure water supplies is an important driver for farmers and for water companies to invest in water re-use. Adequate water management with proper targets (problem 1) and with proper pricing (problem 9) will influence the availability of water to different users. The creation of new secure supplies will become important in water scarce areas where there will be difficulties satisfying all water users (including achieving environmental flows) and where water prices may rise. This will further drive the demand for water re-use.

There is strong justification for EU level action to address the problems identified above. The lack of trust in re-use of water and the potential for barriers to be erected within the internal market by individual action at Member State level are strong justifications for EU action.

The protection of the operation of the internal market is a principle focus for EU policy and common standards for the re-use of water would contribute to this. Furthermore, such standards would ensure a common level of protection of health of EU citizens. This is necessary as agricultural products are traded across the EU and Member State level standards for water re-use may be inappropriate or lacking, thus failing to ensure health is protected.

It is not appropriate at the EU level to set targets for water re-use. This is a river basin level decision, based on the nature of water stress in the basin and potential uses for re-used water, taking account of local economic objectives, physical constraints, etc.

However, the problem analysis has identified finance as a constraint on water re-use, so that lack of sufficient finance can prevent expansion of re-use even where utilities, farmers and appropriate authorities consider that it would be beneficial. EU financial instruments and institutions are able to fund infrastructure projects within Member States subject to specific limitations (e.g. eligibility for Cohesion spending). Water re-use infrastructure, contributing to economic, social and environmental objectives in river basins, could be included within the scope of such instruments and, therefore, some contribution to addressing the financial constraints on investment for water re-use is appropriate at EU level.

9.3 Objectives

The objectives for the Blueprint regarding water re-use are:

- To help overcome the barrier of resistance to re-use of water by developing common standards in Europe to ensure re-used water presents no risks to health, so providing a sound basis for investment by business.

- To help overcome the barrier of insufficient investment in water re-use by prioritising funding for water re-use schemes within appropriate EU level financial instruments.

These objectives contribute to the four operational objectives of the Blueprint as follows:

Foster integration of water into sectoral policies, by ensuring that impact of socio-economic activities and regulations on the state of water resources is fully taken on board.

The objectives on water re-use are not aimed at changing sectoral policies, but they are aimed at enhancing the efficiency of water use by agriculture and providing a more consistent basis for water use (along with crop choice, employment, etc.) for farmers that avail themselves of re-use water. This aids in the integration of water objectives into agricultural policy.

Increase the use of economic instruments for a better allocation of resources and internalisation of external costs.

The objectives for water re-use are not focused on the use of market-based instruments per se, but they include an emphasis on the need to overcome funding barriers for more efficient water use and the prioritisation of water re-use within the EU's own funding instruments. Water re-use itself directly delivers more efficient allocation and use of water as a resource.

Achieve a more efficient water governance and effective working relationships between institutions, and fully integrate water quality, quantity and hydromorphology issues in management actions.

Water re-use is a potentially appropriate water management options in water scarce areas. Ensuring barriers to water re-use are overcome through the objectives set out here does not directly support more efficient governance of itself. Rather it ensures that specific options are available within decision making.

Improve knowledge and tools available to water managers, enabling effective decision making and reducing administrative burden.

The development of standards for water re-use would contribute to the knowledge base for water managers, utilities and others. A common EU-level approach would also reduce the administrative burden on Member States which have separately begun to develop their own standards, but which are ineffective or even counter productive within the single market.

In taking forward these objectives for water re-use in the Blueprint it is important that there are SMART indicators for monitoring their progress and, therefore, whether the objectives have, or have not, been achieved. This will enable the success of policies to be determined and potential barriers (if they occur) to be addressed as policies are reviewed.

For the water re-use objectives, the following SMART indicators are proposed:

- The adoption of EU level standards for the re-use of water for agriculture (and potentially other purposes).
- The number of occurrences of barriers to the sale of agricultural products grown with re-used water compliant with these standards within the EU (to determine whether barriers remain).
- The total number and value of grants and/or loans from EU funding instruments which contribute significantly to investment in re-use of water.
- The investment needs for treatment for water re-use across the EU and how this is changing (taking account of EU funded investments, Member State investment and private investment).

9.4 The options and their elaboration

Several policy options to address the problem of re-use of water were developed to be considered within the Blueprint and subject to IA. These options were subject to a SWOT analysis (see Annex D). Table 22 describes the options as originally developed in the project and submitted for the public consultation together with the final elaboration of options included within the IA, following further discussion with the Commission. The options remained unchanged.

Table 22. The options originally considered and final options to address the problem of water re-use

Options originally considered	Final options for the IA
• Develop EU guidance on certification schemes for water re-use • The Comité Européen de Normalisation (CEN) to adopt standards for re-use of water in agriculture • An EU Regulation establishing standards for water re-use	• Option 7a1 Develop EU guidance on certification schemes for water re-use. • Option 7a2 The Comité Européen de Normalisation (CEN) to adopt standards for re-use of water. • Option 7b An EU Regulation establishing standards for water re-use. • Option 7d is to prioritise spending of Regional Funds and EIB loans on sustainable water management which could include support for treatment and/or distribution of water for re-use.

Option 7a1 aims to develop EU guidance on certification schemes for water re-use developed at national level. The guidelines would define a way forward on how to define certification schemes for agricultural, industrial, recreational and gardening use. The guidelines would define a way of certification of certain water qualities, but it is left to the MS on which threshold values they agree. This option means that it would still be most likely that no common quality values for EU will exist.

Option 7a2 aims to define an EU wide CEN standard for threshold values for water re-use. The current standard CEN/TC 165/WG 50 on the use of treated wastewater only sets principles of design, construction, installation, operation and maintenance (different codes of practice for water reuse from rainwater, greywater and treated wastewater). For the issue of quality only parameters and test methods how to measure the quality are provided but no threshold values) and quantity in respect of the type of end use. Product standards (performance, test methods, structural behaviour, guide for installation) for different products, e.g. tanks, filters, controls, treatment units, infiltration units in cases where no specific material related TC or a CEN/TC 165/WG exists. Drinking water purposes are excluded from the scope.

It is important to note that a CEN standard is of voluntary nature and users or re-used water will only be required to uptake if such standard is made legally binding under legislation.

Option 7b is an EU Regulation establishing standards for water re-use. This would establish standards that address the primary health concerns associated with water re-use. The regulations will establish criteria to address the risk of pathogen exposure and infectious disease risks associated with various specified uses of treated water. The regulation would also apply to all EU waste water treatment plants that want to trade with treated water.

Option 7d is to prioritise funding support for water-reuse projects within Cohesion funding and EIB loans. The spending of EU Regional Funds has, and can, contribute significantly to achieving the objectives of EU water policy. Current planned Cohesion Policy spending on water/waste water for 2007-2013 is €22 billion. This option seeks to prioritise projects for sustainable water management including investment in water re-use within these spending programmes. General Regulations and strategic orientations of Regional Policy are set out at EU level, but the responsibility of setting specific project priorities is at MS level.

On 6 October 2011, the European Commission proposed its legislative package for new Regulations for Regional Funds under the next MFF (COM(2011)516, COM(2011)614, COM(2011)607, COM(2011)612). The Common Provisions Regulation establishes the main principles, objectives and rules governing the funds. Eleven new thematic objectives are introduced, four of which are of relevance for the environment. EU Structural and the Cohesion Funds will underpin two new goals: (1) 'Investment in growth and jobs' and (2) 'European territorial cooperation' with the majority of funds concentrated in poorer regions. The Cohesion Fund will continue to support MS where Gross National Income (GNI)

per capita is less than 90 per cent of the EU average. It supports interventions under the 'Investment in growth and jobs' objective with a total budget of €68bn. €10bn however are 'ring-fenced' for support to large scale transport infrastructure (TEN-T) under the new Connecting Europe Facility. The total budget for the European territorial cooperation goal is €11.7bn.

This option does not seek to interfere with either the proposals for the next MFF set out by the Commission in October 2011 nor with the development of this legislation through the adoption procedures within the Council and Parliament. Rather it aims to encourage Member States to identify leakage reduction as a priority in the Partnership Contracts that will need to be developed subsequently.

The option also seeks to prioritise water re-use investment within European Investment Bank loans. The bulk of EIB environmental lending goes to EU countries. In 2011, the EIB provided direct financing for a total of EUR 25.6bn in the EU. These figures do not include environmental components of projects where the overall objective is not directly related to the environment. Specifically, the EIB states that its focus is to ensure compliance with the principles and recommended practices of EU legislation, including the WFD and related directives. EIB financing can cover investments in the entire water cycle. The 2008 EIB water sector lending policy[285] emphasised water efficiency as a major priority as it plays a "key role to play in the efficient allocation of water resources, addressing water scarcity issues, ensuring the viability of service providers, and increasing the efficiency of their services". This specified four efficiency measures, one of which was "efficiency of the system itself". The 2012 statement on financing in the water sector also emphasises water efficiency as a key objective as well as support for additional water supplies as long as there is proof that water efficiency and demand-side management have been considered and implemented; an options analysis has been undertaken; and the projects are consistent with the Bank's environmental and social policy[286].

9.5 Effectiveness, Efficiency and Coherence of the options

The options above seek to improve the uptake of water re-use in the agricultural, industrial, recreation and gardening sector. They are all effective to varying degrees regarding achieving the operational objectives of the Blueprint.

With respect to objective 1 on fostering the integration of water into sectoral policies, guidance would help to improve the integration of water objectives into the agriculture and other sectors. Given its voluntary "soft" nature the option would lead to considerable support but they can be viewed as necessary companions to other more mandatory approaches. The options would have a positive effect on governance by triggering the

[285] EIB (2008). The EIB's Water Sector Lending Policy. Strengthening the EIB's Support for EU Policy Objectives in the Sector.

[286] EIB (2009). EIB Statement of Environmental and Social Principles and Standards.

cooperation between water re-use producers and users. This is particularly the case with the financing option as project preparation, etc., would require enhance co-operation.

All options will indirect impact the use of economic instruments. Water re-use might affect water availability and thus in a second order affect externalities of water use, and thus in a third order the way water is priced. The prices for waste water are normally cheaper than those for freshwater and the revenue from selling the water might lower the cost for water treatment or increase the level of cost recovery. The first two options are of voluntary nature and therefore the impact is strongly depending on the uptake. The third and mandatory option would have the strongest impact, as would the financing option in those areas eligible for finance.

All options would improve knowledge and tools in the same way as their development would trigger the exchange of existing experiences among MS. For some threshold values new research might be needed.

In terms of efficiency, the ability of guidance documents (Options 7a1) to encourage MS to re-use water depends on the extent to which the guidance will be applied. The development of guidance can be expected to be faster than of a CEN Standard or EU legislation. However the efficiency of the latter two is expected to be higher. Most effective is seen the EU regulation as its application is mandatory. The financing option aids coherence in those areas eligible for funding.

In terms of policy coherence, all options would contribute greater unity between MS standards on water re-use. The weakest option in terms of coherence would be the guidance approach as it would only provide general rules MS can follow or not. A CEN standard would at least define common threshold values. However as a standard is also of voluntary nature its application is difficult to predict. The most coherent approach would be an EU regulation.

The table at the end of this section summarizes the influence of the options on the four operational objectives and their contribution to efficiency and coherence.

9.6 Acceptability

The public consultation sought views on three options to develop EU wide standards for water re-use. The results are presented in Table 23.

Table 23. The results of the public consultation concerning options to address water re-use

Option	Yes (%)	No (%)	Do not know (%)
Develop EU guidance on certification schemes for water re-use	40	33	27
The Comité Européen de Normalisation (CEN) to adopt standards for use of recycled water in agriculture	39	25	36
An EU Regulation establishing standards for water re-use	42	31	27

All three policy options are supported by about 40% of the respondents. The highest share, 42%, supports a regulatory approach, i.e. an EU regulation establishing standards for water re-use. It should be noted that specific funding options for water re-use were not asked in the consultation. Overall, use of EU funds was supported for the options on leakage reduction (see above). Whether there would be similar views for spending on this issue is not known.

A number of written comments from different stakeholders recognise the importance of water re-use to address water scarcity and the need for standards to protect health. Some state that water re-use should remain a local decision. Other responses, however, support EU action on this topic. A number of responses favour Europe-wide work on technical standards, citing ISO and CEN work on re-use standards. Many responses, including those favouring EU action, underline that health concerns should be paramount in decisions on water re-use. Several comments from industry and also national administrative bodies call for greater attention to reuse in industry and other sectors.

The Association Luxembourgeoise des Services de l'Eau (Aluseau) and Veolia (CZ) both consider that public health protection is a priority and EU regulation is the best way to address this, although whether water is re-used must remain a local decision. In contrast Severn Trent Water does not see the added value of EU regulation and considers that standard setting should be undertaken by national governments. The American Chamber of Commerce considers that water re-use can help to address water scarcity and that improvements in technologies to support re-use is needed.

Central Europe Energy Partners and Verband Kommunaler Unternehmen also recognise the potential of water re-use for coping with water scarcity in water stressed regions. However, they consider that any standards that any be adopted should respect the need to protect health and the environment, but not be so strict as to discourage water re-use. The Royal Institute of Chartered Surveyors recognises the importance of water re-use to address scarcity issues and that quality standards should be appropriate to be use for which the re-used water is made. Maison Europeenne des Pouvoirs Locaux Francais supports the re-use of water, but emphasises the need to meet sanitary standards as exemplified by recent French legislation.

The Country Land Owners Association recognises the need for common standards to allow for health protection, establishing trust in the market place and providing a level playing field for competitive agriculture across Member States. Electricite de France is also supportive of the development of EU guidance and supporting investment in water re-use.

Of the NGOs Grune Liga considers that strict environmental regulations for waste water recycling are necessary, supported by dissemination and research on best practice in the area. Italia Nostra states that 'using polluted water for irrigation in agriculture should be prohibited' as is diluting it with clean water to make it acceptable. Water used in agriculture should not contain pollutants that exceed legal standards.

The Third European Water Conference concluded[287] that some stakeholders support the development of EU standards for water re-use, underlining the need to have common quality parameters for the re-use of water at EU level. Different quality levels for re-used water should be set for different users on a scientific basis and in cooperation with the relevant sectors (agriculture, water suppliers, industry). Some stakeholders, however, argue that EU standards will not help because situations vary greatly between countries and sectors.

Published positions of organisations also provide further information on the acceptability of the options. The European Federation of National Associations of Water and Waste Water Services (EUREAU)[288] 'fully supports' the idea of water re-use where appropriate controls are in place to protect health. It argues that re-use has many advantages, but that these need to be evaluated on a site specific basis and closed loops that endanger drinking water supplies should be avoided. However, EUREAU considers[289] that re-use is 'hampered by the unclear and inconsistent legislative framework'. Thus it supports guidance and guidelines, such as good practice for re-use within RBMPs.

[287] http://waterblueprint2012.eu/sites/default/files/Key%20Messages_English_1.pdf

[288] EUREAU (2011). Position Paper. Water re-use and other alternative resources at home: rainwater harvesting and greywater recycling for domestic purposes.

[289] EUREAU (2012). EUREAU Position on the Water Blueprint.

With regard to financing, EUREAU[290] notes the importance of grants and loans to support water infrastructure. However, it does not consider these sources to be realistic in the long-term and that such aid 'should be reserved for transition periods and specific conditions'. Overall, EUREAU considers that such financing is not consistent with the principle of sustainability of water services and that investment and running costs should be covered by prices paid by users, not least because this is consistent with the cost recovery principle of the WFD.

It should also be noted that stakeholders (industry, NGOs and others) in the public consultation and stakeholder workshop to support the Fitness Check[291] argued that water re-use is not adequately addressed by EU water policy. Stakeholders raised concerns that lack of EU standards on the quality of water intended for re-use in agriculture is a potential gap in the EU policy framework that may inhibit its wide use. The concern expressed was that the lack of EU level standards could inhibit free movement of agricultural produce in the single market and inhibit investment by the water industry. Therefore, this was an appropriate area for potential intervention at the EU level.

9.7 Economic, social and environmental impacts

Economic impacts

The aims of the options are all to increase the uptake of water re-use and, in this regard, the relative economic impact of the options is directly proportional to their potential effectiveness addressed above. The extent and type of economic benefit depends on the considered activity and the particular user. Based on a large literature survey and some case study analysed[292] identified the following economic benefits:

- Agriculture: Reliable irrigation water supply is an important economic constraint for farmers in semi-arid regions across Europe. Water re-use decreases the risk of a crop failure and consequently the risk of income losses.

- Industry: Large industrial re-use of water for cooling water might become attractive in particular if it competes with desalination of seawater or production has to be stopped because of heating of surface water. However certain industrial sectors like pulp and paper, tannery and the textile sector already re-use water as this is considered to be cost-effective.

[290] EUREAU (2010). Position Paper on Requirements for Financing Investment in the Water Sector.

[291] See http://ec.europa.eu/environment/water/blueprint/fitness_en.htm

[292] Campling, P., L. De Nocker, W. Schiettecatte, A.I. Iacovides, I. Iacovides, T. Dworak, E., Kampa, M. Berglund, M. Álvarez-Arenas, C. Cuevas-Pozo, O. Le Mat, V. Mattheiß, F., Kervarec. 2008. *Conditions for the Sustainable Development of Alternative Water Supply Options*. Study undertaken for the European Commission – DG Environment. Flemish Institute for Technological Research. http://ec.europa.eu/environment/water/quantity/pdf/task%203%20report.pdf

- For households and domestic uses: Much of the fresh water is used for activities that do not need a high standard of water quality (e.g. flushing toilets, gardening). So replacing fresh water by treated re-used water can result in cost savings where water is metered.

- In urban areas re-used water can also be used for dust control for cleaning roads, sidewalks and fire fighting. The cost benefits depend also on the price of fresh water, but in general they can be assumed to be high, only limited extra infrastructure is needed (additional storage capacity at the treatment plant). The water can then be taken directly from the treatment plant.

- For public supplier water re-use can be either negative or beneficial. In cases where no water scarcity exists the re-use of water might lead to a lower income for a water supplier as wastewater might be cheaper in particular when used in closed loops (e.g. for household and industry). At the same time for operators of public treatment facilities it might be economically beneficial to recycle the treated water when disposal of wastewater is charged with a fee. Effluent charges can be saved when the water is not discharged into the water environment.

- For recreational/environmental uses: These types of re-use typically include landscape areas (cemeteries, motorway landscaping, golf courses and parks), landscape and recreational impoundments, soil compaction, decorative fountains.

The extent and type of economic benefit depends on the particular user of the re-used water. For agriculture, re-used water is economically beneficial to farmers when the costs of that water are more viable than alternative water sources. The reliability of supply is also an important economic variable. Abstraction for irrigation from, for example, surface waters may be interrupted during droughts and this can result in significant losses to farmers. As a result some farmers are willing to pay a premium for secure re-used water supplies. For example, a survey of Sardinian farmers found that 64 % of the farmers were willing to pay at least 10 % more for re-used water than alternative supplies as this source was secure[293]. High value agriculture, such as horticulture and wine production, would particularly benefit[294]. In Australia the Northern Shoalhaven Reclaimed water management scheme has been demonstrated to improve the long-term functioning and economic security of dairy farms compared to farms not receiving the re-used water[295].

[293] Virdis, A., Botti, P., Meloni, B. (2001). Public acceptance and education in irrigation projects: the Sardinian case study. In: Final Report of the CatchWater Project ENV4-CT98-0790, 627-649.

[294] Thomas, J.S. and Durham, B. (2003). Integrated Water Resource Management: looking at the whole picture. Desalination 156: 21-28.

[295] Shoalhaven Water (2004). REMS Annual management report 2003-04.

It should also be noted that re-used water may contain nutrients which are also of value to farmers. This is well recognised in studies on use of this water supply[296].

Alcon et al. (2011)[297] undertook a contingent valuation study of a representative population in the Segura River Basin in south eastern Spain. They found that the use of reclaimed water for irrigation had significant non-market environmental benefits (mean willingness to pay of €5.13 per month per household, with a total annual value of €23.3 million, or €0.31/m3 of water). The authors concluded that the non-market benefits of re-using water for agriculture justify its implementation, as they overcome the average treatment costs of €0.16-0.26 m3.

For water treatment companies the supply of re-used water can be less costly than other forms of water supply such as desalination. Anderson (2003)[298] found that average capital cost savings of between 15 and 20% are found and, in some cases, the cost savings can be up to 50%. Furthermore, where waste water discharges are subject to discharge or pollution fees, the diversion of the water to re-use results in cost savings. An example is the Braunschweig agricultural re-use scheme[299]. Hochstrat et al (2008)[300] argue that investment in water re-use is needed, but that this "can only make an impact when backed by a well defined framework for water reuse which is still missing on European level".

For industry, the supply of re-used water may be economic if it is cheaper than other sources and if there are reliability issues with those alternative sources. Standards are often triggering technological developments[301] and innovation which can secure jobs in a certain sector. For water reuse the affected sector would be the water sector in particular those companies developing water technologies.

Administrative burden

The economic impacts associated with the options on guidance or CEN standards are mainly associated with the administrative burden and costs of developing guidance or CEN standards at EU level.

[296] Muñoz, J. (2005). Maximitzacío del benefici ambiental en l'explotació d'una zona turística costanera. Proceedings of the Technical Workshop: The integration of reclaimed water in water resources management, 19-20 October 2005, Lloret de Mar, Costa Brava, Spain, 93-106

[297] Alcon, F., Martin-Ortega, Berbel, J. and de Miguel, M.D. (2011). Environmental benefits of reclaimed water: an economic assessment in the context of the Water Framework Directive. Water Policy, 14: 148–159.

[298] Anderson, J. (2003). The environmental benefits of water recycling and reuse. Water Supply 3(4), 1–10.

[299] Abwasserverband Braunschweig (2001). Reinigung und landwirtschaftliche Verwertung kommunaler Abwässer.

[300] Hochstrat, R., Wintgens, T., Melin, T., Jeffrey, P.J. (2008). Towards a European Water Recycling Policy. Water Practice & Technology 3 (2).

[301] http://kemp.unu-merit.nl/pdf/oecd.pdf

The majority of the administrative burden for CIS guidance falls at EU level but also on the lead Member States that coordinate to the guidance document. Due to the fact that several guidance documents in this area exists and considering the experiences made when developing other CIS guidance documents, the development of a new EU guidance can be assumed to be 9-18 months, depending on the level of ambition and the sectors covered. The administrative burden of the development of standards for use of recycled water in agriculture mainly depends on the duration of the development process. According to CEN[302], "*in order to develop standards within acceptable timeframes according to market needs and, at the same time, to guarantee sufficient time for consultation and consensus building, European Standards (ENs) are developed in a maximum timeframe of 3 years. In the case of Technical Specifications (TSs) and Technical Reports (TRs), the timeframe is 21 months and a half. This time starts to run once the Technical or Project Committee has taken the decision of registering the new work item*." However registered work items that fail to comply with the established timescale are automatically deleted from the CEN work programme. To avoid this, there is the possibility to request an extension of the timeframe of maximum 9 months, called tolerance. In specific cases (e.g. need for research before starting to draft the standard or where resources are limited) the kick-off of an official procedure can be pushed back.

The administrative costs of adoption of a Regulation are with the development of a legal regulation result from the administrative effort for development of law. Agreeing on threshold values can be assumed to be the same effort as for the CEN standard. However the agreement on a regulation might require the involvement of the Council which increases the administrative burden and might delay the negation process. Additional administrative burden can also be expected due to mandatory on site controls and additional reporting of the producers to the competent authorities in a MS, but also of the MS to the EU Commission.

The funding option would provide financial support from EU funds or EIB loans to reduce these impacts where spending is otherwise difficult or not available. Therefore, the option would enhance the delivery of water re-use where investment is a barrier. The exact nature of the economic impacts will depend upon the extent of Regional Fund spending and the particular circumstances of the locations where those investments are made. Funding through Cohesion Policy would deliver economic benefits from leakage reduction only in the Member States eligible for such funding. It is, therefore, not possible to set these out in detail. The timing of infrastructure spending can be an important factor in determining its efficiency and effectiveness. Delays, for example, can result in spending on short-term emergency repairs or smaller projects which are less cost-effective. Therefore, increased availability of funds can improve the economic efficiency of the spending of utilities, provided the finance is correctly prioritised and targeted. The option clearly has an impact

[302] ftp://ftp.cen.eu/cen/Services/Education/Handsonguides/Handsonstandards.pdf

on the EU budget. However, it does not impact on the level of that budget, but rather the priorities to which that budget is applied.

The funding option would have administrative costs on project preparation and appraisal. However, as with other projects supported by Regional Funds or the EIB, these costs are far outweighed by the value of these funds.

Implementation costs

The implementation costs for a treatment plant that allows direct re-use of the water depends on several factors including the type and load of water treated, the type of treatment, the type of technology used, the type of reuse and the level of treatment needed[303]. This applies for all options.

For developing CEN standards, costs might be linked to the costs for certification and recertification if the standard is applied. Depending on the level the standard is set (e.g. much higher as national requirements) higher investment costs for additional treatment requirements might be faced. However these additional costs can be earned back due to access to a new market.

The implementation costs of the regulation option are related to the administrative burden for implementing the regulation, but also to the upgrading of existing water treatment facilities. These costs can only be estimated when the details of the regulation are agreed.

Social Impacts

The social impacts of water re-use have to be considered in the context of wider water supply issues. The aims of the three options are all to increase the uptake of water re-use and, in this regard, the relative social impact of the options is directly proportional to their potential effectiveness addressed above. Where water resources are scarce or threatened by droughts, the supply of re-used water to agriculture or industry can result in a more secure supply of traditional sources to domestic users. This is not only apparent in high risk areas in southern Europe, but is also a driver for supply of re-used water to the energy sector in eastern England[304]. Furthermore, secure supply of water to leisure activities (e.g. irrigation of golf course) can be important in MS such as Spain for local communities and employment[305].

Where agricultural activity is secured by use of recycled water, employment benefits are an important social impact. For example in Almeria, Spain the use of re-used water for agricultural irrigation has increased crop production and this has resulted in 1 million

[303] http://ressources.ciheam.org/om/pdf/a66/00800302.pdf

[304] www.waternunc.com/gb/angliw08.htm

[305] Anderson (2003).

working hours of employment[306]. Furthermore, technical advances for water treatment infrastructure are important for employment in the water supply sector.

The social acceptance of water re-use is an important consideration in order to expand the use of this alternative water supply further. The type of activity for which the water is re-used plays an important factor. The re-use in agricultural food production might be low, while in the case of bioenergy cropping (the public might not be concerned at all. For example in Italy it has been reported that the reuse of water for producing "traditional food" is resisted by tourists[307]. Community acceptance reduces when re-used water comes closer to human contact or ingestion, for example, for use in the laundry for clothes washing[308]. Further colour and odour complaints from customers may arise making the re-use of water unacceptable to high quality water users[309] .

Alcon et al.[310]in a study in interviewing a representative population in the Segura River Basin in south eastern Spain found that the acceptability of the use of recycled water in agriculture is increased when the population is made aware of the costs of traditional supplies and the savings from re-using water.

The development of EU level CEN standard could also include a public participation process that could be used to lower public resistance against water re-use in particular in agriculture. It would help to minimize the negative associations consumers have towards water re-use in agriculture. Through the establishment of EU standards, coupled with awareness raising of thresholds limits, water re-use could become more common place and have less stigma attached to it. The development of a standard also foresees a public participation process that could be used to lower public resistance against water re-use in particular in agriculture.

The Regulation option would help be beneficial for farmers regarding the ability to use water that is less costly than water at drinking level quality. Farmers would be able to trust suppliers of treated water and know the quality of water they are receiving as well as for what crops the water could be used for.

For the funding option, the social impact would depend again on the level of those current impacts and the size and distribution of the funds available. Funding through Cohesion Policy would deliver social benefits from water re-use only in the Member States eligible for

[306] Thomas and Durham (2003). Integrated water resource management: looking at the whole picture. Desalination 156(1–3):21–283.

[307] See presentation of Francesco Mundo at the CAP meets WFD conference on the 18/19 of September 2008. http://www.ecologic-events.de/cap-wfd/conference3/presentations.htm

[308] Po, M., Kaercher, J., and Nancarrow, B. E. (2004): Literature review of factors influencing public perceptions of water reuse, Australian Water Conservation and Reuse Research Program, CSIRO Land and Water.

[309] http://eureau.org/sites/eureau.org/files/documents/20110829-EUREAU_PP_on_Water_re-use.pdf

[310] Alcon F, Pedrero F, Martin-Ortega J, Arcas N, Alarcon JJ, de Miguel M (2010). The non-market value of reclaimed waste-water for use in agriculture. Span J Agric Res 8.

such funding. It is, therefore, not possible to set these out in detail. However, the degree to which social impacts are affected by individual project choice could be included in the decision making for project selection through both Regional Funds and EIB loans.

Health impacts

Bartone and Mara[311] reviewed health impact studies and concluded that "epidemiological studies carried out over the past four decades have linked the uncontrolled use of untreated or partially treated water for edible crop irrigation to the transmission of endemic and epidemic diseases to farmers and crop consumers". They set out a series of detailed steps to protect public health from water re-use, including adequate treatment. Thus IWA (undated) concludes that "as yet, no reliable epidemiological evidence of disease outbreaks caused by adequately recycled water has been reported". However, Ayuso-Gabella et al.[312] examined the health impacts from recharging of aquifers with recycled water for the purposes of agricultural irrigation through four case studies in Australia, Israel, Italy and Spain. The risk to humans was assessed for three different types of exposure to microbes in the recycled water: farm-workers could accidently inhale particles of the water, local residents could accidently inhale the particles and consumers could be exposed when they ingest the crops irrigated with reclaimed water. They found that, except for the site in Italy, risks were acceptable and that this would be acceptable if the irrigation method was changed to drip irrigation.

Blumenthal et al.[313] noted that there are different ways to establish microbiological quality guidelines and standards for treated water re-use in agriculture:

- The absence of faecal indicator organisms in the water,
- No measurable excess cases in the exposed population, and
- A model generated estimated risk below a defined acceptable risk.

Different types of health protection standards are in place in different regions globally, such water quality requirements, obligations on levels of treatment, etc, including standards established by the WHO[314], which considers the wider health protection issues with water

[311] Bartone, C. and Mara, D. (2010). Improving Wastewater Use in Agriculture: An Emerging Priority. World Bank, Washington.

[312] Ayuso-Gabella, N., Page, D., Masciopinto, C., *et al* (2011). Quantifying the effect of Managed Aquifer Recharge on the microbiological human health risks of irrigating crops with recycled water. *Agricultural Water Management*. 99: 93-102.

[313] Blumenthal, U. J., Peasey, A., Ruiz-Palacios, G. Mara, D. and Saywell, D. (ed) (2000). Guidelines for wastewater reuse in agriculture and aquaculture: Part 1 - Recommended revisions based on new research evidence. LSHTM/WEDC: London/Loughborough.

[314] WHO (2006). Guidelines for the Safe Use of Wastewater, Excreta and Greywater, vol.II Wastewater Use in Agriculture. World Health Organization.

re-use, such as the nature and performance of the installation, consumer behaviour and local environmental issues.

The impact of the re-use of water on public health can be countered by[315]:

- Reducing or eliminating concentrations of pathogenic bacteria, parasites, and enteric viruses in the reclaimed water.
- Controlling chemical constituents in reclaimed water.
- Limiting public exposure (contact, inhalation, ingestion) to the water.

The US EPA concludes that public health exposure varies with each use of re-used water and, therefore, all proposed projects should be subject to risk assessment and that "where human exposure is likely in a re-use application, reclaimed water should be treated to a high degree prior to its use".

IWA (undated) concluded that "emerging contaminants, in particular endocrine disruptors and pharmaceutically active chemicals, are becoming a concern" for health protection. However, IWA (undated) further concluded that the right treatment can address these pollutants. RECLAIM WATER[316], for example, found that advanced water treatment technology with ultrafiltration and reverse osmosis produces water of drinking quality fully depleted of pathogens and it is not a source of diffusion of antibiotic resistance gene in the environment.

Therefore, the health impacts of the re-use of water depend upon the conditions imposed on the treatment and subsequent use of that water. Guidance and the CEN standard options both aim precisely to establish the standards necessary to protect health at a European level. The strong instrument of a Regulation would be more likely to achieve this health protection outcome than a weaker voluntary instrument.

Environmental impacts

The aims of the options are all to increase the uptake of water re-use and, in this regard, the relative environmental impact of the options is directly proportional to their potential effectiveness which is addressed above. Note that health impacts are addressed in the section on social impacts.

The objective of the options is to allow for the provision of an additional water source, inter alia, to reduce pressures on surface and ground waters. Therefore, for water resource, the most important impact is a reduction in the withdrawal from natural systems, reducing low

[315] US EPA (2004). Guidelines for Water Reuse. EPA/625/R-04/108. U.S. Environmental Protection Agency, Washington. http://www.epa.gov/nrmrl/wswrd/dw/smallsystems/pubs/625r04108.pdf

[316] RECLAIM WATER (2009). Water Reclamation Technologies for Safe Artificial Groundwater Recharge. Project no. 018309. Publishable Final Activity Report.

flows, etc. Furthermore, where the re-used water is supplied directly for irrigation or other uses, it is not longer discharged into surface waters and, thereby, there is a reduction in the discharge of pollutants to these waters. The degree of reduction in pollution would depend upon the level of treatment that would be required. Both impacts contribute to maintaining or enhancing the ecology of surface waters and their chemical quality for human uses. The impacts, therefore, contribute to the objectives of the Water Framework Directive.

A particular benefit of reducing abstraction of ground waters by use of re-used water is to reduce the potential for saline intrusion in coastal areas. For example, in Bajo Andrax (Almeria, Spain) over abstraction of groundwater led to an increase in the salinity of those resources, but re-use water has reduced the pressure on those resources, which has led to a reduction in salinity (Thomas and Durham, 2003). Thus the impact of the re-used water is to protect the quality as well as quantity of the groundwater.

Increasing the security of water supply for economic activities in water scarce areas is an important part of any national, regional or local strategy to adapt to climate change. Where climate change is predicted to result in reduced, or more disrupted, water resources, alternative supplies of water are an important adaptive response. Note that this is also true of adaptation to other changes, such as population growth in coastal areas of the Mediterranean.

It is also important to note that water re-use can contribute to the restoration or creation of wetlands. Constructed wetlands can be used to contribute to water treatment prior to re-use and such wetlands can have significant biodiversity benefits for a wide range of different species of all types of biota[317].

The avoidance of pollution of surface waters arising from the diversion of discharges can be important. Pollutants of particular concern from waste water discharge include the nutrients, nitrogen and phosphorus, and while removal of these in treatment works is expensive, their diversion for agricultural use provides the nutrients as a valuable resource to farmers. Avoidance of nutrient pollution avoids eutrophication, which is a major threat to surface waters and one of the main reasons many of Europe's water bodies are not at good status.

For the funding option the exact nature of the environmental impacts will depend upon the extent of which projects are funded by the Regional Funds and the particular circumstances of the locations where those investments are made. Funding through Cohesion Policy would deliver social benefits from leakage reduction only in the Member States eligible for such funding. It is, therefore, not possible to set these out in detail, but they will depend upon:

[317] Brawley-Chesworth, A. and Kinshella, P. (2005) Constructed Wetlands: Treatment or Reuse? Water Reuse Symposium, Denver Colorado.

- The overall amount of funds available (in which this priority would be set).
- The priorities given to leakage in the planning decisions by Member States to direct the overall spending of eligible funds.
- The availability of co-finance.

The funding option does not seek to displace other important environmental priorities. For example, Regional Funds support other priorities to deliver environmental improvements in the water sector (including within this IA options of NWRMs and leakage reduction) and, therefore, the extent of funds available for projects for water re-use would need to take account of these priorities and this would be reflected in the level of environmental impacts that this option would deliver.

It is important to note that the water re-used for irrigation, etc., will probably require different levels of treatment to that for discharge to surface waters (which may be stricter or less strict). Water treatment uses energy, so if increase treatment levels are required, this would have consequences for the overall energy usage, greenhouse gas emissions, air pollution, etc., depending on the type of energy used. These impacts would, however, be small compared to the impacts on water quantity and quality.

The environmental impacts of the individual options would arise from the implementation of individual water re-use projects. The introduction of European level standards for water re-use would be aimed at health and environmental protection. Such standards would enhance the likelihood of increased use of re-used water, although this (and the environmental impacts) would be greater through the use of a Regulation as this delivers the market confidence necessary to justify increased investment. The funding option would deliver the environmental impacts in locations and to the extent that funding is made available.

9.8 Further options for consideration after publication of the Blueprint

The first three options analysed in this IA concern a range of options for developing EU level standards for water re-use directly from treatment plants to the user. However, the purpose of EU intervention on this issue is to ensure common protection of the health of EU citizens and operation of the internal market. The logic of this intervention could, however, be applied to:

- Water abstracted from ground water sources which have been recharged with water (treated or not) from waste water treatment plants or other sources.
- Water abstracted from rivers which have received (upstream) discharges from waste water treatment plants.
- Irrigation water from all sources.

For example, EU-wide standards for the quality of all irrigation water including that from water re-use would ensure that all irrigated crops are irrigated with water to the same minimum quality and that crops irrigated from treated water are not at a commercial disadvantage from those grown with water abstracted from rivers into which waste water may be discharged. Such standards may be set in a voluntary way or as an EU Regulation as with the options explored in this IA.

The impacts of adoption of standards for all water used in irrigation would potentially impact on all areas where irrigation takes place. The extent of the impacts would, further, depend on:

- The specific standards adopted in any EU Regulation.
- The extent to which such standards are not currently met by irrigation water.

Assessment of the latter issue is complicated by the very limited monitoring of irrigation water quality at present, as well as surface water sources for some health contaminants.

The extent of irrigation is set out by the EEA[318] (20102) and Wriedt et al (2009)[319] (Figure 14). The total area equipped for irrigation (total irrigable area) in EU-27 in the year 2003 accounts for 16 million ha on a total of 182 million ha of agricultural land. The majority of irrigated areas are concentrated in the Mediterranean region. France, Greece, Italy, Portugal and Spain account for 12 million ha corresponding to 75 % of the total area equipped for irrigation in EU-27. However, irrigation is important in selected locations in many Member States. For some northern countries irrigation is selectively used when there are dry summers, while in many southern Member States irrigation is a necessary aspect of agricultural production. There has been some trend to reduce irrigation (due to economic transition in the east, more efficient methods and re-use of water) (Figure 15).

[318] EEA (2010). Use of freshwater resources (CSI 018) - Assessment published Dec 2010.

[319] Wriedt, G., van der Velde, M., Aloe, A. and Bouraoui, F. (2009). A European irrigation map for spatially distributed agricultural modelling. Agricultural Water Management, 96: 771-789.

Figure 14: European irrigation map (EIM) – irrigation intensity in the EU as irrigated area in % of total area (source: Wriedt, et al, 2009).

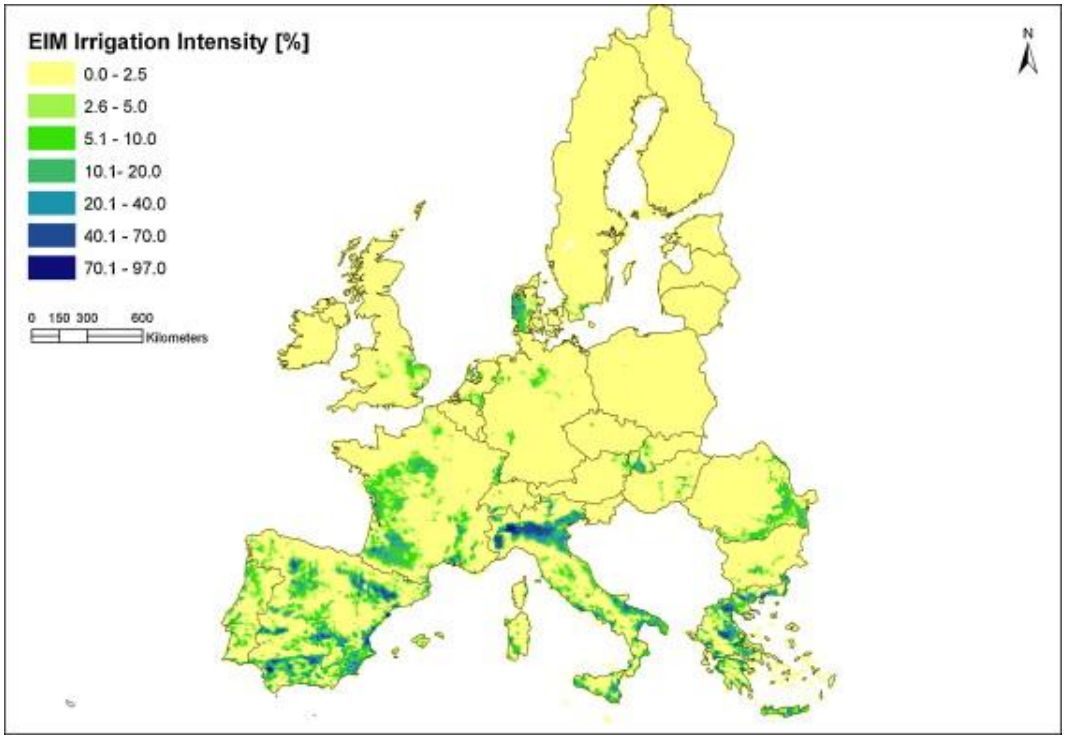
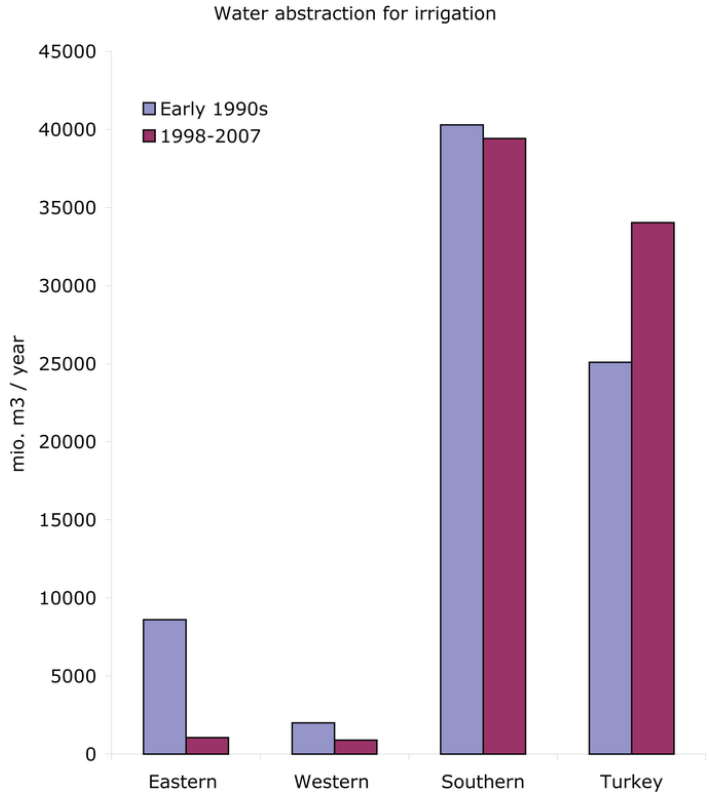


Figure 15: Water abstraction for irrigation (million m3/year) in early 1990s and 1998-2007 (source: EEA, 2010).



Further analysis subsequent to the publication of the Blueprint could explore, therefore, explore several sub-options covering different sources of irrigation water. The impacts (positive or negative) of the options would be more widespread than those focused on re-used water alone.

9.9 Conclusions

All options aim to achieve the same objective – to enhance the re-use of water. The main impacts of the options are compared in the table below. It is important to note that on most economic, social and environmental issues, the impacts of all options are positive – the main negative impacts arising from the burdens to administrations of developing and implementing the options. However, practical implementation of re-use schemes is overwhelmingly positive (see TYPSA[320] for main drivers on reuse).

All of the environmental, social and economic impacts are strongly dependent on the extent to which the options would deliver change. The impacts are, therefore, directly proportional to the extent to which the different options would be effective in delivering the objective. The analysis of effectiveness shows that regulation would be more effective than either voluntary option and that funding would also be effective in those areas of the EU eligible for EU funding. As water reuse is not a new issue and considering the fact that some national and international standards exist, it is not clear what the impact of a voluntary standards regime at EU level would be. In contrast the impact of a Regulation is clear and the positive impacts set out here would be achieved. Funding would also be a strong driver to deliver these benefits and this could be taken forward in parallel with either a voluntary or regulatory approach to setting standards.

In assessing the options, it is important to consider how well they contribute to achieving the objectives for water re-use set out earlier.

With regard to the objective to help overcome the barrier of resistance to re-use of water by developing common standards in Europe to ensure re-used water presents no risks to health, so providing a sound basis for investment by business. The options developing EU level standards all contribute to this objective. However, only a full regulatory (strong legal) approach can ensure the objective is met. Furthermore, the establishment of EU-wide standards has been shown to have positive economic, social and environmental impacts. However, all of these impacts are greatest with a regulatory approach.

[320] TYPSA (2012). Industrial Desalination and Water Reuse: Ultrapure water, challenging waste streams and improved efficiency.

Health impacts are relevant in the context of water reuse, and depend upon the conditions imposed on the treatment and subsequent use of that water. In this context, a binding regulation is likely to achieve this health protection outcome than a voluntary instrument.

With regard to the objective to help overcome the barrier of insufficient investment in water re-use by prioritising funding for water re-use schemes within appropriate EU level financial instruments, the funding option delivers this objective. It is not able to overcome all of the investment constraints within the EU for re-use of water. However, the objective is to heighten the importance of re-use within EU funding for environmental protection and this is delivered by the option.

In conclusion, there is a strong case to explore two options – development of an EU regulation for water re-use standards and to prioritise water re-use in EU funding instruments. The exact nature of impacts would need to be determined in further analysis, such as when specific regulatory standards are proposed. At this stage it will also be appropriate to consider whether a regulatory approach would be more widely applicable to setting quality standards for other irrigation water sources. This would be a task after publication of the Blueprint.

Table 24. Summary of the impacts of the options to address re-use of water.

Note that the two non-binding options are treated together for ease of comparison within the table.

Description of the option	Option 7a1 Develop EU guidance on certification schemes for water re-use Option 7a2 The Comité Européen de Normalisation (CEN) to adopt standards for use of recycled water.	Option 7b An EU Regulation establishing standards for water re-use.	Option 7d is to prioritise spending of Regional Funds and EIB loans on sustainable water management which could include support for treatment and/or distribution of water for re-use.
Effectiveness towards specific Objective	+ Re-use can contribute to meeting the WSD policy, by reducing barriers to re-use, providing a firmer basis for confidence in investment by water companies and farmers. However, being voluntary, there is no guarantee that other MS will not erect barriers to marketing of agricultural products re-using water. Therefore, cost reduction cannot be guaranteed. The voluntary standards do not require re-use where it is not needed. If used, they might result in improved treatment with costs. Alternatively, they could reduce treatment costs if current standards are too strict.	++ A Regulation would be directly applicable in all MS. It would affect treatment conditions only in MS/regions where re-use is part of a strategy for water scarcity management. However, the standards would apply in all MS with regard to the quality of agricultural products imported from MS which re-use water. A Regulation would fully remove barriers to trade in the internal market, which would result in significant reduction in costs for the water industry and agriculture sector. The option would contribute to meeting the WSD policy. A Regulation would speed up implementation significantly.	++ Regional Fund investment would be applicable only to those areas eligible for the funds, whereas EIB loans are applicable across the EU. Investment would only proceed where it is locally identified as appropriate as part of a scarcity strategy. The option can speed up implementation in those parts of the EU which are water scarce and are currently significantly affected by the economic crisis and public spending and private investment restrictions.
Effectiveness towards other specific objectives	++ The option does not impact on use of economic instruments. Guidance and standards would improve knowledge base and have a limited positive governance outcome.	#=+ The impact is the same as options 7a1 and 7a2.	+ In so far as funding is an economic instrument, the option promotes this objective. It has no impact on governance or knowledge base objectives.
EFFICIENCY	≈/+ Guidance is not so costly to develop and as Regulation. The development of a CEN standard would be more expensive than guidance.	+ The development of a Regulation is a bit more expensive than a CEN standard due to adoption issues.	-/≈ The provision of EU funds and EIB loans is efficient administratively. With regard to specific objectives, efficiency will depend upon detailed project criteria and their assessment.
COHERENCE	≈ Guidance would improve common understanding with a limited impact on coherence. CEN standards would be stronger in this regard, but by individual treatment plants is still voluntary.	≈/+ The option would ensure that all relevant water reuse standards are coherent and applied equally across the EU.	Not relevant.

ACCEPTABILITY	+ Results of public consultation: developing guidance on certification schemes for water re-use was supported by 40% of respondents (33% 'No'). The use of CEN standards received slightly less support (about 38%): for this option, however, almost a similar share replied 'Do not know' and 25% 'No'.	+ Results of public consultation: A proposal for an EU Regulation establishing standards was supported by 42% (31% 'No'). Within the Fitness Check stakeholder workshop there was strong support from industry (and other) stakeholders for an EU Regulation on this issue.	≈/+ The public consultation did not include this option. However, there was significant positive support for use of EU funds in the problem on leakage and it can be assumed a similar view would prevail on this issue.
Environmental Impacts			
Ecological Status	≈/+ The impact is via reduction in use of surface and ground waters by providing an alternative water source, so assisting in achieving good status. The voluntary nature of the option may not provide sufficient incentive in some cases, but the option may contribute partially to the objective.	+ The impact is by the same mechanism as options 7a1 and 7a2, but the Regulatory nature of the option will provide a stronger investment incentive, so the impact on ecological status will be more widespread.	+ The impact is by the same mechanism as options 7a1 and 7a2, but would only occur in areas eligible for the respective EU funds.
Water Stress	≈/+ The impact is via the same mechanism and to the same degree as that for ecological status (above).	+ The impact is via the same mechanism and to the same degree as that for ecological status (above).	+ The impact is via the same mechanism and to the same degree as that for ecological status (above).
Vulnerability to extreme events	≈/+ Farmers re-using water are less vulnerable (and other users from knock-on effects). The extent of impact of the option is limited by its voluntary nature.	+ Farmers re-using water are less vulnerable (and other users from knock-on effects). The extent of impact of the option is greater than S1 because it is mandatory across the EU.	+ Farmers re-using water are less vulnerable (and other users from knock-on effects). The extent of impact of the option is in those areas eligible for funding.
Other impacts[321]	-/≈ Treatment would use energy so having limited GHG emissions and possible air quality impacts. Re-use provides a basis for climate adaptation in some localities. Knock-on benefits from water protection (see above) for biodiversity. However, these impacts are limited by the voluntary nature of the option. No important other environmental impacts.	-/≈ Same impacts as options 7a1 and 7a2, but the regulatory nature of option 7b would result in stronger impacts.	-/≈ Same impacts as options 7a1 and 7a2, limited to those areas eligible for receipt of funds.
Economic impacts			
Functioning of the internal market and competition	≈/+ The option aims to reduce barriers in the single market through common action, but MS do not have to implement the standards and could erect barriers to movement of	++ The option, being EU Regulation, would ensure a level playing field for agricultural products (and waste water) across the EU single market, removing potential	≈ The option has no impact on the internal market, although funding and investment would support waste water treatment

321 The climate, Transport and the use of energy, Air quality, Biodiversity, flora, fauna and landscapes, Soil quality or resources, Land use, Renewable or non-renewable resources, The environmental consequences of firms and consumers, Waste production / generation / recycling, The likelihood or scale of environmental risks, Animal welfare, International environmental impacts

	agricultural products.	MS barriers. It provides a sound investment basis for water treatment and distribution to irrigation.	facilities and distribution.
Specific regions or sectors	This option is not specifically directed to any regions. + The option impacts positively on the agricultural, horticultural, food industries and water industry sectors by providing market certainty. However, being voluntary, the option may not deliver the market conditions necessary for the desired impacts.	This option is not specifically directed to any regions. ++ The option impacts on same sectors as options 7a1 and 7a2. This option, because of its regulatory nature, has a stronger impact than option options 7a1 and 7a2.	+ This option has a direct regional impact due to the eligibility of regions for access to Regional Funds. ++ The option impacts on the agricultural, horticultural, food industries and water industry sectors through project support which might not otherwise have taken place.
SMES	+ The SMEs affected are farmers/horticulture and small food handling (and processing companies) by securing water supplies. Being voluntary the impact of options 7a1 and 7a2 is less than option 7b.	++ SMEs and reasons affected same as options 7a1 and 7a2. Being mandatory the impact of option 7b is greater than options 7a1 and 7a2.	+ SMEs and reasons affected same as options 7a1 and 7a2. Impacts will occur for SMEs in regions eligible for funding.
Administrative burdens on businesses	-/≈ Utilities will need to demonstrate that they meet the voluntary standards for water treatment with minor compliance burden.	-/≈ Utilities will need to demonstrate that they meet the mandatory standards for water with minor compliance burden.	The option does not impact on this issue.
Other [322]	-/≈ There would be some burden to public bodies to oversee correct application of voluntary standards. ≈/+ For consumers and households, the option aims to provide confidence to consumers that agricultural products are safe and to avoid confusion by use of different standards across EU. Being voluntary, the option would be unlikely to impact across the EU. There is no impact on third countries, other than potential to lead in development of standards. There is no impact on property rights, or macro-economic environment.	-/≈ There would be some burden to public bodies to oversee correct application of mandatory standards. ≈/+ For consumers and households, the same objective as for options 7a1 and 7a2 applies, but for option 7b the binding Regulation would ensure all MS have the same standards so confidence is increased. There is no impact on third countries, other than potential to lead in development of standards. There is no impact on property rights, or macro-economic environment.	-/+ Public authority costs are only associated with preparing project bids. These costs are small compare to the funding/loan values. There is no impact on consumers and households property rights, third countries or macro-economic environment.
Social impacts			
Employment and labour markets	≈/+ Water re-use may maintain agricultural employment in some water scarce areas. As the option is voluntary, the impact is lower than for option 7b.	+ Water re-use may maintain agricultural employment in some water scarce areas. As the option is mandatory, impact is greater than for options 7a1 and	+ Water re-use may maintain agricultural employment in some water scarce areas. The option would have a strong impact where

322 (Competitiveness, trade and investment flows , Public authorities , Property rights , Innovation and research , Consumers and households , Third countries and international relations , Macroeconomic environment)

		7a2.	spending is provided.
Social inclusion and protection of particular groups	≈/+ The option does not affect social inclusion or particular groups unless they are specifically related to the agricultural labour market (see above).	Same as options 7a1 and 7a2.	Same as options 7a1 and 7a2.
Public health and safety	-/≈ Re-use of water presents a potential risk to public health by possible introduction of pathogens to agricultural products. The option introduces standards to address this, but voluntary application is not guaranteed.	-/≈ Re-use of water presents a potential risk to public health (see options 7a1 and 7a2). The option would introduce mandatory standards to address this.	≈ The option is neutral on this issue, although it is expected that EU funds would only be provided to re-use projects that meet the necessary standards.
Other [323]	+ **Culture:** In water scarce areas, the option may allow for the maintenance of traditional rural societies which might otherwise decline. Being voluntary, the option would have limited impact. Other social issues are not relevant.	++ **Culture:** (see options 7a1 and 7a2). Being mandatory, the option would have greater impact. Other social issues are not relevant.	+ **Culture:** In water scarce areas, the option may allow for the maintenance of traditional rural societies in those areas eligible for funding. Other social issues are not relevant.

323 (Standards and rights related to job quality, Gender equality, equality treatment and opportunities, non -discrimination, Individuals, private and family life, personal data, Governance, participation, good administration, access to justice, media and ethics, Crime, Terrorism and Security, Access to and effects on social protection, health and educational systems, Culture, Social impacts in third countries)

10 GOVERNANCE

10.1 Introduction and problem definition

Effective governance is a necessary pre-condition to achieving the protection of Europe's waters and without effective governance the issues addressed by the other themes in this report will not be taken forward. To develop robust targets for water management requires integrated decision making and delivering those targets requires strong institutions. Economic instruments also require a strong institutional framework. In all Member States the management of land (where application of many technical measures will occur) is administratively complex and, therefore, it is important for river basin management to have a strong administrative foundation to engage in this spatial dimension to decision making.

Without effective and efficient governance the objectives of EU water policy will not be achieved. That policy sets out a range of different functions that constitute effective governance, including:

- Integrated management of waters.
- Assessment of the state of waters.
- Planning.
- Development of measures.
- Stakeholder participation.
- Monitoring.
- Reporting.

To understand whether river basin governance is effective it is necessary to understand all four of these elements. A seemingly fragmented administrative structure may on the surface seem undesirable, but good co-ordinating processes may ensure the 'system' works. In contrast a new single wide-ranging river basin authority might seem ready to deliver effective implementation, but it might have a serious lack of resources to achieve this.

This section takes the form of a scoping assessment of the governance challenges facing different aspects of Europe's waters. These problems can each have their own options to address them, so that the options developed here should not be viewed as alternatives, but complimentary to improving governance. The *Comparative Study of Pressures and Measures in the Major River Basin Management Plans in the EU* (Pressures and Measures study) is providing an in-depth analysis of RBMPS submitted by Member States to examine Governance and Legal Aspects, Development of methodologies, Integration in the WFD Programme of Measures, and Economic Aspects and Integration. As this report is being finalised, the Pressures and Measures study is also concluding, so that conclusions regarding governance are included here.

There are significant governance challenges for the implementation of EU water law and policy in the MS. The Commission concluded in its Communication on improving the delivery of benefits from EU environment measures: building confidence through better knowledge and responsiveness (COM(2012)095) that "Delayed or inadequate implementation has many negative consequences. It ultimately harms the environment and human health, generates regulatory uncertainty for industry and puts in question the level playing field of the Single Market". Improved governance, therefore, delivers improved implementation of EU water law.

The scoping study to support the Fitness Check of EU freshwater policy sought stakeholder views on co-operation between public authorities for river basin management. Public water authorities stated that co-operation is mainly active (61%) within different administrative units in the same Member State and (44%) between Member States managing the same International River Basin District. Despite the positive feedback on co-operation, 63% of Public Water Authorities consulted still highlighted that there remains barriers to co-operation[324]. Amongst others, governance arrangements, lack of human and financial resources and cultural differences were mentioned.

The SCENES project also provided some conclusions relating to river basin governance in selected regions, including that insufficient governance capacity threatens the achievement of WFD objectives, there can be a lack of coordination of relevant bodies in the management of river basins and that co-ordination between different authorities needs to be developed in order to enhance the integration with sectoral policies[325].

The IMPEL report on the interactions between the WFD and IPPC also considered the institutional interaction between water authorities and pollution control authorities in meeting the objectives of EU water law. It found that the institutional relationships between the authorities vary enormously between Member States[326],[327]. It is important to put procedures in place to facilitate ways of working together to ensure that the right information is shared and timely so that management decisions are more robust.

In conclusion, the capacity for water governance is a challenge in some river basins. Measures to support Member States in more effective water governance would be appropriate.

[324] Volkery, A.; Geeraerts, K.; Farmer, A.; Merlino, C.; Chalsège, L.; Vandresse, B.; Da Silva Gaspar, L. & Ursachi, D.; (2011). Support to Fitness Check Water Policy.

[325] Cherrier, V. & Farmer, A. (2010). Draft Collection of Policy Messages. SCENES 6FP Project. Water Scenarios for Europe and for Neighbouring States. M5.14.

[326] Farmer, A. & Cherrier, V. (2010). Linking the Water Framework Directive and the IPPC Directive, Phase 1. IMPEL, Brussels.

[327] Farmer, A. & Cherrier, V. (2011). Linking the Water Framework Directive and the IPPC Directive, Phase 2. IMPEL, Brussels.

Binding nature of RBMPs

A particular concern is whether RBMPs and POMs they contain are or will be implemented – an aspect of how effective those plans will be. Within this question is that of whether the objectives and actions in a RBMP are binding on other governmental decisions, such as other aspects of land-use planning. The Pressures and Measures Study (forthcoming) has examined the legal status of RBMPs and POMs in the Member States. The type of legal effect found was:

- Administrative decisions related to water should 'take into account' the RBMP: 10 Member States.
- Administrative decisions related to water should conform to or be compatible with the RBMP: 9 Member States.
- There is no specific provision on status. The RBMP is rather considered as a general planning document with limited legal effect: 8 Member States.

In the majority of the Member States, the RBMP/PoM is approved by the Government or the Council of Ministers and would usually impose rules upon the ministries and other governmental bodies. The study concludes that the notion of a 'binding' document is unclear and the analysis of the legal contexts shows very different situations, linked to the variety of legal traditions and approaches.

For example, the study concluded that for land use and spatial planning documents, it may be not reasonable to expect that RBMPs would simply take precedence over other planning documents. Overall, the effectiveness of RBMPs depends on the status of those plans and the institutional relationships between water managements and other relevant authorities.

In conclusion, with regard to the binding nature of RBMPs there is clearly an issue that needs to be addressed to ensure that the measures contained in the plans are carried out and objectives and met by other governmental actions.

Implementation and enforcement

Implementation and enforcement of RBMPs also concerns the operation of the administrative processes for compliance control activity. The scoping study to support the Fitness Check addressed the issue of enforcement. It noted that variations in enforcement, including deficiencies, reflect legal, political, economic and cultural differences in the Member States. In particular, enforcement problems may arise from problems of "spatial fit" and "institutional interplay", i.e. the degree to which the intended objectives of European policies match with the policy objectives, interests and administrative capacities as well as vested interests of policy stakeholders at a national and local level as well as how far enforcement Examples of the first type of law include the Nitrates Directive, UWWT Directive and Dangerous Substances Directive (DSD). The second type of law is exemplified by the WFD, particularly in the elaboration of supplementary measures within POMs. The

third includes those which set specific environmental quality objectives. The BWD is an example. Enforcement is an important practical requirement of the Nitrates Directive. The latest, 2011, Commission report on implementation (SEC(2011)909) did not comment on enforcement activity specifically. However, it did state "The majority of farmers subjected to control showed a high compliance with the measures of the action programmes. However, the following difficulties in implementing the action programmes and in order to reach this conclusion (both on levels of compliance and problems encountered), reasonable levels of inspection activity would need to have been undertaken.

The Commission also published its latest report on the implementation of the UWWT Directive in 2011 (SEC(2011)1561). This reported noted progress in application of the Directive and noted implementation problems. However, the report does not consider whether these implementation failures are due to insufficient enforcement. However, all experience of the history of the challenge of implementation of the Directive indicates that implementation failure is due to problems of delivering investment to upgrade or install new waste water treatment works.

The principle EU water law of concern in relation to enforcement is the WFD POMs. The nature of the enforcement activity will depend on the measures themselves and to whom the measures apply. As these measures will be adapted to the particular pressures placing good status at risk in each water body, a common systematic approach to enforcement for all RBMPs is probably not possible. At this stage it is clearly not possible to identify failures of enforcement in application of POMs. If such failures were to occur and their causes to be understood, then specific actions (at EU or Member State level) could be taken to address them. However, only as implementation proceeds and reviews are undertaken might failures of implementation linked to enforcement deficiencies be seen to arise.

The first IMPEL report on the interactions between the WFD and IPPC reached conclusions on enforcement relevant to the WFD. It stated that enforcement activity is critical to ensuring installations comply with permit conditions and the requirements concerning permits within POMs are fulfilled[328]. In particular it noted that the IED requires inspection to take account of the impact of installations on the environment and that this was a new provision introduced during the review of the IPPC Directive specifically to aid integration with EU water law. It noted that for some Member States, inspectors already take this broader approach, but for others this is a new departure (ibid). It will involve working with water authorities to determine if installations are impacting on water bodies. This requires inter-institutional relationships to be forged. A second IMPEL report found that many enforcement authorities' inspections did not focus on wider environmental impacts,

[328] Farmer, A. & Cherrier, V. (2010). Linking the Water Framework Directive and the IPPC Directive, Phase 1. IMPEL, Brussels

although there were important exceptions[329]. In some cases there was little interaction between enforcement institutions and water authorities, but there were also good practice examples of co-operation, such as formal agreements, use of common databases and joint inspections, along with regular meetings, etc.

The Pressures and Measures Study also addressed enforcement, but provides little in addition to that already set out here. However, it suggests several indicators that could be considered in an assessment of enforcement systems:

- Resources available for inspections, including staff and training.
- The number of inspections carried out, and follow-up action.
- Trends in the number of violations identified.
- Level of sanctions, and judgements whether they have a deterrent effect.

In conclusion, there is a need to work towards a better understanding of the challenges of enforcement of measures to implement EU water law and to support Member State authorities on this issue.

Transboundary river basin governance

Many river basins cross national boundaries. The pressures on water bodies in one Member State may arise in another. The need for effective transboundary co-operation and common approaches to water management has been a guiding principle in EU water law since the 1970s. Today, while a number of Directives reference transboundary co-operation or consultation, the two most relevant for freshwater policy are the WFD and Floods Directive.

The Pressures and Measures Study (forthcoming) has found that international RBMPs according to the EU WFD have been developed in 10 international river basins and that 47 international RBMPs are planned for development in international basins and sub-basins within the next WFD implementation cycles. The study concluded that levels of co-ordination vary with 11% having the highest levels of co-ordination, 68% high levels, 18% moderate levels and 3% with lowest levels. A range of joint activities were identified in the international river basins and sub-basins: the preparation of shared visions; the identification of significant water management issues; monitoring programmes and activities; shared databases; public participation activities; and financial cooperation.

The scoping study to support the Fitness Check of EU freshwater policy sought stakeholder views on transboundary river basin management. They overwhelmingly considered that cooperation among Member States of the same International River Basin District has been established or fostered as a result of the implementation of WFD and that this brought added value to water management to achieve the goals set by the EU Water Policy.

[329] Farmer, A. & Cherrier, V. 2011. Linking the Water Framework Directive and the IPPC Directive, Phase 2. IMPEL, Brussels

Stakeholders also considered that support such as EU guidance documents, management tools and incentives to carry out common projects would be useful in order to further enable trans-boundary cooperation. Within the Pressures and Measures study, results indicate that for all international river basins and sub-basins improved international coordination and cooperation were stated to be achieved through the EU WFD. This is indicated for 81% of the basins, whereas for 9% of the basins it is stated that the EU WFD brought along partial improvement.

Further evidence concerning transboundary co-operation is provided by UNECE's 2011 Second Assessment of Transboundary Rivers, Lakes and Groundwaters. This concluded that "cooperation on shared waters is generally advanced in Western and Central Europe[330]. However, in transboundary basins where international cooperation is less established and joint bodies/river commissions are less effective, implementation of the WFD has been limited to the national borders or, at the basin level, has mostly involved the preparation of separate national plans without real coordination and cooperation. Further efforts are needed to strengthen cooperation in the implementation of the WFD in transboundary basins. This is even truer for transboundary groundwaters, starting from the joint designation of transboundary groundwater bodies." (ibid). The report stated that "The WFD has had a major positive influence on water management and the protection of water resources in the sub-region, but is not by itself a sufficient basis for transboundary cooperation. This requires specific structures and institutions." (ibid). The positive conclusions of transboundary co-operation arising from implementation of the WFD were highlighted with respect to situations with pre-existing transboundary co-operative structures or processes. However, "in transboundary basins where international cooperation is less established and joint bodies/river commissions are less effective, implementation of the WFD has been limited to the national borders, or, at the basin level, has mostly involved the preparation of separate national plans without real coordination and cooperation." (ibid).

In conclusion, it can be seen that transboundary co-operation has begun and is predicted to increase. However, even with co-ordinating mechanisms, etc., problems can persist in agreeing objectives or measures to address individual pressures. Support to overcome these barriers would be beneficial.

The Pressures and Measures Study (forthcoming) has found that, in at least 21 Member States, RBMPs have some effect on land use and spatial plans. For example, river basin authorities must be consulted on land-use plans in at least 13 Member States. The role of SEA is also important in this context. In many Member States, RBMPs are subject to SEAs, and so are land use plans. The SEA process constitutes a useful framework to ensure consultation and involvement of the relevant authorities, including river basin authorities in land use planning.

[330] UNECE 2011. Second Assessment of transboundary rivers, lakes and groundwaters. UNECE, Geneva.

Strategic planning

Strategic planning is also considered to be necessary for sound implementation of WFD – Art 4.7 which exceptionally allows the deterioration of water status under strict conditions. According to Art 4(7)(d), alternatives for projects of better environmental options should be assessed at an early stage when better alternatives are available (e.g. alternative locations for hydropower stations). The requirements of Art. 4.7 for new hydropower include amongst others that there are no significantly better environmental options, that the benefits of the new infrastructure outweigh the benefits of achieving the WFD environmental objectives. Moreover, Article 4.7 of the WFD requires that all practicable steps are taken to mitigate the adverse impacts of new infrastructures on the status of water bodies and that the projects should have overriding public/societal interest and/or benefits to the environment and society. Within the WFD CIS policy paper on WFD and Hydromorphological pressures[331], one of the key recommendations was the development of clear guidance on authorisation procedures for hydropower in relation to the WFD. It recommends that Member States should establish pre-planning mechanisms, in which regions and municipalities allocate suitable and "no-go" areas for the development of different renewable energies. This is in line with the recommendation in the Communication on support of electricity from renewable energy sources (COM(2005) 627), that pre-planning mechanisms allocating suitable areas for new hydro-power projects should be developed on appropriate water stretches. This is also confirmed in the Meeting of Water and Marine Directors of the European Union, Candidate and EFTA Countries in Segovia, 27-28 May 2010 (Hydropower Development under the Water Framework Directive - Statement of the Water Directors).

In conclusion, this scoping of the problems facing the governance of Europe's waters has highlighted the following issues:

- The capacity for water governance is a challenge in some river basins. Measures to support Member States in more effective water governance would be appropriate.
- It is important to ensure that the measures contained in the plans are carried out and objectives and met by other governmental actions, such as by ensuring the objectives and/or measures in RBMPs are binding.
- There is a need for a better understanding of the challenges of enforcement of measures to implement EU water law and to support Member State authorities on this issue.

[331] WFD Common Implementation Strategy. (2007). WFD and Hydro-morphological pressures policy paper with focus on hydropower, navigation and flood defence activities, Recommendations for better policy integration.

- For transboundary water governance, even with co-ordinating mechanisms, etc. between Member States, problems can persist in agreeing objectives or measures to address individual pressures.
- The application of strategic assessment and planning for issues such as hydropower needs to be improved.

10.2 Baseline and justification for EU level action

The policy framework for water governance is already in place (WFD, FD, etc.) and competent authorities under all EU water directives have been identified. For the policy baseline, therefore, the expectation is not of new governance obligations, but of how well MS meet the current obligations and how this is expected to evolve. The WFD has proved to be a major challenge for water governance in many MS. Some MS have developed new structures for water management and others have adapted existing structures in implementing the WFD. Given that the Directive has been transposed (although a few non-conformity cases are still open) and that institutional structures that were deemed to be necessary by MS for its implementation would have been identified, created or modified at that time, further major structural change to institutions is unlikely due to implementation of the Directive alone (although public bodies may change for other reasons). As a result, whether structures contribute to, or inhibit, effective water management, these structures themselves are unlikely to change significantly.

As important as the institutional structures are, institutional processes and relationships are critical in determining whether governance is effective. Where public authority obligations are stable, those authorities tend to explore more efficient ways of delivering those obligations. If water governance bodies perceive problems of co-ordination with other bodies, including sectoral administrations, they are likely to seek to improve these relationships. Therefore, some improvement in co-ordination of functions is expected to occur as experience of implementing the WFD continues.

The effective enforcement of the provisions in EU law and the measures set out in POMs in RBMPs is critical to achieving the objectives of the WFD. With a limited number of new measures introduced in the first round of RBMPS, large numbers of measures will need to be introduced in later plans. Furthermore, measures will need to be applied to a large number of small sources of pressures, most notably individual farms. This will present major challenges for effective enforcement action due to the large number of regulated activities. It is possible that lack of adoption of some measures in the first RBMPs is related to specific governance challenges.

There is also a wide variety in the quality of transboundary governance. It is evident that the WFD has stimulated some improved cases of transboundary co-operation, but in others there are severe limitations. It is not possible to know whether cases where transboundary

co-operation is poor will 'catch-up' as the WFD continues to be implemented or whether there are systemic barriers that are likely to remain. A study on transboundary cooperation is currently underway which will clarify this issue.

In considering the future status of water governance in Europe, it is important to stress the potential impact of the current economic crisis. Public expenditure is being cut in many MS and public authorities are suffering from reduced budgets affecting staff numbers, equipment investment, etc. The consequences are expected to last several years and for some of the hardest hit MS, these impacts could have long-term consequences. Therefore, efficiency in the administration of water management is an important objective which will be given greater emphasis.

As a result, while it is reasonable to argue that previous implementation of the WFD has been a learning experience for MS authorities (whether on individual actions, transboundary co-operation, etc.) and future governance improvements might be expected, the economic crisis could reduce the effectiveness of governance in some cases. Thus support for key governance challenges through the Blueprint is even more important.

As effective governance is a necessary precondition for implementation of EU law, intervention on this issue is justified at EU level. However, EU water law does not prescribe institutional structures and many procedural and capacity issues, as this is a subsidiarity issue for the MS. Therefore, it is appropriate for EU level action to set out ways to support the institutions responsible for water management – enhancing their capacity and effectiveness. It is also appropriate to examine whether EU water law is clear as to the requirements on MS institutions and, indeed, of the Commission. It is in these areas, therefore, that options for consideration in the Blueprint are developed.

10.3 Objectives

The objectives for the Blueprint regarding governance, based on addressing the specific problems identified above, are:

- To enhance the capacity of authorities responsible for water management to deliver more effective and efficient river basin governance.
- To deliver more harmonised and effective governance of transboundary waters.
- To ensure strategic planning processes take full account of water management objectives.

These objectives contribute to the main operational objective of the Blueprint to achieve a more efficient water governance and effective working relationships between institutions, and fully integrate water quality, quantity and hydromorphology issues in management actions.

In taking forward these objectives for governance in the Blueprint it is important that there are SMART indicators for monitoring their progress and, therefore, whether the objectives have, or have not, been achieved. This will enable the success of policies to be determined and potential barriers (if they occur) to be addressed as policies are reviewed.

For the governance objectives, the following SMART indicators are proposed:

- The quality of RBMPs as determined by regular WFD compliance assessment.
- The levels of compliance of regulated entities subject to specific measures set out in PoMs.
- The proportion of RBMPs in transboundary waters where pressures and measures are agreed between Member States sharing the water bodies.
- The number of new hydropower plants that have been subject to EIA and (for strategic plans) SEA.

10.4 The options and their elaboration

Several policy options to address the problem of improving governance were developed to be considered within the Blueprint and subject to IA. These options were subject to a SWOT analysis (see Annex D). It is important to stress that EU water law does not prescribe particular structures or institutional arrangements. Therefore, the options set out here aim to support improved governance taking account of the subsidiarity context of the establishment and function of competent authorities in the MS.

As stated in the introduction, these options are not set out as alternatives, but as specific options which address each of the different governance problems that the scoping of the problems has identified.The options developed in this section can interact with other options to support improved water governance. For example, options to take forward a peer review process for competent authorities for water could, within peer reviews, examine procedures and practice for compliance assessment and enforcement.

Table 25 describes the options as originally developed in the project and submitted for the public consultation together with the final elaboration of options included within the IA, following further discussion with the Commission. The option on recommendations in the European Semester was removed as it is not appropriate for IA. It was considered that the Commission and CIS already share best practice and promote river basin management within the EU and in transboundary basins. Therefore, IA of such options is not needed. Options on a peer review process and the legal status of RBMPs are retained. The option on transboundary governance was not considered correct as it is difficult to change the legal position of national bodies. Therefore, an option for a stronger mediation role for the Commission has been introduced instead.

Table 25. The options originally considered and final options to address governance issues

Options originally considered	Final options for the IA
• On the basis of the Commission assessment of the River Basin Management Plans, the WFD CIS to identify and disseminate best practices in the EU. • To develop a peer review process for river basin district authorities within the context of the WFD CIS with a view to help them identifying ways of improving their coordinating role • Specific recommendations are considered for MS on water governance in the context of the European Annual Growth Survey for the European Semester • Develop initiatives on inspections and surveillance to improve the means of detecting and responding to water-related implementation problems such as over-abstraction • Continue to promote the river basin management approach and the implementation of the EU water acquis through EU enlargement policy and international rivers agreements • To amend the WFD to strengthen the coordination powers of River Basin District authorities and the obligations for combined River Basin Management Plans in transboundary contexts. • Enlarge the scope of the Strategic Environmental Assessment Directive to cover all hydropower development plans	• Option 8a: To develop a peer review process for river basin district authorities within the context of the WFD CIS with a view to help them identifying ways of improving their coordinating role. • Option 8b1. To ensure the measures set out in RBMPs necessary to meet the objectives of the WFD to be legally binding through an amendment to the WFD. • Option 8b2. Introduce a stronger mediation role for the European Commission in transboundary river basin management and that Member States must notify the Commission if they cannot agree a joint RBMP or elements in a plan – this requires a WFD amendment. • Option 8b3. Amending the SEA Directive to cover all hydropower development plans

The first option on peer review seeks to stimulate MS in supporting each other in exploring different aspects of governance. The second option on making measures in RBMPs legally binding addresses a particular problem that even when measures are set out in RBMPs, they may not be taken forward by the relevant authorities in all MS. The third option on a strengthened mediation role for the Commission in transboundary water management seeks to provide support in the particular situation of failure to agree on transboundary water management.

The options do not impose new requirements on MS. Rather they seek to help MS authorities to improve the implementation of existing obligations as well as other water objectives that may be nationally determined.

It is important to stress that while this section addresses governance specifically, other options explored in this IA also support improved governance. Effective governance requires sufficient knowledge and tools and options, for example on developing tools for water accounting and options for guidance, aim to improve governance capacity. Efficiency is also necessary for good governance and options to reduce burdens, such as streamlining reporting or improving cost benefit assessment in assessing measures in RBMPs, support this objective.

Peer review (option 8a) is the process by which a river basin district authority is reviewed by representatives of one or more water management authorities from other MS. The scope of the peer review can include any or all water management issues relevant to that authority including relevant aspects of EU water law.

A peer review process would require a central organisation, which in this case is the process of the Common Implementation Strategy. Funds for peer review also need to be provided.

Peer review is already an established practice in other areas of EU environmental law. This has been established by the IMPEL network of environmental enforcement authorities which generally focus on industrial environmental regulation and waste management issues. The IMPEL Review Initiative (IRI) has been in place for several years, has been reviewed and revised. It is this peer review example which provides the basis for cost estimates for assessment of this option set out below. IMPEL's review initiative was established in 2000 to test a "voluntary scheme for reporting and offering advice on inspectorates and inspection procedures". It was reviewed in 2003 after 10 peer reviews were undertaken. This noted limits to participation and it was improved. It was reviewed again in 2008 and further revised, providing a better focus and simplification of the initiative[332].

A previous study[333] analysed options to extend the scope of Recommendation 2001/331/EC providing for minimum criteria for environmental inspections, but this did not include extension to cover implementation of water law. It is also important to note that option 8a is related to the assessment of options for the improvement of compliance with EU environmental law being examined within the development of the 7th Environmental Action Programme, for which the following option is being examined: to extend the scope/content

[332] IMPEL (2012). Support for the new IRI scheme.

[333] COWI et al. (2011). Impact assessment study into possible options for revising Recommendation 2001/331/EC providing for minimum criteria for environmental inspections (RMCEI). Final report. ENV.G.1/FRA/2006/0073. June 2011.

of the IRI to cover other environmental inspection/surveillance activities (e.g. nature/water body sites, water pollution).

There is clearly an overlap between this 7EAP option and option 8a in the Blueprint. Therefore, there may be a need to integrate the options. However, the focus of the 7EAP option is to help MS authorities on compliance checking, while option 8a covers all aspects of governance, such as better mechanisms for stakeholder engagement and tools to make more cost-effective and efficient management decisions.

Option 8b1 is to ensure the measures set out in RBMPs necessary to meet the objectives of the WFD to be legally binding through an amendment to the WFD. The aim of this option is to address the problem that while, in some cases, a RBMP may set out measures to be applied to meet the objectives of the WFD, the measures that it contains may not be binding on other public bodies taking decisions within a MS. These may range from national bodies to local authorities. For example, the RBMP may include a measure or decision that a part of a flood plain should not be built on. However, if that is not binding on a local development authority, other interests may result in that decision being overruled.

The option does not introduce any new obligations to implement the WFD, nor does it seek to add to the measures that river basin authorities include in their RBMPs. Rather it aims to overcome a gap between decisions made to comply with EU law and the implementation of those decisions. An explanation of the context of the option and possible approach is set out in the following box.

The binding nature of measures in RBMPs under the WFD

The WFD does not state that the RBMP is itself binding. However, if the measures in the POMs are considered to be those necessary to meet the objectives of Article 4, then Article 4 states repeatedly '*Member States **shall** implement the measures necessary to*' [different objectives]. It could be argued, therefore, that MS are already obliged to implement "necessary" measures and this applies to all entities in a MS that might be responsible for a particular measure or that could potentially inhibit the implementation of a measure. However, checking compliance in practice might be difficult if the RBMP contains a mixture of necessary and additional measures and these are not distinguished.

Article 11 states "Each Member State shall ensure the establishment for each river basin district [..] of a programme of measures […] in order to achieve the objectives established under Article 4". Although there is not an explicit statement that the measures in the POM are the same as 'measures' referred to in Article 4 (and they are not separately defined in Article 2), the link is quite clear. I think that, if challenged, the legal interpretation would support this. However, there could be a case for clarifying this.

However, there is an issue concerning the Article 4 objectives and the interaction with measures. Article 4 states that the measures are those necessary **to meet the objectives**. If a measure in a

RBMP fails to be implemented, a MS could state that this is still fully compliant for two possible reasons:

- The failure does not result in an impact on status.
- The failure does impact on water status, but the objective for 2015 was "ambitious" and the MS looks to 2021 or 2027.

In such cases the measure(s) could not be considered 'necessary'.

Assuming that there is a need to clarify that measures are those referred to in Article 4, the following amendment to the start of Article 11 would make this fully explicit (additions in italics and deletions in strike through):

"Each Member State shall ensure the establishment for each river basin district, or for the part of an international river basin district within its territory, of a programme of measures, taking account of the results of the analyses required under Article 5, *that would constitute the measures necessary* ~~in order~~ to achieve the objectives established under Article 4 *as required to under that Article*."

For those who consider that the WFD already requires this, the amendment would make no change. For those who do not, the amendment would deliver the binding nature of measures.

Option 8b2 to introduce a stronger mediation role for the European Commission in transboundary river basin management requires a WFD amendment. The WFD currently requires MS to co-operate in transboundary river basin management and encourages MS to cooperate with third countries sharing an international river basin. In some cases, however, such co-operation has been limited and there are difficulties to agree on the objectives for water bodies and/or which measures need to be taken to meet those objectives. The current WFD text includes certain mediation functions, whereby a MS can request the Commission to act to facilitate the establishment of the programme of measures (Art 3.4) or where a MS can report a specific water management issue to the Commission which they cannot influence that may have an impact on the water status in their country, and upon which the Commission may act within 6 months. Where such disagreements exist, an amendment to the Directive would establish a mediation role for the Commission which one or other MS could call upon if mutual agreement cannot be reached.

It is important to note that this option proposes a strengthened mediation role for the European Commission, not an arbitration role. A mediation role seeks to bring parties (in this case Member States sharing a transboundary river basin) to a greater common understanding on the issues they face and attempts for the parties to reach agreement on specific issues. An arbitration role would also include some decision making on the disputed issues - this is not part of the option. Therefore, the option does not seek to force MS to take decisions or impose decisions upon them. This option does not change the objectives of the WFD.

The three options set out to address the problems relating to water governance each seek to contribute in different ways to improving governance. They are not contrasting or alternative options. None, one or all could be taken forward.

Note that options 8b1 and 8b2 involve an amendment to the WFD. Therefore, if these options are taken forward, a further IA accompanying the proposed amending Directive would need to be undertaken. This IA should, therefore, be viewed as a preliminary assessment.

Therefore, in taking forward these options, the wider policy context, acceptability and opportunities for legal amendment are linked to other options considered within this IA that would also amend the WFD.

Option 8b3 would be to enlarge the scope of the SEA Directive by amendment in 2016 in order to cover all hydropower development plans. More specifically, the scope of this option would introduce strategic planning for hydropower development on a river basin scale.

The protection and sustainable management of the aquatic ecosystems is the central aim of the WFD and the quality of surface waters is assessed on the basis of the biological community, the hydromorphological characteristics, and the chemical and physico-chemical characteristics. The overall goal, the good (ecological) status or potential, is defined as allowing only a slight variance from the biological community that would be expected in conditions of minimal anthropogenic impact.

In principle, the enforcement of the WFD has introduced an entirely new assessment methodology/ framework with new water quality criteria throughout European countries. Consequently, the enforcement and implementation of the WFD has impacted and will further impact on the possibility for development of the remaining hydropower potential.

Regulations, protocols, criteria catalogues etc. have been updated or introduced which take into account the WFD goals and requirements and a) define the rules for hydropower development and operation in European waters e.g. ‘no-go’ areas and b) delineate specific environmental mitigation measures for existing and future hydropower/dam schemes.

When applicable, the SEA Directive can help co-ordination and integration between the different policies in assessing the environmental consequences of plans and programmes and in producing an environmental report including consideration of reasonable alternatives. The Directive has formal and explicit links with the Habitats and EIA Directives, but it is also closely linked to other directives (Water, Nitrates, Waste, Noise and Air Quality

Directives) which contain requirements for the establishment and assessment of P&P in sectors covered by the SEA, and has relationship with the SEA Protocol[334].

The SEA and EIA Directives are to a large extent complementary: whereas the SEA is "up-stream" and identifies the best options at an early planning stage, the EIA is "down-stream" and refers to the projects that are coming through at a later stage. However, different areas of potential overlaps in the application of the two Directives have been identified, e.g. considering the unclear boundaries sometimes between what constitutes a plan, a programme or a project. In this regard, the definitions of some project categories listed in Annex II of the EIA in relation to changes in land use are not clear, and could create confusion with the SEA. The MS have chosen different approaches to resolve potential shortcomings resulting from overlapping procedures; these approaches range from joint procedures in specific cases to informal coordination between the competent authorities.

On the one hand, the assessment of the effectiveness of the SEA Directive has been based on the degree to which planning and programming procedures and decisions have been influenced by the integration of environmental considerations. A majority of MS particularly mentioned the contribution of the SEA to an improved organisation and structure of the whole planning procedure, regarding this as a positive element. In particular, the formal requirements of consultation with environmental authorities and the public have led to increased transparency in the planning procedures. On the other hand, the effectiveness is assessed according to the extent to which P&P were amended as a result of the application of the SEA procedure. The majority of the MS reports that, in many cases, SEA changed the content of the P&P. MS have identified a number of benefits of SEA, such as:

- The integration of environmental considerations into decision making and the "greening" of P&P.
- The introduction of participation and consultation of relevant public authorities; this facilitates and strengthens cooperation between different authorities (planning, environment and health).
- The increased transparency in decision making, due to the involvement of several levels of society.
- The contribution of SEA to improved compliance with the requirements of the specific environmental policy concerned.

[334] Protocol on Strategic Environmental Assessment to the UNECE Convention on EIA in Transboundary Context (Kiev, 2003). It was approved by Decision 2008/871/EC, OJ L 308, 19.11.08, p.33

10.5 Effectiveness, efficiency and coherence of the options

Option 8a on peer review addresses the shortcomings in governance that may result in incomplete, ineffective or inefficient implementation of EU water law and, in particular, the WFD. The primary Blueprint objective that this option seeks to address is to support full implementation of that Directive. However, improved governance supports all water management objectives, including improved efficiency and greater resilience to extreme events.

The option does not impose new requirements on Member States. Rather it seeks to help Member State authorities to improve the implementation of existing obligations as well as other water objectives that may be nationally determined. Therefore, many of the impacts that would derive from the option are those of existing law.

Peer review seeks to improve governance. A key outcome of improve governance is improved efficiency. Where water management authorities make inefficient decisions, lessons from other Member States through peer review may identify improved decision making methods and processes. In such cases the administrative burden of decision making can be reduced and particular emphasis can be given to the consequences for SMEs and consumers.

Furthermore, with public authorities under increasing pressure in this time of economic constraints particularly on public budgets, a sharing of more efficient working methods is likely to be a particular benefit. It has to be noted that the peer review process will require investment by the relevant authorities in personnel time. However, the lessons from IMPEL are that the benefits outweigh these costs.

Regarding the effectiveness of meeting the operational objectives of the Blueprint, option 8a contributes to the effectiveness of meeting all four objectives. On the objective to foster integration of water into sectoral policies, by ensuring that impact of socio-economic activities and regulations on the state of water resources is fully taken on board, the outcome of the option is improved efficiency and effectiveness of governance to implement EU water law. Amongst the issues that can be addressed in peer review can be a better understanding of the impact of socio-economic activities on water by water management authorities and a better understanding of options on how to address these, including improved co-operation between institutions responsible for water and those responsible for socio-economic activities. Thus not only is there a potential for enhanced policy integration, but also administrative integrated regarding sectoral policy management.

On the objective to increase the use of economic instruments for a better allocation of resources and internalisation of external costs, peer review can improve water management by identifying opportunities for the determination of appropriate use of economic instruments. The exact nature of the economic instrument and where these would be used would be the subject of individual peer reviews. In particular, peer review would enhance

exchange of experience on the use of economic instruments (opportunities and limitations) between Member States.

On the objective to achieve a more efficient water governance and effective working relationships between institutions, and fully integrate water quality, quantity and hydromorphology issues in management actions, it is important to note that the primary purpose of the option is to delvier more effective and efficient governance across the full range of water issues. Thus where Member State authorities have problems in the working relationships of institutions or integration of particular issues in water management decisions, these will be priority considerations in peer review analysis and development of recommendations. How far this objective would be addressed will depend upon which authorities are subject to peer review and how well they implement the resulting recommendations.

On the objective to improve knowledge and tools available to water managers, enabling effective decision making and reducing administrative burden, the option enables a sharing of knowledge and tools between Member State authorities, including on their effectiveness and appropriateness for different situations. Peer reviewed authorities can be exposed to new tools and ways of using the tools, improved ways of undertaking economic analysis, better methods for stakeholder consultation, etc. How far this objective would be addressed will depend upon which authorities are subject to peer review and how well they implement the resulting recommendations.

Peer review is able to identify actions to improve water management efficiency and cost-effectiveness and, therefore, improved efficiency of water management is an expected outcome. Peer review should not, however, increase administrative burdens on regulated entities, but has the potential to improve efficiency. However, undertaking peer review does have some administrative costs to those involved in the peer reviews. As noted above, existing experience with peer review is that undertaken by IMPEL and the long experience of IMPEL in undertaking peer reviews has led it to identify the necessary elements, size of peer review team and duration of the peer review. At this stage it is assumed that peer review for water management would be of a similar nature and, indeed, only implementation of the option would result in this being revised from lessons learned.

It is useful to note that while a previous study[335] analysed options to extend the scope of Recommendation 2001/331/EC providing for minimum criteria for environmental inspections, which for the focus for IMPEL work on peer review, this did not include extension to cover implementation of water law.

[335] Cowi et al. Impact assessment study into possible options for revising Recommendation 2001/331/EC providing for minimum criteria for environmental inspections (RMCEI). Final report. ENV.G.1/FRA/2006/0073. June 2011.

Table 26 provides details of the IMPEL project budgets for IRI projects agreed over the last two years which provide a good indication of the current level of expenditure on the IRI. It is important to note that these costs only cover travel, accommodation, meeting venue, etc. They do not include any personnel costs. The average cost is €11,546.

Table 26. IMPEL project budgets for IRI projects agreed over the last two years (Source IMPEL[336]).

IRI	IMPEL budget costs (€)	Host country cost (€)	Total (€)
Latvia 2011	11,000	2,000	13,000
Croatia 2011	9,325	-	9,325
Iceland 2012	11,710	2,000	13,710
Lombardia	6,360	3,790	10,150

Regarding personnel costs, the IRI projects specify the time to be spent by the peer review team. This includes a pre-meeting (1.5 days for two participants) and the project meeting itself (3 or 4 days for seven participants). This gives a total time input of 24-31 days. However, this time does not include:

- Time for preparation (important for familiarisation with host country information).
- Time for host country staff (preparation time and attendance – for the latter the Lombardia IRI indicated 5 staff for the project meeting).
- Time for the peer review team to produce a report with recommendations after the visit.

Conservatively, for the peer review team it is assumed that preparation and report writing total 10 days. For the host team, preparation and participation is estimated conservatively at 20 days. This gives a total time input of:

- Peer review team: 34-41 days (average 37.5 days)
- Host country: 20 days.

Personnel costs vary significantly across the EU. With social costs and salary, using as average of €800/day, the personnel costs are estimated at:

- Peer review team: €30,000
- Host country: €16,000

[336] IMPEL (2011 and 2012). Terms of References for IRI projects for Latvia, Croatia, Iceland and Lomardia.

Therefore the overall costs for a peer review are estimated as:

Item	Cost (€)
Expenses (travel, subsistence, meetings)	11,546
Peer review team personnel cost	30,000
Host country personnel cost	16,000
Total	57,546

It is assumed that the budget for expenses would be met through the Commission budget and the peer review team and host country would meet their own personnel costs. Currently IMPEL organises two peer reviews a year and if this were repeated in water management, the costs would double.

The option has the potential to improve policy coherence with all relevant water, environmental and other policy areas. Integration of EU water law (and other law) is part of effective water governance and peer review can support this process, both in terms of policy areas identified and administrative relationships for governance of these policy areas.

Option 8b1 addresses the problems in the implementation of measures adopted in RBMPs to meet the objectives of the WFD in some Member States due to the lack of a binding nature of those RBMPs on public bodies. Therefore, the objective of the Blueprint that this option seeks to address is to support full implementation of that Directive and, therefore, to ensure that the effectiveness of the Directive is improved.

The option would only have an impact on those Member States where RBMPs are not (or not fully) binding already. Taking account of the forthcoming results of the Pressures and Measures study it is thought that the option would not result in any impact in 10 Member States, where RBMPs are already legally binding. In other Member States where RBMPs are partially binding, the requirements of RBMPs generally are required to be taken into account in decision making. Thus the impact of this option in other Member States would depend on the extent to which measures, etc., in RBMPs are not implemented by other authorities.

Regarding the effectiveness of meeting the operational objectives of the Blueprint, option 8b1 contributes to the effectiveness of meeting three of the objectives. On the objective to foster integration of water into sectoral policies, by ensuring that impact of socio-economic activities and regulations on the state of water resources is fully taken on board, the outcome of the option is to ensure public authorities implement (or not conflict with) RBMP measures and so the WFD is implemented effectively. Where appropriate, RBMPs should include measures to address the impact of socio economic activities impacting on water status. The assessment of the appropriateness of the measures and ensuring that these are binding should stimulate broader policy debate on integration challenges with the sectors

concerned and the public administrations responsible for these sectors which may stimulate improved policy integration more generally.

On the objective to increase the use of economic instruments for a better allocation of resources and internalisation of external costs, the option would require that, where measures in RBMPs include provisions for economic instruments, a binding RBMP will more likely ensure these are implemented. The options does not stimulate the development or use of particular economic instruments.

On the objective to achieve a more efficient water governance and effective working relationships between institutions, and fully integrate water quality, quantity and hydromorphology issues in management actions, the option would mean that the requirements of RBMPs will deliver more effective governance of waters addressing all of these issues, where relevant, as the decisions of water management authorities become binding on other relevant authorities.

On the objective to improve knowledge and tools available to water managers, enabling effective decision making and reducing administrative burden, the option does not affect the tools and knowledge used for water management.

Ensuring measures that are analysed and consulted on in the RBMP development process are implemented will enhance governance efficiency. The option would not result in any change in the administrative burden over that which would occur from implementation of existing measures in RBMPs as the option introduces no new measures on regulated activities.

The option has the potential to improve policy coherence with all relevant water, environmental and other policy areas. By ensuring RBMPs are implemented by making their requirements legally binding, this enhances their integration into other areas of decision making and enhanced policy coherence.

Option 8b2 addressed the difficulties in reaching agreements between Member States in some transboundary river basins to set objectives and define measures adopted in RBMPs to meet the objectives of the WFD. Therefore, full implementation of the Directive is at risk. A mediation role for the Commission could help overcome this problem. Therefore, the objective of this option seeks to address is to support full implementation of that Directive and, thereby to increase the effectiveness of its implementation.

Regarding the effectiveness of meeting the operational objectives of the Blueprint, option 8b2 contributes to the effectiveness of meeting these objectives. On the objective to foster integration of water into sectoral policies, by ensuring that impact of socio-economic activities and regulations on the state of water resources is fully taken on board, the objective of the option is to reach agreement between Member States on objectives and measures in trasnboundary river basins and so contribute to WFD implementation. This may

include consideration of particular socio-economic activities, both undertanding of the impacts of these activities and the appropriateness of measures to address pressures. This should lead to enhanced sectoral integration, depending on the particular transboundary river basin.

On the objective to increase the use of economic instruments for a better allocation of resources and internalisation of external costs, the option would only contribute to this objective where mediation resolved specific differences between Member States regarding the use of economic instruments. This is particular problematic across borders, although there may be benefits from considering payments for ecosystem services in a transboundary context. At this stage it is not known how many transboundary situations this option would contribute to this operational objective.

On the objective to achieve a more efficient water governance and effective working relationships between institutions, and fully integrate water quality, quantity and hydromorphology issues in management actions, improving transboundary co-operation, resulting from this option, is a pre-requisite to address key govenance challenges and, therefore, this option will contribute significantly to the operational objective. Depending of the transboundary river basin and the points that would benefit from mediation, any or all of these objectives could be supported by the option.

On the objective to improve knowledge and tools available to water managers, enabling effective decision making and reducing administrative burden, the option contributes to the objective as improved transboundary co-operation involves improved understanding, improved knowledge and use of common tools for assessing pressures and impacts, although the extent of the impact would depend on specific circumstances.

Successful mediation will remove blockages to transboundary co-operation and to WFD implementation, thus potentially improving efficiency of implementation. The effect of the option on the administrative burden on regulated activities is not possible to identify. However, the option is only a mediation role for the Commission and any measures agreed would be the decision of the Member States concerned based on agreed pressures analysis and priority measures to improve the effectiveness of the implementation of the WFD.

The option has the potential to improve policy coherence with all relevant water, environmental and other policy areas. Mediation in a transboundary context may help enhance coherence between different legal obligations, but this will depend on the particular issues of disagreement between Member States.

Option 8b3 would be to enlarge the scope of the SEA Directive by amendment in 2016 in order to cover all hydropower development plans. More specifically, the scope of this option would introduce strategic planning for hydropower development on a river basin scale.

Strategic planning is considered to be inevitable for sound implementation of WFD – Art 4.7. This option ensures that water environmental impacts are considered in hydropower sectoral planning, thereby structuring and increasing transparency in the planning procedures.

The SEA Directive would require producing an environmental report including consideration of reasonable alternatives (e.g. alternative locations for hydropower stations). However, this requirement exists already as according to Art 4(7)(d) of the WFD, alternatives for projects of better environmental options should be assessed at an early stage when better alternatives are available. In case of various developments in the same river basins, what is generally considered to be the case with regard to hydropower projects, best environmental options need to be addressed at a strategic level since a decision on the issue is considered impossible on a project basis without any strategic guidance. This means that if existing licensing processes correctly take into account existing legislation thus also the WFD, environmental benefits specifically linked to this issue could be limited.

The option makes it possible to reconcile the Renewable Energy Directive and WFD requirements. It is largely complementary to EIA Directive, however there are considerable legislative costs involved with the option:

- Amendment to the SEA Directive.
- Modifications to the EIA Directive, as it involves the amendment of its main provisions and its annexes. It can be done either by recasting or by amending the codified Directive.

Administrative costs borne by MS and RBD primarily come from uptake of requirements, comparing it with own case-by-case approach and adapting organisational and legislative process. However, these can be relatively limited, as case-by-case approaches largely can be considered to be in line with SEA and EIA approaches. On the other hand, administrative benefits can be expected from streamlining existing processes.

Early stakeholder consultation which is stimulated by the SEA Directive contributes to higher acceptance, and therefore to the early identification and resolution of conflicts.

During the CIS workshop on WFD & Hydropower of 4-5 June 2007 in Berlin, participants recognised the advantages of pre-planning mechanisms to facilitate the (proper location) identification of suitable areas for new hydropower projects. These pre-planning mechanisms should take into account WFD and other environmental criteria as well as socio-economic aspects, including other water uses. The use of such preplanning systems could assist the authorisation process to be reduced and implemented faster, provided that the criteria of WFD Art. 4.7 are met. At the workshop, it was proposed that at least 3 categories of areas could be distinguished for pre-planning: suitable, less favourable and non-favourable areas. These categories should be identified with the involvement of all

stakeholders based on transparent criteria, they should be monitored and revised within a pre-defined period of time.

10.6 Acceptability

The public consultation sought views on a range of options to address water governance challenges. The results are presented in Table 27.

Table 27. The results of the public consultation concerning options to address governance issues

Option	Yes (%)	No (%)	Do not know (%)
On the basis of the Commission assessment of the River Basin Management Plans, the WFD Common Implementation Strategy to identify and disseminate best practices in the EU	85	5	9
To develop a peer review process for river basin district authorities within the context of the WFD Common Implementation Strategy with a view to help them identifying ways of improving their coordinating role	40	21	39
Specific recommendations are considered for Member States on water governance in the context of the European Annual Growth Survey for the European Semester	30	20	50
Develop initiatives on inspections and surveillance to improve the means of detecting and responding to water-related implementation problems such as over-abstraction	34	44	21
Continue to promote the river basin management approach and the implementation of the EU water acquis through EU enlargement policy and international rivers agreements	68	7	25
To amend the WFD to strengthen the coordination powers of River Basin District authorities and the obligations for combined River Basin Management Plans in transboundary contexts	33	48	19
Enlarge the scope of the Strategic Environmental Assessment Directive to cover all hydropower development plans	40	33	27

The identification and the dissemination of good practices for river basin management planning via the CIS process is very strongly supported. Other voluntary approaches, such as specific recommendations for Member States on water governance in the frame of the European Semester and the development of initiatives on inspections and surveillance around water-related implementation problems, receive less support, with respectively 30% and 34% of "yes". In addition, 40% respondents support the idea of a peer review process for river basin district authorities.

A high share, 68% of the respondents, supports the promotion of EU river policy through EU enlargement policy and international water agreements. By contrast, almost half the respondents (48%) oppose a regulatory measure for amendment of the WFD, to strengthen the coordination powers of River Basin District Authorities and the obligations for combined RBMPs in a transboundary context.

Several written comments call for better integration of RBMPs with other planning and policies at national and also at cross-border level. Several comments from national administrative bodies, while supporting some of the options, refer to the high administrative cost of implementing the WFD. Some national administrative bodies, in particular from northern Europe, write that current arrangements function effectively and major initiatives on governance are not needed. A number of industry responses raise concerns about the administrative cost of peer reviews.

The Leibniz Association emphasises problems in water management arising from lack of coordination of data and strategies. Harmonization of operational monitoring programmes will be supported by the INSPIRE Directive. Objectives and management plans need to be adjusted in line with all aspects of water management. New governance forms should be developed and tested to overcome fragmentation of actors and to reach integration over sectors, administrative units and scales. Informal cooperation can be seen as a complementary means that allows for an early identification of conflicts and the preparation of broadly acceptable solutions. This will lead to comprehensive water and risk governance with its contribution to the development of integrated and sustainable management strategies and to the successful implementation of mutually agreed actions.

Maison Europeenne des Pouvoirs Locaux Français emphasises the importance of local governance and the need for stakeholder interaction. It is important for EU level action to support such stakeholder involvement. The Royal Institute of Chartered Surveyors recognises the need for good governance. Improving water governance is likely to require better institutions, greater capacity and the political will to manage water more effectively. It also requires both governments and societies to understand that water is not an infinite resource and to value it as such.

The Country Landowners Association broadly agrees with the proposals. Trent Water considers that water governance in the UK is robust, but overall governance should be

flexible enough to accommodate the very different circumstances faced by the different Member States.

Several NGO replies call for a stronger role for the CIS process and the European Commission to improve the second round of RBMPs; the need for a stronger role as well as capacity building on the part of local authorities, as well as broader participation of stakeholders at RBD level. Wetlands International agrees that ineffective governance can undermine policy objectives. It suggests that best practice in peer review should include best practices in relation to river restoration and related governance models. What constitutes best practice should be defined. WWF Hungary supports the options but also recommends that RBMPs should be promoted as regional planning instruments for energy, transport, and other developments and investment decisions.

On the issue whether hydropower plants should be part of the SEA directive, some stakeholders, in particular in industry, comment that this could increase administrative burdens, while others write that these plants are already subject to environmental assessment procedures in most Member States. However, a number of comments (including from NGOs) state that issues related to hydropower as well as navigation deserve higher attention in the Blueprint.

The separate public consultation by the Commission to support the development of the 7EAP[337] indicated that there was overwhelming support for EU level action (67% of respondents stating 'very significant' or 'significant') for complementing national inspections and surveillance with enhanced capacity at EU level to ensure consistency and effectiveness of implementation. Furthermore a slightly higher proportion of respondents support 'support for experts' networks' to share best practice, etc. The latter looked to the experience of IMPEL. Although the 7EAP consultation was not directed at specific options within the Blueprint, support for EU level action to enhance the effectiveness of implementation and networking within this (which could include actions such as peer review) is evident.

The Third Water Conference concluded[338] that since its adoption, the WFD has been the main driver for improvement of governance in European water management and public participation, transboundary cooperation and the knowledge base have improved. However, the implementation of water policy has sometimes been difficult due to the fragmentation of institutions and that overcoming this requires the definition of common objectives. Problems arise in implementing cross-sectoral activities between the WFD and other sectors, because water policy makers have no competence to intervene in other sectors such as agriculture and energy. In addition, coordination between water quality and hydromorphological aspects as well as between water policy and nature protection has so

[337] See: http://ec.europa.eu/environment/newprg/pdf/Response%20charts.pdf

[338] http://waterblueprint2012.eu/sites/default/files/Key%20Messages_English_1.pdf

far not been sufficient. There is also a specific problem with illegal abstraction such as lack of compliance mechanisms.

Published positions by organisations also provide views relevant to these options. The European Union of Water Management Associations (EUWMA)[339] argues for better stimulation of international co-ordination in river basins as this has not be 'properly implemented'. More generally EUWMA considers that there should be stronger role for the Commission in monitoring and enforcement of EU water law – a view also taken by the European Environment Bureau[340].

The consultation sought views on whether the application of Environmental Impact Assessment should be enhanced with regard to irrigation projects. 39% of respondents supported this approach, while 26% opposed it and 35% did not know. **Therefore, overall the public consultation expressed more support than opposition to increased EIA for irrigation projects, but there was a large proportion of 'do not know' responses'**.

The consultation sought views on whether to enlarge the scope of the Strategic Environmental Assessment Directive to cover all hydropower development plans. 40% of respondents supported this approach, while 33% opposed it and 27% did not know. **Therefore, overall the public consultation expressed more support than opposition to increased SEA for hydropower, but generally responses were relatively evenly divided**.

By contrast, regulatory measures receive much less support: 39% of responses are in favour of enlarging the scope of the Environmental Impact Assessment to apply to irrigation projects and 40% are in favour of enlarging the scope of the Strategic Environmental Assessment Directive to cover all hydropower development plans.

On the issue on whether hydropower plants should be part of the SEA Directive, some stakeholders, in particular in industry, comment that this could increase administrative burdens, while others state that these plants are already subject to environmental assessment procedures in most Member States. However, a number of comments (including from NGOs) state that issues related to hydropower as well as navigation deserve higher attention in the Blueprint.

10.7 Conclusions

The options described in this section all contribute to improving the governance of Europe's waters. Each has the potential for improved efficiency and effectiveness and, furthermore, generally they have support within the stakeholder consultation.

The options are not alternatives. Therefore, all could be progressed within the Blueprint. Progress can be monitored against the SMART indicators described earlier.

[339] EUWMA (2011). Position on the Fitness Check and the Blueprint to Safeguard Europe's Water Resources.
[340] EEB (2012). EEB's main priorities of the Blueprint to Safeguard Europe's Water.

However, it must also be emphasised that many of the other problems and the options developed to address these also contribute to improved governance, such as the options regarding knowledge base or specific tools. Therefore, improving governance is not a separate activity, but is integrated within many actions that will taken forward within the Blueprint.

Table 28. Summary of the effectiveness, efficiency and coherence of the options concerned with improving governance

Description of the option	Option 8a: To develop a peer review process for river basin district authorities within the context of the WFD CIS with a view to help them identifying ways of improving their coordinating role.	Option 8b1. To ensure the measures set out in RBMPs necessary to meet the objectives of the WFD to be legally binding through an amendment to the WFD.	Option 8b2. Introduce a stronger mediation role for the European Commission in transboundary river basin management and that Member States must notify the Commission if they cannot agree a joint RBMP or elements in a plan – this requires a WFD amendment.	Option 8b3 Amending the SEA Directive to cover all hydropower development plans
Effectiveness towards specific Objective	++ The primary purpose of the option is to deliver more effective and efficient governance across the full range of water issues	++ Ensuring the requirements of RBMPs will deliver more effective governance of waters addressing all of the issues, where relevant.	+ Improving transboundary co-operation is a pre-requisite to address key governance challenges and this option will contribute significantly.	+ strategic planning is considered to be inevitable for sound implementation of WFD – Art 4.7. Enlargement of SEA Directive ensures that water environmental impacts are considered in hydropower sectoral planning.
Effectiveness towards other specific objectives	+ Outcome is improved governance to implement EU water law. This can include better understanding of the impact of socio-economic activities on water and better understanding of options on how to address these. + Improved water management is likely to enhance decision making including determination of appropriate use of economic instruments ++ Peer review enables a sharing of knowledge and tools between MS, including on their effectiveness and appropriateness for different situations.	+ Outcome is to ensure public authorities implement RBMP measures. This will include actions to address the impact of socio economic activities impacting on water and stimulate broader debate on integration. + Where measures in RBMPs include provisions for economic instruments, a binding RBMP will more likely ensure these are implemented ≈ The option does not affect the tools and knowledge.	+ Outcome is to reach agreement between MS on objectives and measures and this may include consideration of particular socio-economic activities ≈ There would only be an impact on use of economic issues if this were a subject for mediation. ++ Improved transboundary co-operation involves knowledge and use of common tools for assessing pressures and impacts.	+ enlargement of SEA Directive would improve organisation, structure and transparency of planning procedures
Efficiency	++ Peer review can identify actions to improve management efficiency and cost-effectiveness. There is no increase in administrative burden on regulated activities,	+ Ensuring measures analysed and consulted on are implemented will enhance governance efficiency. There is no change in the	+ Successful mediation will remove blockages to transboundary co-operation and to WFD implementation. The administrative burden on regulated	- limited additional costs of uniform strategic planning in SEA enlargement

	rather the option may identify improved efficiencies in water management decisions. There is a small cost to administrations, but this should be outweighed by efficiency savings.	administrative burden.	activities is difficult to identify, but the option is only a mediation role and any measures agreed would be the decision of the Member States concerned.	
Coherence	+ Integration of EU water law (and other law) is part of effective water governance and peer review can support this process	++ Ensuring RBMPs are implemented enhances their integration into other areas of decision making	+ Mediation may help enhance coherence between different legal obligations	- SEA Directive enlargement is largely complementary to EIA Directive however involves amendment of its main provisions and annexes
Acceptability	++ Public consultation: 40% of respondents support this option with 21% opposed.	The option on binding RBMPs was not subject to public consultation.	- Public consultation: A stronger mediation role for the Commission is opposed by 48% of respondents, with 33% supporting it.	40% of respondents to Public Consultation are in favour of enlarging the scope of the Strategic Environmental Assessment Directive to cover all hydropower development plans (33% respond negatively)

11 WATER BALANCES AND TARGETS

11.1 Introduction and problem definition

The central objective of the Water Framework Directive is to achieve good status of water bodies. A critical aspect of the status of water bodies is the quantity of water, varying naturally over the seasons and over a river basin as a complex flow regime. Therefore, understanding this flow regime and how different water uses impact on it is necessary to take forward effective RBMPs. Such water accounts area first step. From these targets can be set – from ensuring flows sufficient for ecological objectives (environmental flows) are met and there is equitable distribution to different users. However, in many instances, river basin managers are not fully aware of:

- how much water flows in and out of their river basin and water bodies, resulting in poor quantity management which in areas of limited water availability or high demand can contribute to or be a causal factor of water stress;
- how socio-economic plans or land use plans will impact the static and dynamic water balances of their water bodies, resulting in the poor integration of water into other sectoral policies and plans;
- the cost of the integrated management of water resources in order to achieve society's quantity and quality objectives (the 'resource cost'), resulting in the poor allocation of limited water and financial resources;
- how climate change is likely to alter the supply / demand mechanisms impacting the water balances within their river basin.

Thus, even when in charge of water allocation, they are unable to allocate the water resources efficiently or even fairly among water users including the basic needs for aquatic ecosystems, such as environmental flows. This is both a water quantity and quality problem since good water quality status cannot be achieved without adequate water allocation mechanisms / quantity management; that is, good water quality status cannot be achieved for water bodies that are not in balance. Target setting within water allocation mechanisms is an essential tool to achieve water balance at river basin level and the good governance of water and thereby to achieve good ecological status. Without adequate information on flows it is not possible for MS to accurately assess the state of waters, correctly design and implement programmes of measures, monitoring is ineffective and reporting presents an inadequate picture of the characteristics and patterns of flows in river basins.

It is vital to accurately monitor water bodies in order to enable sound governance and achieve targets which improve the quality and quantity of the water resources. Target setting is vital to achieving the operational goals of the Blueprint, and without it, the effectiveness and efficiency of policies will be difficult to assess and amend, and ultimately

reduce the coherence of water governance, and diminish opportunities to foster the integration of water into sectoral policies. The WFD has, however, proved to be a major challenge for environmental monitoring in many Member States.

Actions to support improved target setting if effective would significantly impact on efforts to achieve good ecological status and reduce water stress. Not only would improved target setting improve the ability to account for water, it would also provide an improved knowledge infrastructure from which to assess, implement and monitor environmental flows. Such improved information would directly impact upon the ability of river basin managers to allocate water, do so fairly amongst different users (including ecological systems) and to establish resilience in the face of future uncertainties in precipitation and groundwater recharge. There is furthermore a link to the control of illegal water abstractions, an issue that result easier when water balances are established (and eventually allocation is communicated to all water users and the public[341]).

Target setting within water allocation mechanisms to achieve water balance at river basin and water body level would therefore have positive effects on water efficiency and – if adequately considered in planning – reduce vulnerability to droughts, water stress and poor ecological status. Positive environmental impacts would be expected in particular in those basins where EU water allocation patterns have failed to reduce significant water consumption and produce water stress and deterioration of ecological status[342].

While the WFD sets out GES, including both chemical and ecological status, as an overall target, it does not specify how this can be translated into a precise value for ecological status. The work of the Common Implementation Strategy (CIS) has addressed several issues for a consistent determination of good ecological status; however, difficulties remain. In terms of defining the GEP the WFD also does not clearly indicate how GEP has to be set. Within the CIS process two approaches have been developed; the CIS approach and the Prague approach. As the assessment of the RBMPs shows, both methodologies are difficult to apply in practice and are not fully comparable.

A further issue is that the WFD targets for chemical and ecological status for surface water bodies do not specifically address water quantity and, therefore, flow regimes. GES/GEP is unlikely to be reached in a water body with significantly altered flows, as this will result in changes to the river ecosystem through modification of physical habitat and alterations in erosion and sediment supply rates[343]. The WFD does not specify the flow regime required to

[341] see the section on economic instruments, but also Dworak et al. (2010): Background Paper to the conference "Application of EU Water-related Policies at Farm Level" 28-29 September 2010. http://ecologic-events.de/wfd2010/documents/LLN_backgroundpaper-final220910.pdf

[342] OECD, 2010, Agricultural Water Pricing: EU and Mexico

[343] Sánchez Navarro, Rafael & Guido Schmidt (2012): Environmental flows as a tool to achieve the WFD objectives: Discussion paper. Draft 2.0, Document prepared for the European Commission. Available at: https://circabc.europa.eu/sd/d/0898cf3d-657a-4018-b53d-b34ac3460997/55171-Eflows-Discpap-Ed2-20120613.pdf.

achieve Good Status, but requires that the flow regime should provide conditions 'consistent with the achievement of the values specified for the Biological Quality Elements'. A hydrological regime consistent with the environmental objectives of the Directive is very close to the eflow concept (ibid). Accepting this relationship it can be said, therefore, that environmental water allocation is implicit in the WFD and could be defined as the hydrologic regime necessary to achieve the values specified for the biological quality elements in order to be classified as Good Status.

The concept of environmental flows (eflows) was historically developed as a response to the degradation of aquatic ecosystems caused by overuse of water. In this context environmental flows may be defined as the amount of water that is left in an aquatic ecosystem, or released into it, for the specific purpose of managing the condition of that ecosystem[344+345+346]. Environmental flows are understood as the quantity, quality and timing of water flows required to sustain ecosystems and the services they provide. Studies which aim to provide eflow recommendations should be able explicitly to indicate the magnitude of eflows, the environmental objective(s) they have, and the proportion of the long-term mean annual flow they constitute. One of the most promising approaches to establish benchmarks for GES is making use of the estimates produced by comprehensive environmental flows assessments and analyzing those estimates in the hydrological context (e.g. eflows as percentage of average flow) (ibid).

In order to close these gaps, the EU has addressed some quantitative aspects of water policy. The Floods Directive (2007/60/EC) addresses this topic by requiring assessment of the risks/hazards of flooding and flood management planning, but it does not set any target in terms of risk reduction. The 2007 Communication on water scarcity and droughts presents an initial set of policy options to address and mitigate these issues, but does not set any quantifiable policy target to reduce water use (note that it sets no binding obligations on Member States). Such a policy target has now been introduced with the Roadmap to a Resource Efficient Europe (COM(2011)571). This includes a target for water abstraction: that it should stay below 20% of available renewable water resources in each RBD in the EU (thus, a target for absolute pressures on water quantity).

However, in the field of drought management the Communication on WSD aims for a shift in drought risk management (DRM), away from a crisis response to a modern, comprehensive risk management approach, based on a profound understanding of the drivers and impacts of drought and making use of advanced monitoring and early warning systems at the European level. The Communication stated that the WFD has "sufficient

[344] King, J., C. Brown y H. Sabet. 2003. "A scenario-based holistic approach to environmental flow assessments for rivers". Regulated Rivers: Research and Assessment. Volume 19 Issue 5-6, Pages 619 – 639

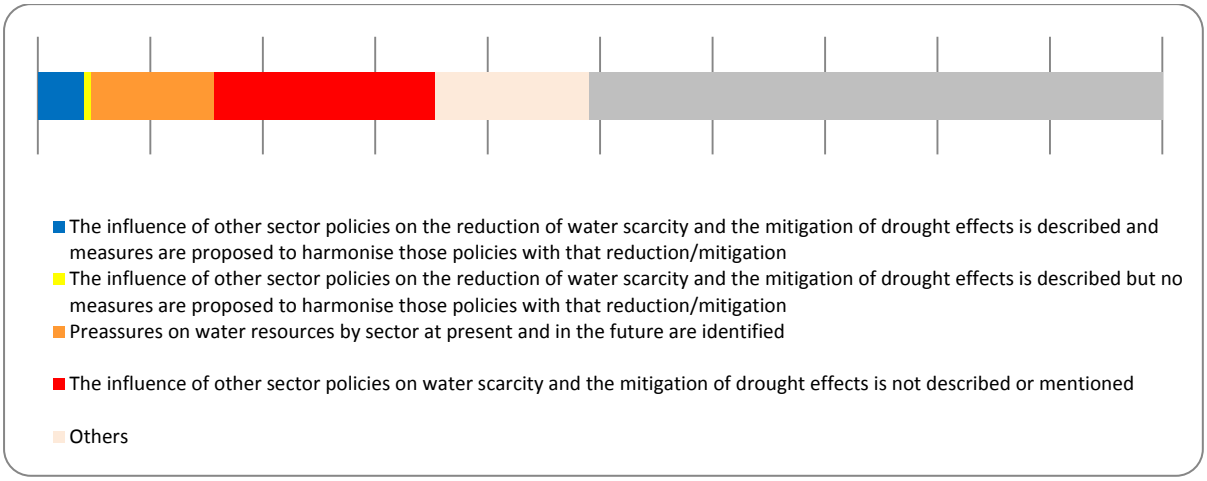
[345] Arthington, A.H., S.E. Bunn, N.L. Poff y R.J. Naiman. 2006. "The challenge of providing environmental environmental flow rules to sustain river ecosystems". Ecological Applications 16:1311-1318.

[346] Brown, C. and King, J. 2003. Environmental Flows: Concepts and methods. In Davis, R. and Hirji, R. (eds). Water Resources and Environment Technical Note C.1. Washington, D.C.: The World Bank.

flexibility to develop specific Drought Management Plans (DMP) in relevant River Basins (RB)" (p. 9). The WFD has, however, not triggered any legal action in that area so far and MS are thus not legally required to address water scarcity and drought issues. No specific implementation processes or tools are formally reported to have been put in place either.

Any action to address drought management in Europe is expected to be undertaken through existing EU policies, as well as through measures and actions taken at Member State level[347]. Nonetheless, it should be taken into account that a major part of the resource efficiency aspects is not only targeted towards drought management, but primarily on water scarcity management, which should sharply be distinguished from droughts regarding its causes:. "Water scarcity is a man-made phenomenon. It is a recurrent imbalance that arises from an overuse of water resources, caused by consumption being significantly higher than the natural renewable availability. Water scarcity can be aggravated by water pollution (reducing the suitability for different water uses), and during drought episodes"[348]. Furthermore, it should be taken into account that RBMPs[349] have not always expressed in a clear way the influence of sector policies on water scarcity.

Figure 16. Inclusion of sector policies in the RBMPs



According to a screening exercise of RBMPs, for only 6 RBDs out of 123, the influence of other sector policies on the reduction of water scarcity and the mitigation of drought effects is described, and measures are proposed to harmonise those policies with that

[347] Intecsa-Inarsa (2012, forthcoming): Analysis of the role of drought management plans in the framework of the River Basin Management Plans (part of the Comparative Study of Pressures and Measures in the Major River Basin Management Plans: Task 3d: Water Abstraction and Water Use). Study for the European Commission.

348 Schmidt, Guido, Juan José Benítez & Carlos Benítez (2012): Document: Working definitions of Water scarcity and Drought. Version 4.0. European Commission. Available at: https://circabc.europa.eu/sd/d/02a234f7-ac60-4f81-bd8d-a3a0973e77d1/55171-Drought-WS_Definitions_V4-27Abril2012.doc

349 Schmidt & C. Benítez (2012): Topic report on: Assessment of Water Scarcity and Drought aspects in a selection of European Union River Basin Management Plans. Version 3.0. 5 September 2012.

reduction/mitigation. For only 13% of the assessed RBMPs, the pressures on water resources by sector at present and in the future are identified.

For almost 25% of the RBMPs assessed, the influence of other sector policies on water scarcity and the mitigation of drought effects is not described or mentioned in any section, and for more than 60% of the plans, the information is not relevant/ unclear, or simply no information has been found. Of these RBMPs, somewhat less than half (34 in case of water scarcity; and 31 for drought) should not be concerned about the issue due to the circumstances in their basins; but for the remaining 50% water scarcity and/or drought are a recognised problem.

One of the main concerns with the implementation of the WFD is the **level of ambition** exhibited by Member States in the first round of RBMPs. It appears that many RBMPs have used exemptions, postponing the attainment of good status from 2015 to future cycles of RBMPs. Some of the reasons might be explained by conflicting objectives and targets set out in the different EU policies. Water targets are not always the top priorities in decision making. Another explanation might be the fact that for exemptions justified by disproportionate costs no clear and common methodology at EU level exists. There is no clear cost-benefit ratio agreed and MS are free to calculate those following different approaches, allowing also for consideration of affordability issues. However the definition of affordability is a political judgement that per se allows for differences.

A further concern relates to the **difficulties** in determining good ecological status. A key challenge currently facing water policy in Europe is developing robust indicators and measures of water security and ecosystem status that embrace a diverse range of risk and vulnerability perceptions that exist between stakeholders. According to the EEA[350], the DPSIR (drivers, pressures, state, impacts, response) model provides a strong framework for identifying stressors and impacts in order to identify intervention measures, but the framework oversimplifies, and does not properly account for, ecosystem services or the complexity of social-ecological systems. Effective monitoring systems of chemical and ecological status and biological assessment methods are needed, following the requirements of the WFD and the conclusions from CIS guidance. In some Member States, water monitoring programmes are still being reformed to meet the needs of EU law and policy. Assessment methods for several quality elements are lacking in many Member states. Also Member States need to develop a typology of water bodies and determine reference conditions for good ecological status. While extensive work has been carried out across the EU, problems remain. For example, the CIS has worked to identify intercalibration types, to ensure that similar water bodies across the EU have similar targets. However, it appears that intercalibration has not brought a strong convergence, and a great many water body types have proliferated. At the same time, it appears that the analytical work used to

[350] European Environment Agency (forthcoming): Vulnerability draft for EEA 2012 State of Water assessment, draft final of June 2012.

assess the current status of water bodies varies greatly across Member States and RBMPs. Some authorities have, therefore, indicated that it would be useful for there to be common guidance at EU level on the methodologies for target setting, not least to address discrepancies that might exist in transboundary river basins. As a result, it appears that targets for GES can vary across Member States[351]. Furthermore, an initial screening of the RBMPs shows many Member States do not explicitly consider issues such as variability of water flows, both in terms of seasons or in terms of year-to-year differences in precipitation. In other words good ecological status is not adequately linked to aspects of water quantity.

In many Member States, environmental water allocation requirements and environmental stream-flow regimes ('eflows') have been established in legislation or in RBMPs: these requirements regulate, for example, water flows from dam operations or water demand for irrigation. However, scientific validation, participatory processes and implementation of eflows are still great challenges, and there is no overview on eflow policy in the EU[352].

Thus, for example, the status of eflows regarding the priority of water uses for water allocation purposes is unclear at the EU level. Restrictions in water use are applied in many MS in order to preserve aquatic life and ecological status of water bodies, though the ambitions, methodologies and implementation procedures and successes are different and have not been compiled or compared against the WFD (ibid). The **lack of comparability** of eflows is another concern.

A first overview of eflows at EU level has been made in the framework of the support studies for the Blueprint, concluding that methodological tools, basic data, implementation rules and even the proper components of eflows regimes differ between Member States and, in many cases, between regions. For example, regarding calculation approaches some countries use detailed physical habitat simulation models, such as PHABSIM, to define ecologically acceptable flows, whereas other use expert-based judgment or rules of thumb. These differences may cause problems when flow requirements need to be established for transboundary rivers and for EU-wide assessments of the ecological status of water bodies (ibid). One can conclude that recognition of the value of eflows is clearly on the increase in the Member States, but, at the same time, that very little is known so far regarding the adequacy of proposed regimes to meet ecosystem goals established by the WFD. As a general rule in Europe, the sustainability of water resources seems to be relatively absent from public policies in the Member States. According to a recent EEA report on resource

[351] Additional information on this should be available from the P&M study's work on intercalibration.

[352] Sánchez Navarro & Schmidt (2012) & Intecsa-Inarsa (2012, forthcoming): Analysis of the role of environmental streamflows in the framework of the River Basin Management Plans (part of the Comparative Study of Pressures and Measures in the Major River Basin Management Plans: Task 3d: Water Abstraction and Water Use). Study for the European Commission.

efficiency in Europe[353], only two EU Member States (Portugal and Hungary) have set out targets for water efficiency at national level. Moreover, water efficiency and sustainability receives only limited attention as a criterion in decision making processes and, although promising work is under way, water is currently excluded from Eurostat's Material Flow Accounting (MFA) system.

Annex III of the WFD sets out the need to consider future water demand (development of a baseline scenario). During the implementation phase of the Directive it was generally accepted that a forward thinking, systematic approach to integrated water management is vital in order to achieve the requirements/objectives of the WFD. This resulted in a recommendation to develop the baseline towards all pressures of the WFD within the WATECO and the DG ECO1 working group. Even if the establishment of a **baseline scenario** is not an explicit requirement of the WFD, guidelines have given it considerable attention. The baseline scenario can be considered as a starting point when working on the identification of measures to be taken for WFD implementation. One must consider what would happen by 2015 (and beyond) based on decisions already made to implement other legislation; it therefore is the "business-as-usual"-scenario in a River Basin. In addition, the baseline scenario must be based on an understanding of the development of **socio-economic trends** and it has to be fully integrated in the assessment of the risk of not meeting the environmental objectives of the WFD. Thus, the baseline scenario should be used in the development of a RBMP, which will include e.g. the selection of measures. However, only some MS followed this recommendation. Even if the recommendation was followed and a scenario was developed the target setting process did not consider this baseline scenario[354].

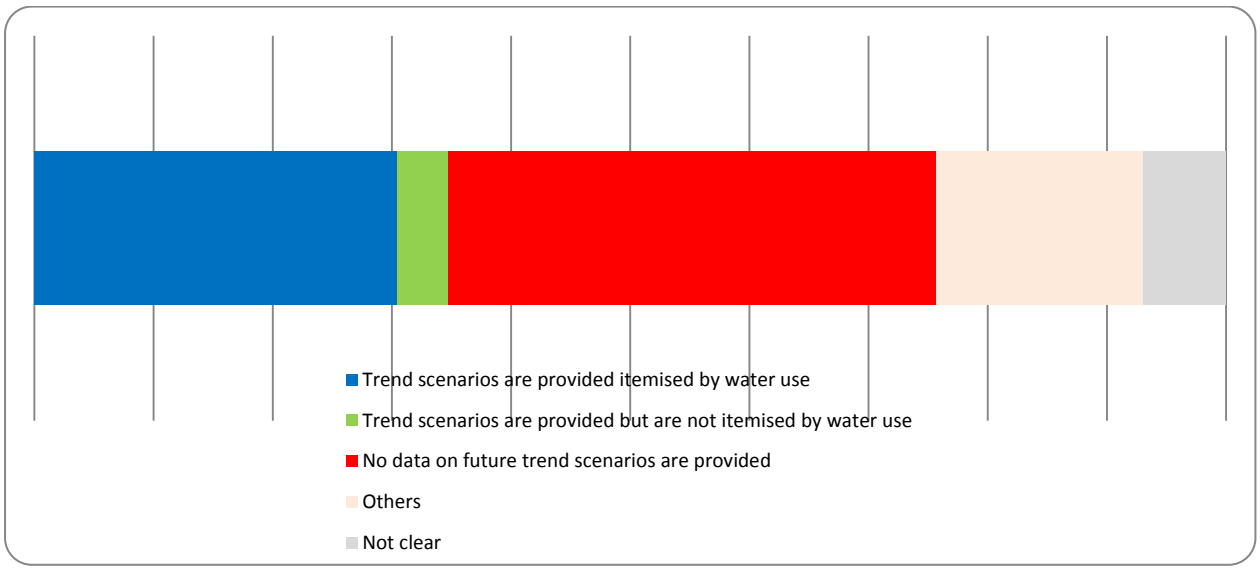
According to a screening exercise[355], EU RBMPs present a different level of detail and analysis of water demand and availability scenarios. The RBMPs present data on water demand trend scenarios for almost 35% of the screened RBDs, and for the majority of them, the data are also analysed by water use type. The completeness of the timeline of these projections (e.g. 2015, 2021 and 2027) and information regarding the geographical scope, magnitude and trend data for each itemised water use, have not been assessed so far.

[353] EEA (2011). Resource efficiency in Europe — Policies and approaches in 31 EEA member and cooperating countries. EEA Report No. 5/2011.

[354] Dworak, T.; Berglund, M.; Vranken,L.; Campling, P.; Kampa, E.; Ribeiro, M; Thaler, T. (2009). Summary report on an in-depth assessment of RD-programmes 2007-2013 as regards water management- Study undertaken for the European Commission – DG Environment.

355 Schmidt & C. Benítez (2012): Topic report on: Assessment of Water Scarcity and Drought aspects in a selection of European Union River Basin Management Plans. Version 3.0. 5 September 2012.

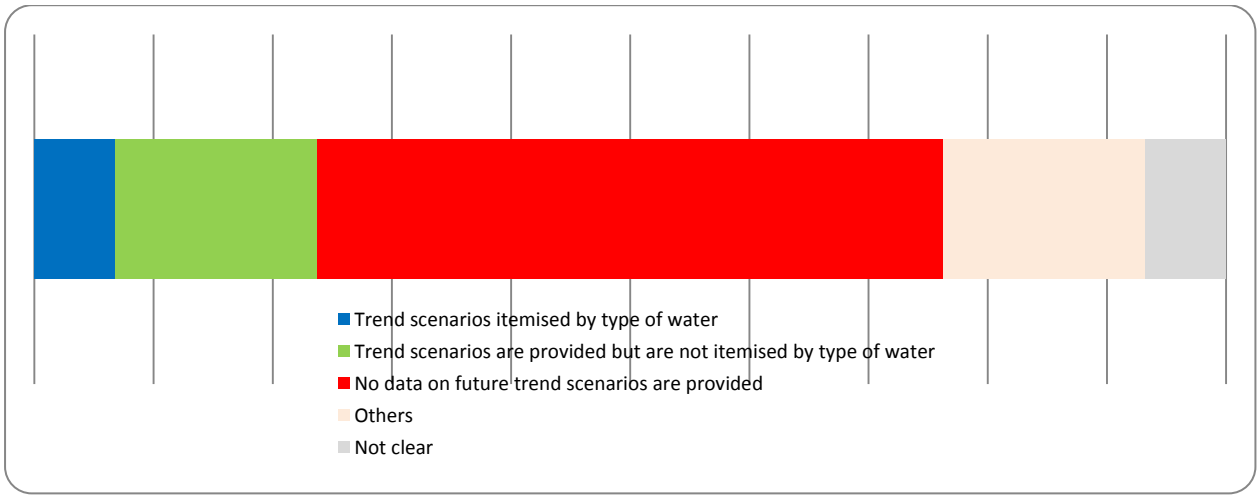
Figure 17. Water use trend scenarios in the RBMPs



However, it is still of concern that most of the assessed RBMPs do not include data on future trend scenarios, showing an inconsistency with the principles of sound management of (future) water resources. This is particularly concerning for those RBDs that have reported on WS as RBD-wide issues.

Regarding the analysis of the water availability trends, the assessment shows that in less than 25% of the RBMPs, these scenarios are provided; in addition, around 7% of the RBMPs provide itemised data (by water type). The completeness of the timeline of these projections (e.g. 2015, 2021, 2027) and information regarding the geographical scope, magnitude and trend data for each itemised water type have not been assessed so far.

Figure 18. Water availability trend scenarios in the RBMPs

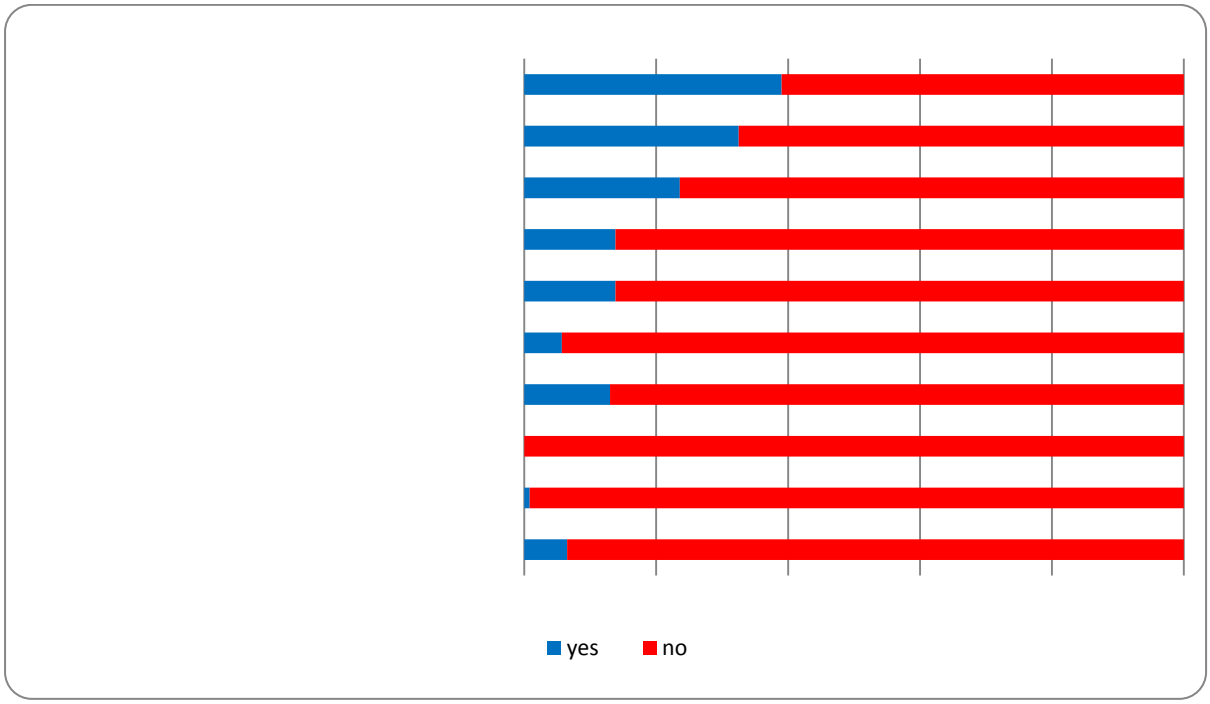


In most of the assessed RBMPs, no data on future water availability trend scenarios are provided. This is particularly important for those RBDs that have reported on water scarcity as RBD-wide issues.

A further issue is that many the programmes of measures (PoMs) in RBMPs do not appear to be **concrete**, information on their financing is not extensive and many lack a strong presentation of the links between measures and the attainment of objectives. (Indeed, many PoMs appear to re-propose existing measures.) Thus, many PoMs may not be **effective** in terms of achieving WFD and RBMP goals. Related to this, there may be a need for a stronger analytical framework to link pressures, state, impacts and responses, as these relationships can be complex.

In this sense, in almost 15% of the assessed 123 plans[356], uncertainty of data is made explicit in the dataset used, and when relevant, the time span of the dataset is made explicit. For less of 10% of the screened RBMPs, the sources of funds to implement the Programme of Measures are specified for each measure separately, and for even less of the RBMPs (around 6% of them) the uncertainty of data is taken into consideration when stating the expected results in the Programme of Measures.

Figure 19. Main features of the datasets included in the RBMPs



356 Schmidt & C. Benítez (2012): Topic report on: Assessment of Water Scarcity and Drought aspects in a selection of European Union River Basin Management Plans Version 3.0. 5 September 2012.

Moreover, for none of the assessed RBMPs, the existing social conflicts were considered as a risk for successful implementation, and just for one of them the interrelation (either positive or negative) between measures was highlighted. This shows the lack of transparency and adequacy of the analysis regarding key quantitative aspects of the water planning scheme, within most of the assessed RBMPs.

One key issue recognised throughout discussion of the WFD is that attaining its goals will require **integration and coherence** with other policy areas, including agriculture, industry and urban and land use planning. While the RBMP process could provide a mechanism to address potential conflicts, there are concerns that integration between water policy and sectoral policies is not sufficiently strong in many Member States and regions (see below).

In turn, have the RBMPs and PoMs taken on board objectives from other EU policies? In several cases, there is a timing issue: policies such as the EU Biodiversity Strategy and the Resource Efficiency Roadmap were presented close to, or after, the deadline for the first round of RBMPs.

A closely related topic is **climate change**, which is expected to change mean and seasonal temperatures and precipitation. Climate change is not addressed in the WFD itself. A 2009 CIS guidance document provides guidance for considering climate change in RBMPs: while it notes that climate impacts can affect the attainment of WFD objectives, it states that more likely, mitigation and adaptation responses to climate change will have a greater impact on water bodies, and it cites bio-energy crops as an example. The guidance warns against using climate change as a justification for relaxing objectives. At the same time, it calls on Member States to monitor changes at reference sites, and to incorporate adaptation measures in PoMs. The latter is causing some problems as, due to the high uncertainty that is related to climate change, it is difficult to set concrete targets which can be addressed by measures.

Finally, droughts create uncertainties and variations for future water levels. Following the Communication on WSD in 2007, a report was published to give general guidelines to develop drought management plans (DMPs)[357], which are not an obligation. Since then, good progress has been achieved both at EU and MS levels: according to the WS&D 2010 Follow-up Report complemented with further investigation[358i], in the current first planning

357 Water Scarcity and Droughts Expert Network (2007): DROUGHT MANAGEMENT PLAN REPORT Including Agricultural, Drought Indicators and Climate Change Aspects. Technical Report - 2008 – 023. Available at: http://ec.europa.eu/environment/water/quantity/pdf/dmp_report.pdf.

358 REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL Third Follow up Report to the Communication on water scarcity and droughts in the European Union COM (2007) 414 final. COM/2011/0133 final. Available at: http://eur-lex.europa.eu/Notice.do?checktexts=checkbox&val=561772%3Acs&pos=4&page=1&lang=en&pgs=10&nbl=5&list=562045%3Acs%2C561774%3Acs%2C561775%3Acs%2C561772%3Acs%2C561773%3Acs%2C&hwords=&action=GO&visu=%23texte.

cycle of the WFD implementation, a number of RBDs and countries have developed DMPs or similar tools. ES and UK (England and Wales) have separate DMPs already in place while FR and NL have equivalent operative tools. CY has included its DMPs as an Annex of the RBMPs and GR is currently working on them within the same framework. Scotland (UK), MT and CZ are also in the drafting stage. In other countries (IT, AT, BE, HU, RO, SK) drought management is considered as part of RBMPs or regional plans. Other countries have tools focused on emergency management (LU, North Ireland [UK]) or specific early warning systems (PT, PO). In other MS, planning is under discussion (EE), or not foreseen at all (IE, SE, BG).

Droughts are reported for a wide range of RBDs across Europe, although the results from the screening exercise show that approximately 39% (48 RBDs) of the RBMPs assessed, do not consider drought as a relevant phenomena. According to 10 RBMPs, drought spells are recognised as RBD-wide phenomena, and for other 27 RBDs, local or sub-basins drought spells are said to take place. In 24 RBDs, droughts and water scarcity affect part of or the entire basin, though the two conditions are not clearly distinguished, or this issue is not clearly addressed[359]. Moreover, governance measures as the enhancement of the resilience of the ecosystems (e.g. eflows), very relevant to ensure the achievement of the environmental WFD objectives in areas that face WS&D, are planned in 55% of the RBMPs. Thus, the current focus is very varied, and WFD provisions are not necessarily completely coherent with DMPs and vice versa. It is important to make sure that the plans live up to the expectations set in the guidance document. Ideally, the **RBMP should contain quantitative and measurable targets of water conservation, and set of measures to achieve these targets**, prioritised according to their performance and implementation costs.

Water balances and adequate water allocation are, therefore, poorly implemented at river basin level. In many instances, river basin managers are not fully aware of how much water flows in and out of a river basin. Nor do they know how climate change will alter precipitation or how land use will affect groundwater recharge and therefore the availability of water. Thus, even when in charge of water allocation, they are unable to allocate the water resources efficiently or even fairly among water users including the basic needs for ecological systems, such as environmental flows. This is both a water quantity and quality problem since good water status cannot be achieved without adequate water allocation.

Target setting is key to the good governance of water and thereby achieving good ecological status. Without adequate information on flows it is not possible for MS to accurately assess the state of waters, correctly implement and design programmes of measures, monitoring is

[359] Intecsa-Inarsa (2012, forthcoming): Analysis of the role of drought management plans in the framework of the River Basin Management Plans (part of the Comparative Study of Pressures and Measures in the Major River Basin Management Plans: Task 3d: Water Abstraction and Water Use). Study for the European Commission.

ineffective and reporting presents an inadequate picture of the characteristics and patterns of flows in river basins. Target setting is vital to achieving the operational goals of the Blueprint, and without it, the effectiveness and efficiency of policies will be difficult to assess and amend, and ultimately reduce the coherence of water governance, and diminish opportunities to foster the integration of water into sectoral policies.

Actions to support improved target setting if effective would significantly impact on efforts to achieve good ecological status and reduce water stress. Not only would improved target setting improve the ability to account for water, it would also provide an improved knowledge infrastructure from which to predict, control and monitor environmental flows. Such improved information would directly impact upon the ability of river basin managers to allocate water, do so fairly amongst different users (including ecological systems) and to establish resilience in the face of future uncertainties in precipitation and groundwater recharge.

Target setting would therefore have positive effects on water efficiency and – if adequately considered in planning – reduce vulnerability to droughts, water stress and poor ecological status. Positive environmental impacts would be expected in particular in those basins where EU water allocation patterns have failed to reduce significant water consumption and produce water stress and deterioration of ecological status.

The CIS process has initiated discussions on such targets, based on its Mandate to develop a set of indicators to measure water scarcity and drought across the EU. Regarding water scarcity, the indicator development work evolved from the Water Exploitation Index (WEI[360]) to a further set of indicators, in particular the WEI+[361] with an added value by considering a more precise geographic and temporal scale and accounting for water consumption. Nonetheless, this indicator is still in its early implementation phase, and further work is required to assess preliminary results based on the available datasets, to define further dataset needs and/or reporting requirements, to establish targets (e.g. thresholds for environmental flows and/or threats to supply different users) and to prepare communication messages according to the data and thresholds.

[360] see http://www.eea.europa.eu/data-and-maps/indicators/water-exploitation-index-1

[361] EG on Water Scarcity & Drought (2012). Update on Water Scarcity and Droughts indicator development. May 2012. Available at: https://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp?FormPrincipal:_idcl=FormPrincipal:_id3&FormPrincipal_SUBMIT=1&id=4d7abdd6-adcd-4853-acd9-1f177cb7996f&javax.faces.ViewState=rO0ABXVyABNbTGphdmEubGFuZy5PYmplY3Q7kM5YnxBzKWwCAAB4cAAAAAN0AAIxMHB0ACsvanNwL2V4dGVuc2lvbi93YWkvbmF2aWdhdGlvbi9jb250YWluZXIuanNw

This development is consistent with the approach proposed for resource efficiency indicators and targets[362] at a broader level, currently being developed. A proposed basket for indicators includes two resource-oriented indicators for water use (domestic water use: water abstraction, ideally changed in the medium-term towards water consumption; and global: water footprint) and two environmental impact-oriented indicators (domestic: WEI, and global: Global Water Consumption Index[363]). Data for the indicators are not always available on the appropriate level. For example, water data is available on the aggregated country level and only stepwise being disaggregated with regard to the more appropriate water basin levels.

Regarding the setting of targets, the following proposal has been made[364]:

- Water Abstractions (WA): [indicator development]: Indicators on water abstraction are still in development and some major decisions on conventions still have to be taken. Thus, a target on water abstraction cannot be formulated for the time being.

- WEI 2020: <20%. 2050: <10%. The Water Exploitation Index is currently used in Europe. In line with EEA recommendations, the proposed target is to reduce the WEI below 20% until 2020 and below 10% until 2050. A Water Exploitation Index between 10% and 20% is considered as "low water stress", WEI between 20% and 40% is indicating "stress on water resources" and above 40% represents "severe water stress". The targets on WEI have to be considered as overall targets. In order to be operational they need to be linked to a particular spatial scale. Water and water bodies do not follow administrative boundaries and consequently the level of management has to be set on a more ecosystem related level – this would preferably be at the river basin level.

In conclusion, it is clear that understanding water accounts in a river basin and, as part of this, understanding environmental flows is critical to implementing the WFD. With such accounts as the basis for action, water managers then need tools for effective target setting as part of their approach to developing measures within RBMPs. However, many river basin

[362] BIO Intelligence Service, Institute for Social Ecology and Sustainable Europe Research Institute. (2012) Assessment of resource efficiency indicators and targets. Final report prepared for the. European Commission, DG Environment.

[363] idem: 44: Global Water Consumption Index (WCI). Definition: Annual direct and indirect consumption in a water shed of blue and green water divided by the longterm average freshwater resources in the water shed. Unit of measurement: index (in %). Data: not yet available. Methodology: not yet developed. Decomposition: in the future: by blue/green water; by geographical region, where water uptake takes place. Strengths: Includes blue and green water, Includes direct and indirect consumption, thus considers effects of international trade, Assesses water consumption, not only water abstraction, Water shed level, not only national level, Includes global perspective. Weaknesses: Indicator very difficult to calculate with high data requirements, Considerable effort in setting up accounting principles and creating data, possibly not available in the next 5 years.

[364] idem:79

managers are unaware of the water flows in, through and out of their river basins (water accounts). They are unaware of the environmental flows. They are also unable, therefore, to establish robust targets for water users consistent with flow regimes compliant with the WFD. This stems from a combination of a lack of tools to perform these analyses and a lack of capacity to perform the analysis once the tools are in place.

11.2 Baseline and justification for EU level action

Under the WFD, water demand and water efficiency are among the issues that RBMPs are called on to address. Appropriate target setting requires levels of information and knowledge that are simply not provided for at present. Furthermore, the lack of consistency and coherence with which methodologies have developed in Europe has persistently presented challenges in establishing water accounting and in monitoring environmental flows (EEA, 2012). An improved knowledge infrastructure that could permit and control water allocation would foster coherence between water policy and sectoral policies, in particular with the agricultural sector, as present levels of consumption are unsustainable and often not charged for proportionately.

As noted earlier, the practical definition of good ecological status is a difficult task. However with the feedback from the on-going monitoring programmes, the lessons from experiences made when implementing measures under the first cycles and the further development of methodologies under the CIS should allow Member States to set better and realistic targets. However this does not necessarily mean that the status of water bodies will improve. It is equally likely that the number of exemptions used by Member States will increase and that exemptions in time will turn more often into establishment of lower objectives.

Furthermore, the Roadmap to a Resource Efficient Europe has established that by 2020 water abstraction should stay below 20% of available renewable water resources. The Roadmap sets a 2020 target for water efficiency at river basin level. However, current implementation and target setting practices indicate the adoption of this target will vary across Member States and is likely to be incomplete. Indeed, a continuation of present approaches, where environmental water allocation is decided at local level, often after thresholds have been surpassed and crises occur, is evident within the baseline scenario.

If adequately implemented, with consistent and clear methodologies, river basin managers can promote far improved water efficiency across all sectors but notably amongst the current high consumers, whose water use and pricing stands to change the most. If targets are set appropriately, water allocation will be far more effective, in ensuring adequate groundwater recharge rates, costs for abstraction, and in predicting droughts and e-flows.

Those businesses however, which is already water efficient but high consumers, such as the high value agricultural sector could be damaged by increased pricing resulting from caps[365].

As regards water quantity targets even fewer improvements can be expected if no further EU action is taken. As set out earlier, the Commission policy on water scarcity and droughts lacks a clear legal foundation, which makes it difficult to predict future development on the MS level. However from the WaterGap study it is clear that the effects of the water saving measures recently implemented or about to be so are not sufficient to answer the challenges of water scarcity[366]. As they stand, mainly focusing on pressures/ impacts, rather than on drivers, they are not decisive. As noted earlier, the 2011 EEA report on resource efficiency in Europe noted that only two Member States (Portugal and Hungary) have set out targets for water efficiency. Other Member States may set targets in response to the Resource Efficiency Roadmap, and work may also be carried out within individual river basins. Moreover, water scarcity on a sub-basin level may not be addressed. Even if the proposal for the new Common Agricultural Policy foresees that the existing GAEC according to which farmers have to comply with national abstraction rules would remain, the impacts of this penalty mechanism are expected to remain limited. Therefore, over allocation of water resources is not expected to be reduced due to lack of ambition, lack of sufficient tools and the lack of the requirement to define eflows.

Should no further action be undertaken, the sustainability of water resources may not be addressed consistently in the development of plans and projects and a range of different approaches, either binding or voluntary, is likely to coexist. This may hinder concerted action across the EU and possibly undermine overall results in terms of reducing water demand and improving water efficiency. Instead water supply instruments (i.e. desalination, water re-use) are likely to be applied more often as they have proved to be a more effective response to stress, but they are not sufficient to adequately, if not sustainably, respond to the challenge. However, it is expected that the approach of increasing supply will prevail in particular as EU funding (and indeed Member State and private funding) for such an approach will remain. Previous experiences have demonstrated that important changes in drivers have significantly changed water stress patterns (i.e. historical evolution of the WEI from 1990 to 2010). However, such changes are not recognized so far in any of the basins assessed.

The problem of water scarcity might further evolve due to further socio-economic developments and climate change. The recently completed ClimWatAdapt project has

[365] Bogaert et al (2012). The role of water pricing and water allocation in agriculture in delivering sustainable water use in Europe – report to the European Commission.

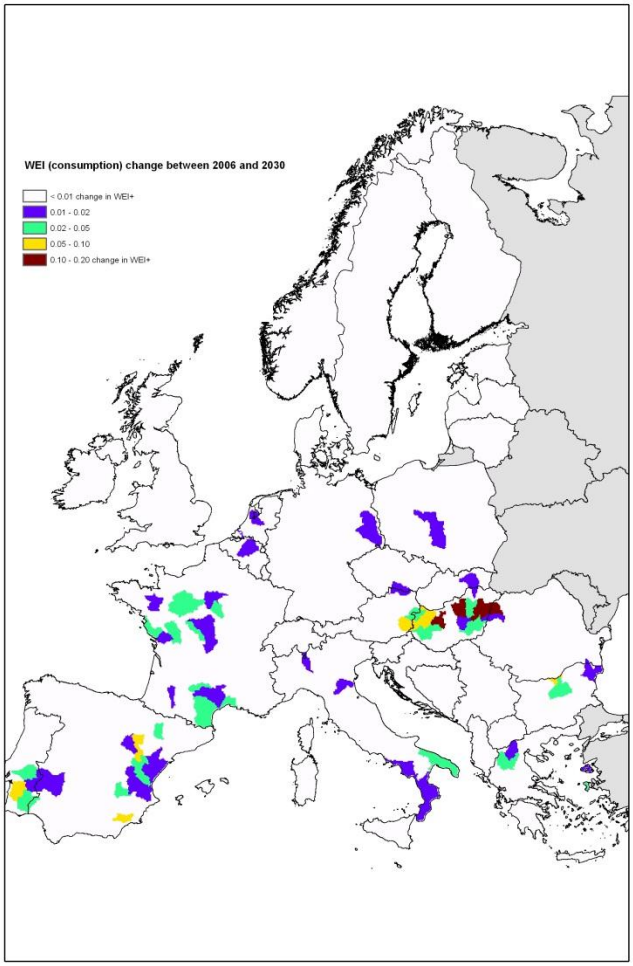
[366] ACTeon (ed.) (2012). Water Scarcity & Droughts Policy in the EU - Gap Analysis. Interim Report. Study for the European Commission, DG Environment. Available at: http://ec.europa.eu/environment/water/quantity/pdf/WSDGapAnalysis.pdf.

analysed several climate and socio-economic scenarios until 2050[367]. The analyses show that climate change has a major effect on extreme events, i.e. the occurrence of droughts and floods. On the other side, future vulnerability to water scarcity is more dependent on socio-economic development than on climate change impacts, i.e. changes in water use are likely to have more impact on water scarcity than changes in water availability resulting from climate change. Water quality will deteriorate as a consequence of climate change, e.g. because in cases where reduced runoff will lead to lower dilution rates or, on the other hand, in cases where a much higher runoff will cause higher nutrient loads. The main message from the scenarios is that despite strong improvements in water efficiency in all sectors, water stress would remain a problem in numerous EU catchments, including in central and Western Europe. Due to the increasing awareness of Member States to adapt to climate change these developments might trigger new water efficiency targets and corresponding measures, but there is also the risk of mal adaptation and a focus on increasing supply. It is currently unclear how the Commission adaptation strategy will address the issue of mal adaptation and to make sure that only climate proofed projects will be funded.

The policy responses currently in place are not fundamentally reversing the trend in water scarcity in the medium time horizon (2030). Without modification to the institutional and policy measures already implemented or planned, water scarcity in 2030 is expected to increase.

[367] Flörke, M.; Wimmer, F.; Laaser,C.; Vidaurre, R.; Tröltzsch, J.; Dworak, T.; Stein, U.; Marinova, N.; Jaspers, F.; Ludwig, F.; Swart, R.; Giupponi, C.; Bosello, F.; Mysiak, J; (2011). Climate Adaptation – modelling water scenarios and sectoral impacts.

Figure 20. Evolution water exploitation index including returns (WEI+), baseline 2006-2030[368]:



At global level, the recent GEO-5 report[369] states that *despite the progress, there are concerns that the limit of sustainability of water resources, both surface- and ground-water, has already been reached or surpassed in many regions, that demand of water continues to increase and that water-related stress on both people and biodiversity is escalating rapidly*. These trends[370] confirm the importance of complementing the analysis of EU water resources with an assessment of the impact of goods and services imported into the EU on global water resources, taking into account local water management contexts (see the chapter regarding Global Aspects).

[368] Source: Lot 1 study.

[369] http://www.unep.org/geo/geo5.asp

[370] mapped e.g. in Vörösmarty, C.J., McIntyre, P.B., Gessner, M.O., Dudgeon, D., Prusevich, A., Green, P., Glidden, S., Bunn, S.E., Sullivan, C.A., Reidy Liermann, C. & P.M. Davies (2010), 'Global threats to human water security and river biodiversity', Nature, Vol. 461: 555-561

A positive development can be expected in terms of integrating the different water polices such as the WFD and Floods Directive. Triggered by the CIS process and the experiences learned from the first planning cycle and more integrated planning and target setting can be expected. Depending on the level of ambition within a RBD this might improve the water status, but there is also the risk of more exemptions as it becomes more obvious that a fully integrated water management is not achievable in many places. The reasons might be found in lack of resources (which might become increasingly scarce due to the current economic crisis), the lack of available land and conflicting objectives with other EU policies. Even if the current proposals of the CAP and the proposed resource efficiency roadmap are heading towards a more sustainable water use, it is too early to determine to which extent the final legal acts and the following implementation actions will deliver these objectives.

The on-going joint project between DG Environment and the EEA for the the computation of monthly water balances at sub-catchment level under the SEEAW framework ("EU water accounts"), is revealing the main data gaps for a proper understanding of water stress and further assessment of water efficiency targets:

- Meteorological data, in particular coastal area, cryosphere and grid size
- River discharge gaps is the major issue (see figure below) jeopardising the whole exercise in many basins, in East and South-East Europe
- Groundwater quantitative status
- Data on water use currently collected at too wide level (lack of stratification and geo-localisation)

The parallel exercise of building a hydro-economic model undertaken by the European Commission (DG Environment and Joint Research Centre) is facing the same problems for a proper calibration of the reference period, and also the lack adequate information on water demand and on the costs and benefits of measures. This is addressed under the problem analysis of knowledge base.

Furthermore, in the preparation of the Blueprint the Commission has started a number of activities for the development of EU water accounts at sub-catchment level, for the assessment of ecological flows and for the building of a hydro-economic model that can support the assessment of policy scenarios and the formulation of targets for water efficiency and reduction of vulnerability, as well as for an indicators system on water scarcity.

The European Commission is developing a baseline scenario bringing together climate, land-use and socio-economic scenarios and looking at the implication for water resources availability and use under different policy scenarios. The aim of the modelling is to seek the maximization of net social benefits from the use of water by economic sectors including a range of components, such as welfare impacts for water users, valuation of key ecosystem

services provision, valuation of external costs from degradation of ecological and chemical status and energy consumption triggered by water abstraction and return[371]. The suite of models are accounting for the variability of quantity and quality of water resources.

In this assessment, availability and development of water resources are evaluated in terms of human consumption, irrigation, environmental requirements (eflows), recreational needs, cost, energy consumption and pollution under global change. For instance, the environmental flow indicator is used to assess the number of days to comply with eflows. Baseline for eflows is defined and compared with new scenarios where different measures have been implemented (e.g. desalination, improved irrigation efficiency). Multi-Criteria Decision Models (MCDM) provide a systematic mean for comparing trade-offs and selecting alternatives that best satisfy the decision maker's objectives. The MCDM process typically defines objectives, chooses the criteria to measure the objectives, specifies alternatives, transforms the criterion scales into commensurable units, assigns weights to the criteria that reflect their relative importance based on stakeholder interactions, selects and applies a mathematical algorithm for ranking alternatives, and proposes an alternative.

The modelling results are promising and show great potential when it comes to setting goals in water balances (including eflows and water scarcity indicators). However, some data gaps have been identified (e.g. discharge data for southern European countries to validate models, large scale water transfers).

If these activities are not integrated under the Common Implementation Strategy and synergies are not found with similar initiatives at national or regional level, there is a risk of duplication and ineffectiveness. Moreover, if the current data gaps and inconsistencies are not solved with additional action, these tools will not be useful.

Under the WFD, water demand and water efficiency are among the issues that RBMPs are called on to address. Appropriate target setting requires levels of information and knowledge that are simply not provided for at present. Furthermore, the lack of consistency and coherence with which methodologies have developed in Europe has persistently presented challenges in establishing water accounting and in monitoring environmental flows[372].

An improved knowledge infrastructure that could permit and control water allocation would foster coherence between water policy and sectoral policies, in particular with the

[371] Ad de Roo, P. Burek, A. Gentile, A.l Udias, F.l Bouraoui, A. Aloe, A. Bianchi, A. La Notte, Onno Kuik, J. Elorza, I. Vandecasteele, S. Mubareka, C. Baranzelli, M. Van Der Perk, C. Lavalle, G.i Bidoglio. 2012. "A multi-criteria optimisation of scenarios for the protection of water resources in Europe". Draft version 6.0.

[372] EEA (2012). Towards efficient use of water resources in Europe. EEA Report No 1/2012. http://www.eea.europa.eu/publications/towards-efficient-use-of-water

agricultural sector, as the baseline indicates that present levels of consumption are unsustainable and often not charged for proportionately[373].

Furthermore, the Roadmap to a Resource Efficient Europe has established that by 2020 water abstraction should stay below 20% of available renewable water resources. The Roadmap sets a 2020 target for water efficiency at river basin level. However, current implementation and target setting practices indicate that the adoption of this target will vary across Member States and is likely to be incomplete. Indeed, a continuation of present approaches, where environmental water allocation is decided at local level, often after thresholds have been surpassed and crises have occurred, is evident within the baseline scenario. If adequately implemented, with consistent and clear methodologies, river basin managers can promote far improved water efficiency across all sectors but notably amongst the current high consumers, whose water use and pricing stands to change the most. If targets are set appropriately, water allocation will be far more effective, in ensuring adequate groundwater recharge rates, costs for abstraction, and in predicting droughts and assessing environmental flows. Those businesses however, which are already water efficient but high consumers, such as the high value agricultural sector could be damaged by increased pricing resulting from caps[47].

Across Europe, water accounting and the implementation of monitoring environmental flows is relatively absent from public policies in the Member States. Nevertheless there are some promising initiatives in place:

- In Austria, both the effects of existing hydropower plants on environment and the economic impacts of environmental restoration on hydropower sector has been assessed in the framework of RBMPs. The majority of stretches impacted by water abstraction has not been designated as HMWB but, on the contrary, eflows regimes and other measures have been designed to ensure the achievement of GES, as well as research projects launched to fill knowledge gaps. A pilot plant has been built to measure the response of aquatic organisms to different conditions (hydropeaking ratio, frequency, swell and downsurge velocities) under strictly controlled conditions[374].

- In France, ONEMA (Office national de l'eau et des milieux aquatiques) is developing a methodological approach aimed to the identification and quantification of changes of flow regime and the consequent habitat alteration. Regarding hydropeaking, three work lines must be highlighted: the construction of the so-called *Index of*

[373] Arcadis et al. (2012). The role of water pricing and water allocation in agriculture in delivering sustainable water use in Europe, study commissioned by DG ENV, ARCADIS, Fresh Thoughts Consulting, InterSus, Typsa & Ecologic Institute

[374] Ofenböck (2012): Minimum flows and hydropeaking, state of play in Austria (presented in CIS ECOSTAT HYDROMORPHOLGY WORKSHOP, 12th and 13th June 2012). Gisela Ofenböck, Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management..

hydrological perturbation, based on discriminant analysis of base flow, maximum flow, range, rate of change and number of hydropeaks; the characterization and monitoring of impacts on fish habitat; and the design of mitigation measures, including changes on management and on stream morphology: Regarding minimum flows, an analysis of the evolution of low flow at large scale during the three last decades and consequent changes in fish communities has been carried out.[375]

- In Spain, environmental flow regimes has been assessed and their impact in current allocation simulated by models that confront water resources with socioeconomic and environmental demands. These regimes, determined for all river stretches by a combination of hydrological and habitat modelling simulation techniques, are still awaiting full implementation in the framework of the consultation process of new RBMPs, but the required hydrologic information systems are virtually ready, so facilitating continuous follow-up of flows. Adaptive monitoring is intended to verify the achievement of objectives and, if not, provide information to adopt the necessary changes in the medium term. On the other hand, the Catalan Water Agency have developed pilot studies In upper river Ter assessing potential costs and impacts of implementation by considering different packs of measures, scenarios and tools for agreement, as well as the willingness to pay for restoring flow regimes and river habitats. This analysis is intended to support implementation process that must be completed before 2015[376].

Moreover, water efficiency and sustainability receives only limited attention as a criterion in decision making processes and, water is currently excluded from Eurostat's Material Flow Accounting (MFA) system.

Furthermore, in many EU Member States, there is a lack of a consistent methodology for calculating water balances, eflows and targets. Action at EU level is triggered not only by the need to ensure consistency of water allocation mechanisms in transboundary basins and a level playing field in the implementation of the WFD, but also by the economies of scale and quality improvements that can be achieved by common methodologies and datasets.

In the current round of RBMPs, attention to measures for ensuring sustainable abstraction varies greatly. However, restrictions in water use are applied in many Member States (AT, CH, CY, CZ, ES, FR, HU, IT, NL, PT, RO, SK, SE, UK) in order to preserve aquatic life and ecological status of water bodies, though the ambitions, methodologies and implementation procedures and successes are different and have not been compiled or

[375] Baran (2012): Hydropeaking and minimum flow : the French approach (presented in CIS ECOSTAT HYDROMORPHOLGY WORKSHOP, 12th and 13th June 2012). Philippe Baran, French National Agency for Water and Aquatic Environments.

[376] Munné (2012): Implementing environmental flows in Catalan rivers. Cost analysis and impact on use (presented in CIS ECOSTAT HYDROMORPHOLGY WORKSHOP, 12th and 13th June 2012). Antoni Munné. Catalan Water Agency.

compared against either the legal objectives or the ambitions of the WFD. The current review of the WSD policy[377] has further highlighted the lack of targets, etc., set out in RBMPs in response to scarcity or drought being linked to concepts such as environmental flows.

However, the Water Framework Directive only sets clear rules for groundwater abstraction [set out in Art 4.1.b (ii)]. In the case of surface water there is only an indirect link via the definition of good status. Moreover, while EU legislation addresses floods, water scarcity and drought has only been the topic of a Commission Communication (2007).

As a result, there is currently no common European policy on water quantity, or consistent and applied definitions of water accounting or environmental flows to support the measures necessary to achieve good ecological status through river basin management planning.

In conclusion, the Water Framework Directive already establishes the legal goals at river basin level within which water accounts, environmental flows and targets would be established and used. It is not, therefore, appropriate at EU level to seek to set specific goals beyond this.

However, in order to help Member States to meet their obligations under the Water Framework Directive EU level action is justified in developing guidance and analytical tools to formulate water accounts, determine environmental flows and set targets for water bodies, water users, etc.

11.3 Objectives

Taking account of the problems identified and the scope for EU policy intervention, the following objectives regarding water accounts, environmental flows and targets are appropriate:

- To improve the capacity of MS authorities to undertake water accounting and determining environmental flows at river basin level.
- To improve the capacity of MS authorities to set targets at river basin level for environmental objectives, sectors and allocations for specific major users.

There objectives will assist in delivering better management of water resources by:

- Fostering integration of water into sectoral policies, by i) considering the actual state of water resources, ii) reducing the level of conflicting objectives and iii) targets and by considering future socio-economic and climatic developments.
- Improving the development of robust analytical tools for development of objectives for practical water management, including for eflows and target setting.

[377] Draft Communication from the Commission: Report on the Review of the European Water Scarcity and Droughts Policy.

- Assisting Member State authorities to use the tools that are available through improved dissemination to ensure that the benefits of improved water management are realised in all river basins and good status is achieved in 2027.
- Improving the effectiveness of drought management planning to reduce risks to the environment, society and the economy.

In taking forward these objectives regarding water accounts, environmental flows and targets in the Blueprint it is important that there are SMART indicators for monitoring their progress and, therefore, whether the objectives have, or have not, been achieved. This will enable the success of policies to be determined and potential barriers (if they occur) to be addressed as policies are reviewed.

For the objectives regarding water accounts, environmental flows and targets, the following SMART indicators are proposed:

- The number of river basins which have undertaken analysis to determine flows, water balances, etc., leading to an understanding of the water accounts of the basin.
- The number of water bodies for which environmental flows have been determined.
- The total number of river basins for which targets for different objectives and water uses have been determined.
- The number of RBMPs that have fully integrated water accounts, environmental flows and target setting within their analysis and development of measures.

11.4 The options and their elaboration

Several policy options to address the problem of target setting and water accounting were developed to be considered within the Blueprint and subject to IA. These options were subject to a SWOT analysis (see Annex D). The options for promotion of tools for accounting, eflows and target setting range from legal amendment to guidance and sharing best practice. Legal amendment has the benefits of ensuring application by Member States. However, the weakness is that such tools may not be robust in all contexts, thus a legal amendment may result in application problems due to divergent circumstances. Guidance does not have this problem, but is not binding. However, for the purposes of Impact Assessment options which are legally binding and which are non-binding will compared.

Table 29 describes the options as originally developed in the project and submitted for the public consultation together with the final elaboration of options included within the IA, following further discussion with the Commission. Thus the option on specific recommendations to be taken forward within the European semester was not considered appropriate for IA as these are individual issues as they arise. The other options were

modified to focus on either development of guidance and tools or legal amendments to the WFD as alternative approaches. The issues were further restructured in a more logical fashion focusing firstly (options 9a1 and 9b1) on understanding flows (accounting and environmental flows) and, once flows are understood, setting targets in relation to flows and other objectives.

Table 29. The options originally considered and final options to address the issues of water accounts and target setting

Options originally considered	Final options for the IA
• Develop guidance through a working group under the WFD Common Implementation Strategy to support the use of water accounting and E-Flows at river basin level (including specific tests in pilot river basins); to agree a methodology for efficiency target setting at river basin level; and to update reporting to the EC to include E-Flows and river flows. • Develop a Recommendation on the use of water accounting, efficiency target setting and environmental flows at river basin level and an indicative EU water efficiency target. • Specific recommendations are considered for Member States on water accounting, efficiency target setting and environmental flows at river basin level in the context of the European Annual Growth Survey for the European Semester. • Adopt technical annexes to the WFD on E-Flows that will require water accounting for river basins; specify the protocol for establishing E-Flows, making the use of the E-Flows definition compulsory in all water stressed river basins; and require the setting up of water efficiency targets on the basis of an agreed methodology.	• Option 9a1 Develop guidance through a working group under the WFD Common Implementation Strategy on the methods and use of water accounting and environmental flows at river basin level (including specific tests in pilot river basins). • Option 9b1 Adopt technical annexes to the WFD on environmental flows that will require water accounting for river basins; specify the protocol for establishing environmental flows, making the use of an environmental flows definition compulsory in all water stressed river basins; and to update reporting to the EC to include environmental flows and river flows. • Option 9a2 Develop guidance through a working group under the WFD Common Implementation Strategy to support the setting up of water allocation mechanisms and targets, including sectoral targets, to achieve water balance at river basin and water body level on the basis of an agreed methodology. • Option 9b2 Adopt technical annexes to the WFD to require the setting up of water allocation mechanisms and targets to achieve water balance at river basin and water body level on the basis of an agreed methodology.

European water legislation has long recognised the potential positive impacts that support measures can provide river basin managers. However whilst promoted within European

legislation, as well as by the technical services of the European institutions, with clear progress being made by the JRC and EEA in enabling MS to better account for water and to develop tools from which to set and achieve targets; the lack of consistent and accurate information is frustrating this progress. The resulting policy options have been developed to support the aims of the Blueprint and directly support each of the operational objectives. The success of both improved water accounting and the use of environmental flow approaches to target setting, will rest largely on the ability of actors to both agree on consistent methodologies that can be assessed accurately (and which is currently constrained by data availability) and to be able to implement the methodologies such that targets are indeed set that provide for improved water allocation (EEA, 2012). Whether this is approached through the CIS (options 9a1 and 9a2) or by amending the annexes of the WFD (options 9b1 and 9b2) the methodological constraints are not trivial. If achieved however the ability to improve water allocation through target setting to achieve water balances could be considerable in supporting good ecological status.

To address the problems of water accounting, identifying ecological flows and target setting, four options are considered. Options 9a1 and 9b1 are to develop a model for water accounting either at Member State level or at European level and support this with guidance on its use, including establishing ecological flows. Option 9a1 is a voluntary option, setting out the approach in guidance, while option 9b1 achieves this through amending the WFD. Options 9a2 and 9b2 support water allocation and target setting in river basins, again either through a voluntary/guidance approach (option 9a2) or by WFD amendment (option 9b2):

- Option 9a1 sets out an involved and deliberative process in the development of guidance that would approach target setting by acknowledging the technical challenges currently faced by river basin managers. Pilot testing in specific basins would provide an opportunity to refine and build capacity in the face of these challenges as well as provide a broad and inclusive technical base from which to draw input.

- Option 9b1 would focus on ensuring consistency in implementation by amending the WFD, setting clear obligations for the practical application of an environmental flows approach; the option also prioritises water stressed basins and places additional requirements on both monitoring and reporting.

- Option 9a2 places emphasis on integrating the application of water allocation through guidance, including within sectoral policies – directly supporting the operational objectives of the Blueprint. The development of guidance through a working group would gather the needed expertise and consensus required to tackle the long standing challenges in this area. Option 9a2 further integrates resource and economic efficiency with the view of ensuring an overall cost-effective water allocation within river basins.

- Option 9b2 takes forward a similar approach to option 9a2, but by placing methodologies for water allocation within technical amendments of the WFD.

Note that options 9a1 and 9a2 involve detailed and deliberative commitment from MS through the CIS process. Options 9b1 and 9b2 involve supplementary annexes to the WFD which may require further impact assessment. Options 9a2 and 9b2 provide the additional benefit of addressing the quantitative management of water resources for water balance and resource efficiency at a basin and water body level necessary to facilitate solutions to other problems, such as that on leakage (see below). It is important to stress that options 9a2 and 9b2 can only be effectively taken forward where there is good water accounting and, therefore, require that one of options 9a1 and 9b1 have progressed.

11.5 Effectiveness, efficiency and coherence of the options

Before examining each of the options in turn, there are some comparative costs involved in establishing new methodologies related to water accounting and e-flows relevant to the implementation of each. Le Quesne et al[378] report that "Water re-allocation from offstream uses to environmental flows presents special financing challenges." From 2008, the Australian government appropriated $3.1 billion to transfer water from irrigation to the severely strained Murray-Darling River system. In 2007, an order to cease irrigation of 33,000 acres of farmland to restore flows in Idaho's Snake River (USA) was estimated to cost the state's economy more than $200 million". Whilst in Sweden a study on the Esman and Ljusnan completed over two years in 2009 cost 17M SEK.

Following national legislation and technical recommendations, and in the framework of implementation of WFD and drafting RBMPs, Spanish Water Administration has carried out studies to assess eflows regimes with the technical assistance of consulting companies, hired for an approximate updated budget of 5,300,000 € (13.3 €/km^2), covering the nine inter-regional river basins (74% of the country). These studies include the determination of flow regimes in rivers and estuaries (including relaxation, if any, during prolonged drought situations) and also the ecological needs of selected lakes and wetlands. A significant budget is devoted to support to the implementation process. Habitat modelling has been used in 10% of SWB (around 280) and hydrological studies for all of the 2,785 type river SWB.

The implementation costs are difficult to assess since multi-objective measures may play an important role (e.g. modernization of irrigation areas) and eventual compensation payments (if water rights are to be modified) are controversial. In the specific context of hydropower restructuring along the upper Ter river (a stretch that hosts up to 85 installations of this kind), Catalan Water Agency have estimated that implementation cost varies between 9 and 20 € per inhabitant of the affected region per year, depending on considering or not

[378] Le Quesne, T., Kendy, E. and Weston, D. (2010). The Implementation Challenge: Taking stock of government policies to protect and restore environmental flows. WWF.

compensation costs[379]. Furthermore, regarding target setting, to promote the conservation and wise use of water, Canada intends to achieve a 30 % reduction in water use in various sectors by 2025 (based on 2009 water use levels)[380].

There are clear uncertainties about the cost implications of addressing the options irrespective of the approach adopted, as each approach looks to develop new methodologies, the implications of which in cost terms are uncertain, which is why these figures from the US, Australia and Sweden are useful in underlining the level of uncertainty that each of these options represents irrespective of approach – the level of implementation will need to be at the river basin level and thus, inevitably that is where much of the additional burden may fall. These support measures then will need to provide implementation support, and not be limited to the difficult technical challenges of agreeing methodological approaches.

Option 9a1 presents some advantages because of the pilot process it suggests to test the efficacy of the approaches developed. Option 9a1 in common with the other options; clearly addresses the four operational objectives below:

- Foster integration of water into sectoral policies, by ensuring that impact of socio-economic activities and regulations on the state of water resources is fully taken on board.
- Increase the use of economic instruments for a better allocation of resources and internalisation of external costs.
- Achieve more efficient water governance and effective working relationships between institutions, and fully integrate water quality, quantity and hydromorphology issues in management actions.
- Improve knowledge and tools available to water managers, enabling effective decision making and reducing administrative burden.

However, each of the options here face challenges in providing river basin managers with knowledge and tools within the second cycle – limiting the success in also achieving greater integration, economic instrumentation and strengthening working relations.

However, Option 9a1 presents some commitments that in the longer term would ensure both a consistent and tested methodology is in place (supporting policy coherence), and

[379] Munné (2012): Implementing environmental flows in Catalan rivers. Cost analysis and impact on use (presented in CIS ECOSTAT HYDROMORPHOLGY WORKSHOP, 12th and 13th June 2012). Antoni Munné. Catalan Water Agency.

[380] BIO Intelligence Service, Institute for Social Ecology and Sustainable Europe Research Institute (2012) Assessment of resource efficiency indicators and targets. Final report prepared for the European Commission, DG Environment:26

that guidance would be available at river basin management level (efficient and targeted). There are though a number of significant drawbacks. Firstly, operating through the CIS process provides for high levels of input and implementation from Member States, but this is also a more time consuming process. There are for example some 26 CIS guidance documents currently published.

Such guidance would as suggested need to be developed and tested through a specific piloting stage, thus following further amendments; it is unlikely that such guidance would be available before 2014. The costs of this approach would be able to be met through varying implementation funds and a lead Member State would need to have consistent scientific input from other Member States and from the technical agencies of the European institutions to discuss data consistency and eventual monitoring and evaluation methodologies.

As the delivery mechanism chosen for the methodology is guidance there are further issues regarding, integration with other sectors, governance, the use of economic instruments and knowledge available to river basin managers. Guidance presents flexibility as a delivery mechanism but it may also limit the degree to which implementation may occur and the extent to which integration with other sectors is attained. In terms of governance the CIS process will provide the buy-in of MS, but it will also clearly be time-consuming.

Guidance that follows testing may at the earliest be available in 2014/15 hampering the governance of the sector; as water allocation continues to be based on poor information, limiting the introduction or adjustment of economic instruments that will both improve the overall accounting of the sector and also set incentives to reduce abstraction and improve good ecological status. Nonetheless, the CIS process has also shown examples of “fast-track transfer” of knowledge and good practice, and it could be expected that water balances and e-flows are being picked up in the process of drafting the 2nd generation of RBMPs, e.g. as a result of the discussions in the Expert Group on Water Scarcity & Drought. Long term cost adjustments, and the introduction of improved governance operations and economic instruments may not be effectively operating before 2019. This may also delay the effective application of the Polluter Pays Principle as charges remain poorly allocated. Finally, though the knowledge available to river basin managers of the basic levels of water available, allocated and the costs involved will still remain unavailable for a considerable period of time.

Whilst guidance may not prove as binding as legislation, greater awareness amongst river basin managers of the flows and costs of water allocation will encourage greater water efficiency, as well as a better risk management. The consistency with which target setting is achieved relative to the guidance may remain less certain. As such the piloting phase of the approaches developed may be well served by examining their applicability in a range of different basins. The efforts of the EEA in establishing methodologies for target setting have

highlighted a number of data quality issues that would need to be resolved by MS in order to provide for consistent methodologies.

Water stress and vulnerability will continue increasing, according to the forecasts on water consumption which will place greater pressure on river basin managers to allocate water resources and to have appropriate caps and charges in place. Guidance will certainly improve the governance, knowledge base and likely application of economic instruments, the degree to which guidance will support integration with all sectors remains questionable. This may yet be a focus of the methodological debates that will likely be part of the development process, and be further considered during the piloting phase of the option's development.

An EU level water accounting system is being developed to allow for accounting at sub-catchment level. However, this requires provision of data from Member States and these are not effectively delivered in all cases. Guidance (option 9a1) is unlikely to be effective in this regard. However, a WFD amendment (option 9b1) would not be developed until the WFD review and, therefore, not come into force for several years. As a result, the two options need not be viewed as alternatives. A voluntary approach better supported by guidance from the Commission could be taken forward and the regulatory option proceeded with if Member States fail to supply data or otherwise support water accounting where it is needed.

Option 9b1 is perhaps the most rigorous of the options set out to ensure improved target setting. Requiring water accounting for river basins and in making the definition compulsory in all water stressed basins presents a vigorous counter to the current baseline performance in water allocation. Given the degree of compliance that would be required the level of improved action in setting targets, caps and costs in line with more accurate figures on water availability and use might be assumed to be high and have a considerable impact compared to the baseline.

However, the development of such a protocol, implementation, and reporting would place considerable administrative burdens on MS, notably those with high levels of existing water stress. The success of such a protocol may be constrained too by the level of current data available on water stress and e-flows[381], in particular regarding the definition(s) of "water-stressed basins". A large number of studies have been carried out in order to identify these basins with different approaches[382] that have led to significant discussions, and no

[381] EEA (2012). Towards efficient use of water resources in Europe. EEA Report No 1/2012. http://www.eea.europa.eu/publications/towards-efficient-use-of-water

[382] E.g. Pierre Strosser, Thomas Dworak, Pedro Andrés Garzon Delvaux, Maria Berglund, Guido Schmidt, Jaroslav Mysiak, Maggie Kossida, Iacovos Iacovides, Victoria Ashton (2012):Final Report Gap Analysis of the Water Scarcity and Droughts Policy in the EU. European Commission Tender ENV.D.1/SER/2010/0049, and Schmidt & C. Benítez (2012): Topic report on: Assessment of Water Scarcity and Drought aspects in a selection of European Union River Basin Management Plans.

consensus has been reached so far on the identification of those basins, either under current or future water stress.

We might argue that such a protocol, assumed to be effective, would have a direct impact on good ecological status. The adoption and control of more stringent target setting by MS, particularly in water stressed basins should alleviate several factors affecting today's baseline. Namely, quantifying the amount of water entering and leaving a basin, whether through abstraction or not. Such abstraction might more readily be the subject of water pricing, adjusted to reflect more accurate values and costs. Groundwater recharge and water availability might be understood to be consequences of reduced consumption over time, building resilience to water stress and vulnerability over time. These environmental impacts present several economic and social consequences.

More stringent allocation control and potential increased water charges may have negative impacts on businesses, such as energy production and agriculture reliant currently on the possibility of new allocation and lower cost abstraction. This may though lead to market adjustments and longer term, incentivise innovative and more efficient responses to the changed market structure. Moreover, particularly in relation to agriculture, more accurately set economic instruments will provide a degree of stability for the sector and set more accurate investment levels[383]. However, it is not possible to determine the level of any charges/allocation and, therefore, quantify impacts on business sectors.

Resilience in the sector to increased future uncertainty due to climate change may well also be mitigated by a level of water availability that is more accurately controlled, more fairly priced and allocated, and more likely to be available in the long-term if prices curtail over consumption and increase recharging of groundwaters. Riegels et al[384] highlight how small enterprises in northern Greece are likely to be adversely affected by rising water prices, but also underline the difficulty in assessing groundwater flows, and the implications this may have on guidance provided to river basin managers in practice.

Greater awareness of water stress amongst river basin managers is also likely longer term to improve the awareness and water efficiency of business and further downstream domestic consumption. Particularly in water stressed areas longer term restoration of water resources, not just in terms of quantity, but also in terms of quality as higher flows result in fewer technical fixes, should result in more secure long term supplies and earlier warning and mitigating actions in times of drought (EEA, 2012, see also Communication on Water Scarcity and Drought, 2007).

[383] Bogaert et al (2012). The role of water pricing and water allocation in agriculture in delivering sustainable water use in Europe – report to the European Commission.

[384] Riegels et al (2012). Comparison of two water pricing policies in hydro-economic modelling.

Option 9b1 may present a rigorous option, but this may in practice not foster the levels of good governance sought by the Blueprint given the limited capacity of river basin managers to reach the levels of activity and implementation of measures promoted here. Option 9b1 may therefore present burdensome administrative arrangements.

Option 9a2 appears to have the most diffuse objectives of those suggested to address the problem of target setting. Common to the other options are the economic, social and environmental impacts – these again vary only marginally depending upon the efficacy and speed with which the option might be realised. In this instance the CIS process does place time constraints on how quickly more effective target setting can be achieved compared to the baseline. In almost all MS target setting is currently inefficient, sets water prices below valuations, and is poorly integrated across the sector (Bogaert et al 2012).

However, the degree to which a working group under the WFD CIS process might rectify these issues is unclear. There are a number of obstacles to the successful implementation of such an approach, including the management of sectoral water targets and their relation with water use permitting, and the relationship between individual efficiency targets for products and overall targets at the RB(D) levels. The working group would place both technical and administrative burdens on MS; whilst prioritisation would be difficult to achieve as water stress basins are not specifically targeted. The guidance produced through what we can assume to be a process that would last in excess of 24 months, may prove too diffuse to have direct impacts on the key driver of good ecological status, the wider environmental, economic and social impacts may prove again less evident and noteworthy.

One example for expected problems is the poor implementation of the guidance on water pricing, which the WFD already requires MS to be using water pricing (the current target remains at 2010) to reduce water stress and incentivise efficiency. Therefore, much would depend on the effectiveness of the Working Group in prioritising longstanding methodological obstacles, and in simplifying guidance to a level which is easily and effectively implemented at river basin level.

The option does not however place reporting duties on MS, which may reduce the administrative burden, but also the effectiveness of the targets set.

Effective water allocation and target setting is needed in water scarce river basins. This can ensure not only the maintenance of ecological flows, but also an economically and socially equitable distribution of water. Option 9a2 aims to support Member States authorities' action in this area through guidance. There is some lack of information and tools and the option would be effective where this is currently a barrier. Furthermore, guidance is able to explore a wide range of different aspects of target setting (different sectors, types/sizes of river basin, water rights contexts, etc.), maximising its usefulness. It can also be taken forward relatively quickly. A WFD amendment (option 9b2) would be binding and ensure

target setting respects ecological flows as part of Good Ecological Status. However, it would take several years to enact. As with options 9a1 and 9b1, the two options can be viewed together as a voluntary option, followed by a regulatory option if target setting remains a significant problem in the EU.

Option 9b2 sets out to, Adopt technical annexes to the WFD to require the setting up of water allocation targets on the basis of an agreed methodology. This option removes the specific wording around water pricing and e-flows and instead implies that it remains an outstanding task to resolve the methodological challenges mentioned above, notably on data availability, before a Community-wide system of target setting might be in place. Though no longer prescriptive in suggesting how targets might be set, i.e. through water accounting or e-flows, the advantages of this option are that longer term, a simplified and common approach might be determined that may prove less burdensome on MS given the current technical costs and complexities of target setting using new methodologies[385]. This option may well be the longest term, and take the longest amount of time to develop – limiting the coherence and effectiveness of that option.

However the impacts are common to each of the options – if, the overall goal of accurate target setting is achieved. Falling short of the objective of the option rests, again, as common with the other approaches, on the technical limitations, and the time restrictions placed on the approach by amending the technical annexes to the WFD.

Option 9b2 in common with the other options here is clearly intended to support river basin managers, enable the introduction of economic measures and foster working relationships and good governance – however, again in common with the other options the degree to which this support will be operable within the second and even third cycles is unclear and may impact upon the overall effectiveness, coherence and efficiency of the option.

11.6 Acceptability

The public consultation asked for views of options in a different format to those addressed in this IA. However, the results of the public consultation provide a good guide to the acceptability of options within the IA.

In order to address the problem of target setting in river basins, the public consultation sought views on whether guidance should be developed through a working group under the WFD Common Implementation Strategy to support the use of water accounting and E-Flows at river basin level (including specific tests in pilot river basins); to agree a methodology for

[385] Naumann, Sandra, Gerardo Anzaldua, Pam Berry, Sarah Burch, McKenna Davis, Ana Frelih-Larsen, Holger Gerdes and Michele Sanders (2011). Assessment of the potential of ecosystem-based approaches to climate change adaptation and mitigation in Europe. Final report to the European Commission, DG Environment, Contract no. 070307/2010/580412/SER/B2, Ecologic institute and Environmental Change Institute, Oxford University Centre for the Environment.

efficiency target setting at river basin level; and to update reporting to the EC to include E-Flows and river flows. 49% of respondents supported this approach, 29% did not support it, while 22% did not know. **Therefore, overall, guidance on target setting was supported in the public consultation**.

The consultation asked for views on whether the Commission should develop a Recommendation on the use of water accounting, efficiency target setting and environmental flows at river basin level and an indicative EU water efficiency target. 43% of respondents supported this approach, 42% did not support it, while 15% did not know. **Therefore, views were evenly divided on support and opposition for a Recommendation**.

On the development of specific recommendations for Member States on water accounting, efficiency target setting and environmental flows at river basin level in the context of the European Annual Growth Survey for the European Semester, 26% of respondents supported this approach, 51% did not support it, while 23% did not know. **Therefore, the consultation overall did not support the approach of making recommendations in the context of the European Annual Growth Survey for the European Semester**.

On legal change to adopt technical annexes to the WFD on E-Flows that will require water accounting for river basins; to specify the protocol for establishing E-Flows, making the use of the E-Flows definition compulsory in all water stressed river basins; and to require the setting up of water efficiency targets on the basis of an agreed methodology, 33% of respondents supported this approach, 53% did not support it, while 15% did not know. **Therefore, the consultation overall did not support a regulatory approach**.

The responses indicate support for voluntary approaches: just under half of the respondents (49%) are in favour of the development of guidance on water accounting and e-flows, and respondents were evenly split on support for development of a Recommendation. In contrast, 51% of the respondents oppose addressing these issues via the European Semester, and 53% oppose a regulatory measure to adopt technical annexes to the WFD on e-flows, water accounting and related issues.

A number of written comments from industry call for flexibility in implementing targets and e-flows; some also underline a need for transparent data collection and methods prior to any decisions on an efficiency target and/or to any legislative decision in this matter. Several replies (not only from industry) call for further discussion on efficiency targets before any action. Several responses welcome proposals for new data gathering in this area. In addition, some industry comments emphasised that the type of use should be considered in any methodology to measure water quantity – a few such replies distinguish between 'non-consumptive' uses such as cooling water and 'consumptive' uses such as irrigation. Electricite de France states that E-flows should be seen as a flexible water management tool, site specific, which can vary along the year depending on the season and on the

different needs (ecosystems and other uses). As the impacts on ecosystems are different, it's crucial to distinguish clearly between withdrawal (uses in which water returns to the eco-system) and consumption of water (uses in which the water does not return to the eco-system).and to address the two situations differently. The need for flexibility in approach is echoed by Eurocoal. Central Europe Energy Partners states that further guidance to authorities on how to use water accounting and the integration of drought management plans in the water framework directive might be useful, but concrete efficiency targets should only be set as lender of last resort and only in water scarce river basins. Verband Kommunaler Unternehmen supports the development of water accounts, but the setting of water efficiency targets on river basin level should only be envisaged once reliable data on all regional water flows are available and a clear picture on a possible future water gap is given.

A few national public bodies are also concerned about differences across the EU: several responses from administrative bodies in northern Europe question the value of setting e-flow requirements for their waters. A North European administrative body also states that water allocation systems should meet the demographic, social and economic needs specific to regions. Most national bodies that provided written comments, however, are supportive of sharing best practices and developing methodologies in this area. One response from a national administrative body calls in particular for analysis of the water quantity impacts of EU biofuel targets. Some written responses from national administrative bodies support an EU Recommendation in this area: one such reply states that a Recommendation would be 'useful', though perhaps not necessary at present.

A number of NGO replies underline the value of developing guidance and methodologies at EU level, with consideration of possible amendments to the WFD in the longer term. Wetlands International considers that the lack of common definition and application of environmental flows is rightly identified as a barrier to achieving good ecological status. However, it considers that nature should be considered as a multiple service provider. WWF also supports action on improved accounting and eflows, preferring the legislative options to deliver this. The Consumer Council considers that decisions about water resources should be based on robust and sound evidence. Thus policy options should be proportionate and take into consideration that some Member States are not affected by all of the problems identified within the Blueprint. Wetlands International also calls for the EU to draw on international experience with e-flows in developing guidance on this topic. WWF also supports actions taken via the European Semester process, as this is a key mechanism to link environmental and economic objectives.

With regard to published positions by organisations, the European Environment Bureau[386] strongly supports water management based on the concept of environmental flows. It

[386] EEB (2012). EEB's main priorities of the Blueprint to Safeguard Europe's Water.

supports the development of CIS guidance to support the use of water accounts and environmental flows. This is consistent with the results of the public consultation.

11.7 Conclusions

In conclusion, while options 9b1 and 9b2 would be stronger options in the sense that the requirements would be established in law, these options have two distinct drawbacks:

They cannot be progressed at the earliest until the review of the WFD and, therefore, would be unlikely to be able to influence the third round of RBMPs. This delay would mean that the problems identified at the start of this section would not be addressed for some years.

The issues addressed by accounts, eflows and target setting are complex, with numerous individual elements, nuances, etc. Setting methods in law usually cannot reflect all of these and there is a risk that such amendments would either lack sufficient information to drive Member State change or be too rigid to allow for the flexibility that is needed between river basins.

Therefore, it is recommended that the two non-legislative options should be progressed with the Blueprint:

- Option 9a1 Develop guidance through a working group under the WFD Common Implementation Strategy on the methods and use of water accounting and environmental flows at river basin level (including specific tests in pilot river basins).
- Option 9a2 Develop guidance through a working group under the WFD Common Implementation Strategy to support the setting up of water allocation mechanisms and targets, including sectoral targets, to achieve water balance at river basin and water body level on the basis of an agreed methodology.

Once the guidance has been developed, the degree to which the guidance influences the work of river basin authorities and improvements in river basin planning can be examined (based on the SMART indicators elaborated earlier). If problems persist and there is little progress on accounts, eflows and target setting despite the development of guidance, then the value of legislative options could be revisited on the occasion of the review of the WFD.

Table 30. Overview of the effectiveness, efficiency and coherence of options to address the problem of target setting.

Note that the effectiveness, efficiency and coherence of the guidance options and legal amendment options are similar and are, therefore, summarised together.

Option (s)	Options 9a1 regarding the development of guidance for water accounting and eflows and option 9a2 to develop guidance to support target setting	Option 9b1 to adopt technical annexes to WFD on water accounting and eflows and option 9b2 to adopt technical annexes to WFD on target setting
Effectiveness towards specific objective of improved integration	+ Guidance is able to explore a full range of sectoral issues in developing targets and in water accounting. It can, therefore, examine sectoral integration challenges in different contexts. However, its impact on integration is dependent on MS use of the guidance.	+ Legal amendment of the WFD can be developed with sectoral integration as an objective. However, it is less flexible than guidance. However, being binding it can stimulate change in MS sectoral institutions in ways that guidance is unable to.
Effectiveness towards other objectives	++ Guidance would explore a wide range of technical and policy issues surrounding target setting and accounts, thus significantly enhancing knowledge base and aiding governance. If implemented, significant water efficiency gains would ensure.	++ Legal amendment would stimulate changes in RB governance, ensuring targets are set/accounts used. Effective implementation would require enhanced knowledge by water managers and the binding nature of the option would deliver increased water efficiency.
Efficiency	+/- the impact will depend significantly on the use of guidance, but it is potentially less burdensome than H2. The efficiency depends largely on the buy-in and active participation of MS	-/+ The development of legal change is a burden and will take significant time, which is inefficient. Once adopted, however, the binding nature of the option will help to deliver outcomes and is efficient as a tool.
Coherence	+ Guidance can explore the full range of legal and policy issues surrounding target setting, presenting opportunities to ensure coherence.	+ Legal amendments can accommodate specific coherence issues and implementation would require MS to examine policy coherence at RB level.
Acceptability	+ Public consultation: development of guidance is supported by 49% of respondents, with 29% against.	- Public consultation: legal amendment is opposed by 53% of respondents, with 33% in support.

12 DROUGHT MANAGEMENT

12.1 Introduction and problem definition

Droughts have become more frequent and severe in large parts of Europe. South-eastern Europe is increasingly facing protracted periods of droughts, and both Northern and Western Europe have likewise been affected lately. Severe water shortages at specific locations are expected about once every 50 years but the frequency of drought events has been increasing over the past years. This trend is likely to be further exacerbated by climate change, land use changes and water abstraction.

Drought risks will continue to be substantial and may even be exacerbated in many parts of Europe[387]. A recent study[388] using the WaterGap model concludes that, in the absence of further policy action to improve drought management in the EU, an increasing number of river basins, and Spanish, French and Northern river basins in particular, could become water stressed over time. A growing number of Eastern European basins near the Black sea are also likely to face increased drought-related problems.

Droughts have significant social, economic and environmental impacts in Europe. A large-scale assessment of the socio-economic impacts of droughts estimated the economic impacts for the past 30 years at €100 billion across the EU, with annual costs at over €6.2 billion or 0.05% of (2006) GDP (2006-2007 survey prepared by DG Environment). However, economic costs of individual drought events can be much higher[389].

Drought management is promoted by the WFD and guidance to support the production of drought management plans has been produced. However, the threat of increasing droughts with climate change presents a major challenge to water managers in many parts of the EU.

Droughts are not new, but the key problems to be addressed in the Blueprint are the effectiveness of the preparedness for drought through effective planning and information as well as the ability to respond to droughts when they occur.

12.2 Baseline and the justification for EU level action

While the WFD mentions droughts as potential threats which may undo the efforts to achieve good ecological status of Community water bodies, drought mitigation is but the last among the aims underpinned in Article 1 of the WFD, and the one which is least substantiated.

[387] Intecsa-Inarsa (2012): Task 3d - Water Abstraction and Water Use. Final deliverable.

[388] This section draws on ACTeon, FreshThoughts, Typsa, IACO, Artesia Consulting and FEEM. (2012). Water Scarcity & Droughts Policy in the EU - Gap Analysis. Report to the European Commission. Tender ENV.D.1/SER/2010/0049.

[389] Demuth, S. (2009) Learning to live with drought in Europe. A World of Science, Quarterly newsletter of the Natural Sciences Sector of UNESCO 7(3), 18-20.

In order to close these gaps, the EU has addressed some quantitative aspects of water policy. The Floods Directive addresses this topic but does not set any target in terms of risk reduction. The 2007 Communication on water scarcity and droughts presents an initial set of policy options to address and mitigate drought issues, but does not set any quantifiable target to reduce water use.

Among the seven policy options outlined in the Communication, is the improvement of drought risk management away from a crisis response to a modern, comprehensive risk management approach, based on a profound understanding of the drivers and impacts of drought and making use of advanced monitoring and early warning systems at the European level.

The Communication stated that the WFD has "sufficient flexibility to develop specific DMP in relevant RB" (p. 9). This Directive has however not triggered any legal action in this area so far and MS are thus not legally required to address water scarcity and drought issues. No specific implementation processes or tools are reported to have been put in place either. Any action to address drought management in Europe is expected to be undertaken through existing EU policies, as well as through measures and actions taken at Member State level (Intecsa-Inarsa, 2012).

The absence of binding prescriptions as well as implementation mechanisms and tools has resulted in the objectives of the Communication being only partially met (Intecsa-Inarsa, 2012, p. 49). With regard to drought management plans (DMPs), the Commission's Staff Working Paper accompanying the Third Follow-up Report to the Communication on water scarcity and droughts in the European Union states that (…) several Member States reported not to have separate plans. These are in most cases embedded in RBMPs or regional plans (AT, BE, HU, NL, RO, SK), emergency management (LU) or specific early warning systems (PT). Three Member States reported that their drafting process for these plans is ongoing (MT, CZ, CY), in others the need for such a plan is under discussion (EE), they have regional plans (IT) or do not have such a plan at all (IE, SE, BG). FR, ES and UK are the only Member States who reported to have separate drought management plans already in place

Droughts are reported in the River Basin Management Plans for a wide range of RBDs across Europe. 40% (44 RBDs) of the RBMPs assessed, do not consider drought as a relevant phenomenon. According to 10 RBMPs, droughts are recognised as RBD-wide phenomena, and for other 27 RBDs, local or sub-basins droughts are said to take place. In 15 RBDs, droughts and water scarcity affect part of or the entire basin, though the two conditions are not clearly distinguished.

However, within RBMPs, water quantity issues are often inadequately addressed. Water demand scenarios are presented in only 35% of RBMPs and water availability scenarios in less than 25%. Most plans do not consider data uncertainty and in only 12% of plans are pressures on water resources identified according to different sectors. Very few RBMPs in

water scarce areas propose measures to restrict new water using activities[390]. Most proposed actions prioritise new water supplies. Furthermore, inadequate governance frameworks (such as co-ordination of planning and financing) are a major obstacle.

Thus there is a need to improve the preparedness of Member States to manage future droughts, which are expected to increase in frequency, intensity and geographical scope with climate change. The extent and effectiveness of drought management planning in some Member States is still below that necessary to meet these challenges and protect economies and society from drought impacts. Therefore, there is a clear need for EU action.

The justification for EU level action is clear where improved support for drought management involves pan-European information provision, such as early warning systems. Furthermore, use of EU funds to address the consequences of drought is an appropriate EU-level response.

With regard to drought management itself, action at EU level is justified. Firstly, the issue is already promoted in the WFD and, therefore, elaboration of this EU legal instrument could be justified. Secondly, the Floods Directive is a legal instrument setting out a process for risk assessment and planning which could be analogous to drought management. Thus a similar justification for EU level action is possible. However, there would not be justification for detailed target setting within river basins, for example, for drought management at EU level.

12.3 Objectives

The policy options with regard to drought management that are considered in this impact assessment have direct bearing on at least three of the specific objectives set out by the European Commission in the context of the Blueprint.

The first of these objectives consists of achieving more efficient water governance and effective working relationships between institutions, and fully integrate water quality, quantity and hydromorphology issues in management actions. Monitoring progress toward this objective could be undertaken on the basis of the number of drought management plans that, according to the specifications outlined by the chosen policy instrument (and, if applicable, in transposing legislation), will have been fully and properly developed in drought risk areas and integrated in RBMPs in each future cycle.

Improved drought management policy action could directly contribute is fostering integration of water quantity issues into sectoral policies. Indicators are proposed here for two key water-consuming sectors: agriculture and energy.

Finally, improved drought management is a critical element of improved water governance – a third key objective of the Blueprint.

[390] Draft Communication from the Commission: Report on the Review of the European Water Scarcity and Droughts Policy.

In taking forward the objectives for drought management in the Blueprint it is important that there are SMART indicators for monitoring their progress and, therefore, whether the objectives have, or have not, been achieved. This will enable the success of policies to be determined and potential barriers (if they occur) to be addressed as policies are reviewed.

For the drought management objectives, the following SMART indicators are proposed:

- The number of river basins potentially subject to droughts which have developed full drought management plans.
- The number of river basins potentially subject to droughts where the RBMPs have fully integrated drought management plans, including directing the nature of the measures in PoMs.

It is also possible to consider indicators for improved preparedness for droughts at the sectoral level. These are set out below.

For the agricultural sector, the following indicators can be considered:

- Changes in overall water consumption by the agricultural sector.
- Changes in water efficiency levels of the agricultural sector, as measured by water abstraction per crop produced (EEA).

For the energy sector, proxy indicators could mirror those suggested for the agriculture sector; i.e.:

- Changes in overall water consumption by the energy sector.
- Changes in water efficiency levels of the energy sector, as measured by water abstraction per TWh produced (EEA).

For households and the service sector, indicators for water efficiency of household appliances and buildings are discussed in a separate section of this report.

At a more general level, other relevant, outcome-oriented indicators are:

- The change in the number of water-stressed areas, with a view to assess the extent of reduction in water-stressed areas for 2015-2020 and expected compliance with the WFD by 2027. This is already measured by the EEA.
- Changes in the WEI in drought-risk areas, taking into account the same timescales as above.

12.4 The options and their elaboration

Several policy options to address the problem drought management were developed to be considered within the Blueprint and subject to IA. These options were subject to a SWOT analysis (see Annex D). Legal obligations (through a new Directive or amending the WFD) would provide a strong basis for enhanced drought management and positive protection for society. However, there is likely to be strong resistance to a legal change. Funding for emergencies also has strengths, although it is weak in changing planning if conditionalities are not imposed as the option requires. Each option has strengths and weaknesses, but the options provide a useful range of different types of intervention to compare with Impact Assessment.

Table 31 describes the options as originally developed in the project and submitted for the public consultation together with the final elaboration of options included within the IA, following further discussion with the Commission. It was considered that action is already being undertaken on the European Drought Observatory and a review of the Solidarity Fund is to be undertaken separately. Therefore, specific options on these issues within the Blueprint IA are unnecessary (although they are important contributors to drought management). The enhancement of drought management in the WFD was clarified as two alternative approaches – a Recommendation and amendment to the WFD. The option on a drought management Directive is retained.

Table 31. The options originally considered and final options to address the problem of drought management

Options originally considered	Final options for the IA
• Enhance drought management planning into the next cycle of River Basin Management Plans under the Water Framework Directive for all drought-affected, or potentially affected, Member States. • Develop a European wide early warning system for droughts to timely alert Member States on the need to take counter-measures. • Establish a drought emergency fund which would group in a single instruments and enhance the funding possibilities currently available under the EU Solidarity Fund and rural development funding. The Fund would include appropriate conditionalities on drought prevention measures being	• Option 10a consists of adopting a Commission Recommendation to enhance the integration of drought management issues into RBMPs. This Recommendation would encourage all Member States currently or potentially affected by drought events to take action in the context of the next cycle of RBMPs • Option 10b1 consists of amending the WFD to require Member States to develop and implement drought management plans on a river basin level. Member States would also be required to report specific measures contained in these plans to the European Commission. • Option 10b2 is the adoption of a Drought Management Directive. This Directive

taken. • Establish a drought management directive to require Member States to develop and implement river basin drought management plans with specific drought measures to be reported to the Commission.	would also make compulsory the development of DMP at the river basin level, in coherence with the planning process of the WFD.

Option 10a. The first option consists of adopting a Commission Recommendation to enhance the integration of drought management issues into RBMPs. This Recommendation would encourage all Member States currently or potentially affected by drought events to take action in the context of the next cycle of RBMPs.

Option 10b1. The second option considered here consists of amending the WFD to require Member States to develop and implement drought management plans on a river basin level. Member States would also be required to report specific measures contained in these plans to the European Commission.

Option 10b2. The third policy option under consideration is the adoption of a Drought Management Directive. This Directive would also make compulsory the development of DMP at the river basin level, in coherence with the planning process of the WFD.

12.5 Effectiveness, efficiency and coherence of the options

Compared to the baseline, all three options assessed here can help improve sustainable water management and enhance Member States' capacity to reduce drought-related risks. However, as will be discussed, the choice of the policy instruments will matter in terms of effectiveness, efficiency and overall coherence of the expected outcomes.

Effectiveness

The Gap Analysis for the water scarcity & droughts policy[391] identifies the development of drought management plans as well as requirements for Member States to monitor progress on drought management as part of the second RBMP cycle as key elements. The effectiveness of the different policy options will to a large extent depend on their contribution in this regard.

[391] Acteon (2012): Gap Analysis of the Water Scarcity and Droughts Policy in the EU: http://ec.europa.eu/environment/water/quantity/pdf/WSDGapAnalysis.pdf

Option 10a

Two main factors are expected to determine the actual impacts of policy option 10a: a) specific content and design of the Recommendation; and b) uptake and implementation levels across the EU.

Regarding the first of these elements, studies indicate that integration of drought issues/DMPs more directly into RBMPs rather than presenting them simply as annexes to RBMPs, would ensure a larger coherence and consistency and make sure that River Basin Management Plans contribute to increasing the resilience to droughts. Ensuring consistency across results of modelling carried out for the preparation of each set of plans is also important in this regard.

Moreover, uptake levels of the recommendation will largely determine the effectiveness of the option. In the absence of legally binding requirements, these levels are difficult to foresee and so are associated costs and benefits.

Options 10b1 and 10b2

Evidence in other policy areas suggests that legally binding requirements to implement drought management plans are likely to substantially contribute to strengthening drought risk management capacity in the EU as a whole compared to the baseline, as penalties would apply in case of infringement. These options would thus be more effective than option 10a. Actual socioeconomic and environmental impacts of either option would however depend, to some extent, on measures implemented by Member State authorities as a result.

The Gap Analysis study affirms that, independently of the content of the drought management plans, adopting a Drought Management Directive would enhance the policy profile of drought management and contribute to raising awareness on drought issues in MS. This may entail long-term economic and environmental benefits.

In the case of 10b1, as will be discussed later in this section, time restrictions imposed by the review calendar of the WFD need to be taken into account.

Conclusion

The issue of whether a binding legal instrument or a non-binding instrument would be more effective has to be further examined in the wider policy context. On the surface, binding legislation can be presumed to be more effective and, indeed, all experience in other water policy areas would support this view.

However, the options are all set out as separate legal instruments. In practice, however, water management is driven by the planning processes of the WFD. An additional question

concerning effectiveness is whether separate legal instruments would be more effective than seeking to improve the processes within the context of the WFD itself.

The WSD Gap Analysis has found good practice in drought management currently in place – drawing on the guidance supporting DMP. There are gaps in the extent of drought management planning and problems in ensuring their integration within RBMPs. However, while a separate legal instrument would be more likely to deliver drought management where it currently does not exist (in drought risk river basins), it would not necessarily improve integration with RBMPs.

Therefore, there are arguments both for using a new (or revised) strong legal instrument to push drought management where it is currently lacking and arguments for seeking to enhance the current policy framework, building on the good practice and seeking to integrate drought management as far as possible within the processes of the WFD.

Efficiency

The level of detail and comprehensiveness of a Commission Recommendation on drought management (10a) is likely to be positively correlated with administrative burdens for EU and Member State authorities as well as compliance costs. Sufficient detail will on the other hand probably be required to ensure consistent interpretations of its content across the EU.

Although all options will to some extent generate administrative burdens, results from the stakeholder and public consultation (see 3.10.7 for further details) as well as discussions during Expert Group meetings suggest that administrative burdens would be higher for options 10b1 and 10b2. In the same vein, legislative measures are likely to be perceived by Member States as generating undue burdens in terms of compliance requirements. Both 10b1 and 10b2 are therefore expected to face opposition. Overall efficiency may be higher for the legislative options, as more Member States are expected to be undertaking this work than in option 10a, thus possibly increasing resulting synergies and learning among Member States.

Coherence

A similar pattern of impacts is seen in terms of coherence with broader EU objectives, including those set out in the WFD as well as climate change adaptation. On the one hand, option 10a would not be legally binding. Therefore, the extent to which the outcome of this option would be coherent with EU objectives will depend on uptake levels and implementation modalities. There are risks of diverging levels of implementation and varying interpretations of the Recommendation, which jeopardises coherence. On the other hand, options 10b1 and 10b2 would provide a common legal basis that is more likely to ensure greater consistency in implementation and, in principle, also coherence with EU objectives.

Contribution to the operational objectives

All options could potentially help to *foster integration of quantitative water issues into sectoral policies*, as well as to contribute to a more proactive and efficient water governance by improving working relationships across institutions. Effective drought management plans will need to ensure the integration of water issues with major water using sectors, such as agriculture or energy. As previously stated, the extent to which each of the options may effectively do so will depend on the uptake level as well as on the measures that are undertaken as a result. The timescales for implementation are also likely to be a key factor in this regard: timeliness of the options will determine their ability to feed into the preparation of the next round of RBMPs.

A Commission Recommendation is likely to face fewer constraints to its development and publication than options 10b1 or 10b2. However, timescales for subsequent uptake and implementation are uncertain. From the two legislative options, a new Directive may be faster to develop than any amendments to the WFD, as a calendar for review already exists for the latter whereby any amendments are unlikely to occur before 2018.

The potential contribution of the different options to the *use of economic instruments for a better allocation of resources and internalisation of external costs* will be indirect. It is therefore hard to assess *ex-ante*: the impact will largely depend on the ambition levels of measures set out in drought management plans. Legislative actions can be expected to be more effective than the adoption of a recommendation, as uptake levels tend to be higher for the former. In addition, legislative action is likely to favour a more consistent use of these instruments, and this may help minimise distortions in the economy. In the same vein, none of the options will directly provide improved *knowledge and tools for water managers*, though they may all have an indirect effect: drought management plans could strengthen the development and use of knowledge and tools related to water quantity.

All three options are expected to achieve *more effective water governance and to strengthen relationships among institutions*. Again, options 10b1 and 10b2 are expected to contribute more strongly to this operational objective due to greater consistency, higher uptake levels and explicit timeframes. It must be noted, however, that a Recommendation to enhance the integration of drought management issues into RBMPs (option 10a) may offer leeway for more nuanced or better tailored approaches to such integration. This may in some cases lead to higher levels of effectiveness. The options however focus on water quantity issues, and thus may not directly integrate water quality and hydromorphology questions.

12.6 Acceptability

The results of the public consultation for the range of appliance and building options are presented in Table 32.

Table 32. The results of the public consultation concerning options to address the problem of drought management

Option	Yes (%)	No (%)	Do not know (%)
Enhance drought management planning into the next cycle of RBMPs under the WFD for all drought-affected, or potentially affected, Member States	70	15	15
Develop a European wide early warning system for droughts to timely alert Member States on the need to take counter-measures	51	34	14
Establish a drought emergency fund which would group in a single instruments and enhance the funding possibilities currently available under the EU Solidarity Fund and rural development funding. The Fund would include appropriate conditionalities on drought prevention measures being taken	27	55	19
Establish a drought management directive to require Member States to develop and implement river basin drought management plans with specific drought measures to be reported to the Commission	29	60	11

The policy option that receives the most support, 70%, is for enhanced drought management planning into the next cycle of River Basin Management Plans, a voluntary measure. In addition, 51% of the respondents support the development of a European wide early warning system for droughts. A majority of respondents (60%) oppose a regulatory approach, i.e. the establishment of a drought management Directive. And 55% oppose a funding measure, the establishment of a drought emergency fund. One voluntary measure receives strong support: 56% of the respondents are in favour of the development of criteria by the Commission for the sustainable production of bio-energy crops with specific reference to water protection.

A number of respondents of all types argue that the current Water Framework and Groundwater Directive are sufficient to manage drought-related issues within RBMP levels, if correctly implemented; thus, further EU action in this area is not necessary. Furthermore they underline that drought issues vary widely across Member States and that therefore EU-

level action is not needed. Verband Kommunaler Unternehmen, for example, considers that any kind of legal act on drought management would risk depriving local and regional water managers of the necessary leeway to adopt the measures which are tailored to the specific situation on the spot. The further integration of drought management plans into the water framework directive could also be a possible way, once reliable indicators assessing the potential vulnerability of a region/ river basin regarding droughts are available. Central Europe Energy Partners would not support any attempt to develop an 'one-size-fits all' approach to all European regions and river basins. Rather it supports a tool box concept, which provides the responsible authorities with the tools they need, be it measures for water demand management, green infrastructures, or the development of new sources of fresh water supply. This can be delivered through improved planning in the framework of the WFD.

Some NGOs and national administrative bodies, state that this topic is not adequately addressed at European level: many of these responses underline the value of addressing droughts in RBMPs, and in particular call for non-regulatory measures to support this – for example, EU actions to promote synergies with the WFD, Floods Directive and other legislation. Some responses (also from northern Europe) highlight that drought problems can occur in all parts of Europe. WWF and Grune Liga both oppose a separate drought legal instrument, stating that improved drought planning under the WFD and within RBMPs is the correct way forward.

Some responses write that drought risks show the need for water retention measures in both agricultural and urban areas, as well as higher water efficiency, as well as better land use planning. Other replies highlight the need for further work on water pricing and water efficiency. A few respondents comment that hard and soft infrastructure can help to address droughts.

12.7 Conclusions

The problem analysis has highlighted the need for effective drought management across the EU. While studies supporting the WSD Communication and its implementation have identified some good practice in drought management, there are some significant short comings.

The options considered in the IA each have benefits and disbenefits. A strong legal instrument (stand alone or a WFD amendment) could promote drought management more strongly than is currently the case and would be analogous to the Floods Directive. However, this approach has almost no support from stakeholders of all types, who are concerned either that it would constrain management action and reduce the flexibility

needed by water managers or that improving application of the WFD as it is is the correct approach to drought management.

Therefore, the alternative approach is non-legislative. Whether this is through an additional non-binding approach (a Recommendation) or improvement in the current legislative framework – making drought management planning within the WFD more effective.

There are, therefore, pros and cons to the different options which could be taken forward within the Blueprint.

Table 33. Summary of the effectiveness, efficiency and coherence of the options relating to addressing droughts.

Note that the two legislative options are addressed together for ease of comparison.

Description of the option	Option 10a. Adopting a Commission Recommendation to enhance the integration of drought management issues into RBMPs. This Recommendation would encourage all Member States currently or potentially affected by drought events to take action in the context of the next cycle of RBMPs	Option 10b1. Amending the WFD to require Member States to develop and implement drought management plans on a river basin level. Member States would also be required to report specific measures contained in these plans to the European Commission. Option 10b2. Adoption of a Drought Management Directive. This Directive would also make compulsory the development of DMP at the river basin level, in coherence with the planning process of the WFD.
Effectiveness towards specific Objective	+ The impact of a Recommendation would be positive, but depend on uptake levels	++ Both options can significantly strengthen governance systems for drought management.
Effectiveness towards other specific objectives	+ A Recommendation would require consideration of sectoral impacts and potential management instruments, such as economic instruments. Implementation would improve knowledge base.	+ The options would require consideration of sectoral impacts and potential management instruments, such as economic instruments. Implementation would improve knowledge base.
Efficiency	+ Member States would face an administrative burden to develop drought management plans under a Recommendation, but the overall economic impact should be positive, as drought risks are reduced.	++ Higher administrative burdens can be expected for both 10b1 and 10b2 compared to 10aalthough in both cases these burdens for will depend on specific requirements.Likewise, both legislative options can be expected to have higher positive economic impacts due to drought risk reduction compared to 10a, and favour stronger synergies among MS.
Coherence	+ The option for a Recommendation would take forward EU objectives, but effect would depend on implementation. Diverging levels of implementation and varying interpretations of a Recommendation would jeopardise coherence.	++ Clear legal requirements from both legal options may help ensure coherence
Acceptability	Public consultation: A Recommendation option was not subject to public consultation	Public consultation: The specific option to amend the WFD was not subject to public consultation. -- DM Directive: 60% oppose such a Directive, with 29% in support.

13 ASSESSMENT OF COSTS AND BENEFITS

13.1 Introduction and problem definition

There is an increasing demand for sound economic analysis to support water policy and optimal decision due to the diversity of issues and options considered in the WFD and increasingly reduced (public) financial resources. This increasing demand also results from the actual implementation of WFD, and in particular its requirements in terms of economic assessment as specified under its Article 3 & 4.7 (disproportionate cost and exemptions), Article 5 (economic analysis with a new report due in 2013) and its Article 9 (requiring a consistent background knowledge for assessing the effectiveness of water pricing policies). Moreover, a sound analysis of costs and benefits is needed for ensuring a good understanding of the challenges posed by the integration of water policy into sector policies and in particular EU policy and funding instruments.

The review of RBMP undertaken by the Commission[392] highlights "the low quality of the assessment of costs and benefits". It, therefore, recommends strong improvements in this area, including the definition of a shared methodology for the calculation of costs (including environmental and resource costs) and benefits (building in particular on the Ecosystem Goods & Services framework). This would enhance the quality of assessments carried out, and thus ultimately of decisions. It would also ensure greater transparency on the justification for adopting, or not adopting, specific measures. Linked to the issue of cost & benefit assessment is the question of cost-recovery assessment required under Article 9 that also tackle cost definition issues, in particular when dealing with environmental and resource costs for which there is a lack of a theoretically solid and at the same time practical assessment methodology[393].

13.2 Baseline and the justification for EU level action

The assessment of the RBMPs and their key accompanying documents helped understanding the current state of knowledge on the costs and benefits of the programme of measures and of water policy[394].

- In general, the **costs** of the proposed programme of measures have been assessed and are presented in most of the MS' RBMPs. However, the available information

[392] Draft Communication from the Commission: Water Framework Directive implementation report.

[393] Cost-recovery assessment, including the very definition of water services and water uses to which the assessment applies, is today the subject of infringement actions by the Commission against a number of Member States. The assessment of environmental and resource costs itself is covered in different national and EU guidance. However, different reasons explain a limited use of these guidance documents, including their limited "reader friendliness", inconsistencies between different guidance documents, a lack of practical usability of proposed methods for such assessment and a too academic approach.

[394] Mattheiss, V. Depaoli G. And P. Strosser. 2012 (forthcoming). The costs and benefits of the WFD implementation. Final report of Task 4b of the EU Comparative study of pressures and measures in the major river basin management plans in the EU.

differs significantly in terms of the level of details provided (e.g. with regards to the geographical scale or the aggregation or disaggregation between water use sectors) and the transparency regarding the elements taken into account for cost calculation (e.g. the number of planning cycles taken into account when calculating costs, the handling of different types of measure - basic versus supplementary measures; and the types of cost considered, in particular whether operation and maintenance costs or other costs are considered or not). This renders difficult or impossible any attempt to understand and analyse costs – as compare to existing pressures and the magnitude of environmental issues, or when comparing the approaches implemented by different MS for tackling a specific environmental issue or sector. Taken into consideration the large differences between cost assessments, comparing costs and explaining cost differences remains difficult. And estimating the overall effort (aggregated costs) required for implementing the WFD at the EU scale remains a clear challenge.

- With regards to benefits, the review of RBMPs and of their accompanying documents stresses the limited attention given to the assessment of the WFD benefits. Benefit valuation studies can be found for around 20-25 river basins only (be it in the RBMP itself, in accompanying documents, or in research studies with a clear WFD focus) with benefit information being concentrated to a limited number of MS. A thorough look at the available information, however, stresses the large heterogeneity in the benefit information provided in terms of: the spatial and temporal scale at which benefits are estimated and also reported; the valuation methods applied including the reliance (or not) on the Ecosystem Goods & services (EGS); the types of benefits considered and reported, be it individually or jointly. Due to the issues listed above, and the limited number of benefit studies available, any comparison and aggregation exercise remains challenging and can only deliver rough indications. And there is limited information describing explicitly the assumptions made, and methods applied, for valuing benefits, a clear shortcoming that hamper further use of the available knowledge (be it locally or at national and EU levels).
- The limited importance given by MS to economics is also reflected in the content of the cost-recovery assessment carried out for complying with the Article 9 requirements that are reported in RBMPs.
- In the first RBMPs limited efforts were conducted on the adequacy of the contribution of water uses to the costs of water services as also linked to the polluter-pays-principle. While most RBMPs mention the contribution of households and industry to cost recovery, the contributions of other user groups remain unclear in an important number of RBMPs. Agriculture is often excluded from the analysis of adequate contribution without a clear justification, even where agriculture constitutes an important pressure;
- Overall, there are varying methodologies for the calculation of cost recovery rates, which makes difficult to compare the costs among different RBMPs.

- Regarding the calculation of financial costs (and cost recovery levels) of water services, considerable work is reported in most RBMPs. In general, a consensus is present over the need to cover financial costs of water services. At the same time, it is not always clear how financial costs are calculated in the cost recovery and if all elements of financial costs are taken into account in the calculation, for example regarding capital costs (investment costs, depreciation, cost of capital, replacement costs etc.). On the issue of subsidies/cross subsidies, some RBMPs report on how these are taken into account into the calculations, but in many cases this is lacking. Some additional work is being done/planned (esp. in Member States lacking detailed information so far) in order to improve the data situation concerning financial cost recovery and a more in-depth understanding of certain issues (e.g. financial flows/subsidies).
- Regarding the estimation and integration of environmental and resource costs (ERC) in the cost recovery calculations, in almost half of RBMPs there is some reference to ERC, but these costs have generally not been estimated and integrated into cost recovery levels. The main reason mentioned is the lack of practicable methodologies and linked to this, concerns on how to include these costs in cost recovery calculation.
- An often shared opinion in many of the RBMPs is that most/all of the ERC are already internalized though permit systems as well as charges and fees established. In cases in which the good environmental status is not reached in a water body due to a specific water service, the ERC of that service are assumed often to be as high as the costs of the measures that would be needed to reach the good status (abatement cost approach), mainly due to the methodological difficulties for estimating ERC. Ecosystem services´ benefits are not estimated in the RBMP or used for assessing the adequateness of contributions.

Finally, whether we discuss the current knowledge base on costs and benefits or assessment carried out in line with the requirements of Article 9, very limited additional work for the next management cycle(s) is indicated in some RBMPs. Hence, very limited further progress is expected in the baseline situation, which calls for the need for EU action. This is justified given the importance of ensuring the cost-effectiveness of implementation of EU law (i.e. the WFD) and the need to ensure adequate application of that law, reducing implementation failure and costs to MS of non-compliance and costs to society and the environment of non-compliance.

13.3 Objectives

The policy options with regard to the assessment of costs and benefits that are considered in this impact assessment have direct bearing on all of the specific objectives set out by the European Commission in the context of the Blueprint.

Assessing costs and benefits of measures requires a full understanding of the consequences (positive and negative) on business sectors which may be affected by measures as well as how these can be mitigated within sectoral policy. Therefore, the options contribute to integration of water issues within sectoral policies. CBA can also examine the role of economic instruments, providing (where appropriate) a strong argument for their use.

CBA is also an important pillar of good governance – good decision making should involve an understanding of the consequences of proposed decisions. Improving decision making would help to raise the status of water management more generally. Finally, good CBA requires tools for the assessment process, which is part of improving the capacity and knowledge of water managers.

In taking forward the objectives for the assessment of costs and benefits in the Blueprint it is important that there are SMART indicators for monitoring their progress and, therefore, whether the objectives have, or have not, been achieved. This will enable the success of policies to be determined and potential barriers (if they occur) to be addressed as policies are reviewed.

For the assessment of costs and benefits objectives, the following SMART indicators are proposed:

- The number of Member States where legislation or policy guidance requires or strongly advises the use of CBA tools for assessment of measures in developing PoMs.
- The number of RBMPs where full CBA have been undertaken in the development of PoMs.

13.4 The options and their elaboration

Several policy options to address the problem of improving assessment of costs and benefits were developed to be considered within the Blueprint and subject to IA. These options were subject to a SWOT analysis (see Annex D). Table 34 describes the options as originally developed in the project and submitted for the public consultation together with the final elaboration of options included within the IA, following further discussion with the Commission. While the focus of the options originally considered were on “cost-recovery” and the assessment of environmental and resource costs (in coherence with the requirements of Article 9), the final options considered for the IA focus on the assessment of costs and benefits for “better and more transparent decision”, an issue that is relevant to the implementation of the WFD *per se* but that is directly relevant to the implementation of other water directives and environmental legislation.

The two options were retained, with modifications to enhance their clarity.

Table 34. The options originally considered and final options to address the assessment of costs and benefits

Options originally considered	Final options for the IA
• The WFD Common Implementation Strategy to develop guidance for the next cycle of River Basin Management Plans and a methodology for the calculation of an adequate contribution of the different water uses to the recovery of the costs of water services, including environmental and resource costs and ecosystem services' benefits • The Commission to propose an amendment of the WFD (an Annex) containing a mandatory methodology for the calculation of an adequate contribution of the different water uses to the recovery of the costs of water services, including environmental and resource costs and ecosystem services' benefits.	• Option 11a for the Commission to produce guidance for the calculation of costs and benefits of reference scenario and programme of measures. • Option 11b for the Commission to adopt a technical annex to the WFD on the calculation of costs and benefits of reference scenario and programme of measures.

Guidance may kick-start and/or deepen the integration of economic analysis in Member States with low implementation by filling in knowledge gaps or as a basis to exchange experience. Where economic analysis is already largely embedded in the water policies, guidance can be more effectively implemented from the EU level, to national and local delivery. Therefore, the following options have been identified.

Option 11a requires the Commission to produce guidance for the assessment of costs and benefits of programmes of measures (including the baseline scenario). This guidance may also provide elements that are relevant to the assessment of the recovery of the costs of water services, including environmental and resource costs.

Option 11b requires the Commission to adopt a technical annex to the WFD on the assessment of costs and benefits of programmes of measures (including the baseline scenario). Similar to Option 11a, this WFD technical annex may also provide elements that are relevant to the assessment of the recovery of the costs of water services, including environmental and resource costs. This option proposes an amendment of the WFD containing a mandatory methodology for the calculation of costs and benefits.

The guidance needs to be regarded as a document additional to the WATECO Guidelines on Economics and the Environment – The Implementation Challenge of the Water Framework

Directive (2003[395]), focused on bringing in practical experiences e.g. from the first RBMP cycle but also from parallel initiatives on the assessment of ecosystem goods and services (e.g. as part of the MEA). In this regards, it could link to parallel efforts undertaken as part of the MSFD implementation that also requires the assessment of costs and benefits.

Options 11a and 11b are complementary to each other and could be seen as following steps of a single initiative, as the Technical annex to the WFD will first require the development of guidance.

Note that option 11b involves an amendment to the Water Framework Directive. Therefore, if the options are taken forward, a further IA accompanying the proposed amending Directive would need to be undertaken.

Therefore, in taking forward this option, the wider policy context, acceptability and opportunities for legal amendment are linked to other options considered within this IA that would also amend the WFD.

13.5 Effectiveness, efficiency and coherence of the options

It is important to note that more coherent and transparent information on the costs and benefits of the programmes of measures and of the WFD implementation in general is expected to: a) enhance the overall public participation process, and the understanding by all involved of the cons- and pros- of proposed actions; and b) the reduce the burden from possible court actions against Member States (infringement cases of incorrect interpretation of exemptions and the question of disproportionate costs- see Article 4), as coherent methods would be applied by MS and their results more easily understood. This would overall lead to more effective implementation of the legislation, and to "better" (more informed) decision in the field of water policy.

The effectiveness of the guidance (options 11.1) depends on the active participation of Member States and stakeholders both in the development and especially in the application of the proposed methodology. Guidance can be potentially helpful to overcome barriers in terms of skills and knowledge. Yet barriers in institutional set-up within Member States, the potential variability in interpretation of the need to assess and report costs and benefits are unlikely to be overcome by non-binding guidance. This is linked with the large diversity of local situations appearing in the Member States, which makes the development of guidance as "common minimum standards" challenging.

The timing when effects occur will also depend on the timing within which guidance can be developed and resulting from that, the influence it can have on the next cycles of RBMPs:

[395] Common Implementation Strategy Working Group 2.6 WATECO (2003): Common Implementation Strategy for the Water Framework Directive (2000/60/EC), Guidance Document No 1: Economics and the Environment – The Implementation Challenge of the Water Framework Directive

- In case the guidance is developed within the WFD Common Implementation Strategy, a 2-year process is assumed so implementation of the guidance could start in 2015. In this case, guidance will be able to influence the 3rd cycle of RBMPs.

- In case the guidance is not developed within the WFD Common Implementation Strategy and is developed externally, there is a real chance that guidance is developed within a shorter period of time (because of contractual requirements speeding up the process), e.g. a 1-year process can be assumed. A shorter time period is not realistic, both due to the methodological work that needs to be done but also due to the time needed for commenting by the MS and finding approaches that are acceptable for all. This would mean that implementation of the guidance might start in 2014. In that case, guidance will be able to influence the 2nd cycle of RBMPs.

- It could be considered that amendment of the Directive would only be able to take place following review of the Directive and adoption of an amendment would be unlikely before 2019 or 2020.

The compulsory nature of the option 11b would ensure a broad application of the prescribed methodology. An amendment of the WFD therefore guarantees that in the long term all Member States will the same proposed methodology. This in turn will facilitate cross-comparison and cross-fertilisation between MS so the economic implications of improvements in water status are better captured. Assessed in a coherent manner, this would also help bringing the economic concerns of water policy to a more global macro-economic level, an area that remains poorly investigated today but that is key to future EU water policy.

The administrative costs associated with the uptake of such guidance at MS level (e.g. familiarizing, training, data collection) are not possible to estimate. The differences in national and regional conditions, ranging from available knowledge to the organisation of administrative agencies, make it hard to assess these costs. The use of the guidance will result in a certain additional administrative burden for MS that have done so already, depending on the degree to which the methodologies already adopted are in line with the guidance. Clearly, while it is expected that moving to a coherent assessment and reporting of costs might be a relatively easy task, the same process is likely to be more challenging for benefits because of the more limited available knowledge and the limited expertise in valuation in some MS.

Member States who already assess costs and benefits might need to revise and possibly adapt their methodology to the one prescribed in the Technical Annex (in particular if the technical annex requires a given methodology to be applied for benefit valuation). Therefore, option 11b can be considered less cost-effective compared to option 11a. The efforts required by option 11a are aimed towards filling the gaps in knowledge among the

Member States and River Basins. The burden for Member States who already use a good methodology will be limited, depending on the extent to which the methodology is implemented.

The majority of the start-up costs for developing guidance falls at EU level (both in terms of one-off costs and time spent), and also on the lead Member States coordinating to the guidance document (in case of a CIS guidance) and for all Member States contributing to the guidance by commenting drafts etc. As the guidance would be considered as a document additional to and clarifying the WATECO Guidelines (in which all concepts have been explained), the guidance would focus on practical implementation issues and only additional costs of this work would need to be considered. These start-up costs are one-time payments and limited maintenance costs are associated with guidance (unless the document is updated).

It is difficult to say whether the costs and time attributed by the different parties would be larger if guidance is developed within or outside of the CIS process, as in both cases it will take time to negotiate and find common positions among member states. A means for reducing the costs required for developing guidance on costs and benefits would be to develop a join process for the WFD, the MSFD and other water policy (e.g. the Floods Directive). While this might increase the complexity of the process required for developing common guidance, it might overall reduce the costs and effort for each individual water policy initiative. In the medium term, this will contribute to facilitate overall environmental policy making at the EU scale but also within MS.

The options increase coherence in approach between MS which can provide a firm basis for other policy interventions.

Within the Fitness Check (FC), stakeholders have been consulted on the overall scope and working methods of the CIS. One fifth of the respondents think that the guidance produced by the CIS is helpful and more than half think it is partially helpful for practical implementation. Respondents considered that the CIS process had helped to streamline implementation. However, on some issues (e.g. cost benefit analysis, objective setting) respondents considered further clarity is needed and that the usefulness of the guidance would have been greater if it had been produced earlier in the implementation timetable.

On several occasions, Member States had the opportunity to express informally their opinion on these initial Blueprint options, e.g. during an informal meeting of the EU Water Directors in March 2012[396] and during a meeting of the CIS expert group on WFD and agriculture in April 2012[397]. Seven participants explicitly mentioned their preference in favour of guidance. One participant expressed its preference for the mandatory methodology. A few participants were not in favour of an amendment and expressed they

[396] Extraordinary informal meeting of EU Water Directors, 29 March 2012, Borschette, Brussels

[397] CIS expert group on WFD and agriculture, 4 April 2012, Short workshop on Blueprint options

did not need a guidance document. However, these opinions were linked to the development of guidance (or common reporting requirements) on Article 9 requirements and cost-recovery assessment. It is unclear whether the same responses would have been obtained if guidance or mandatory assessment and reporting on costs and benefits would have been discussed.

It was mentioned that additionally or as a replacement for guidance, sharing of knowledge and best practices/cases in a workshop format would be a useful instrument. This element already came up in SCG members' views that were gathered on the experience in implementing economic aspects of the WFD and future needs in this area[398]. The majority of respondents declared that among the three most urgent issues for future work, was the implementation of the Article 9 requirements on water pricing and cost recovery. The development of common minimum standards for Art. 9 implementation was an issue that was raised. Again, however, it is difficult to extrapolate these reactions to opinions on the assessment and reporting of costs and benefits.

Overall, some of the reactions from workshop participants might be relevant to the development of guidance on costs and benefits. In particular: the need to involve concrete practical problems and solutions based on experiences (e.g. from the first RBMPs) instead of more academic work regarding e.g. monetary evaluation of benefits and non-market goods; the need for review of the existing CIS guidance regarding economics, and the agreement on common definitions; the need for coherence with existing guidance documents; the importance of disseminating guidance documents in several European languages to limit constraints in their application.

In the briefing note 'Which Economic Model for a Water-Efficient Europe' of the Centre for European Policy Studies which is based on discussions of a Task Force, it is suggested to develop more detailed and permanent guidance based upon methodological discussions among water economists (e.g. WATECO group). Ideally, this would lead to a single methodology, while allowing sufficient flexibility for local, regional, national or basin-based circumstances. To be effective, such guidance would need to be differentiated by the targeted governance level, which may be local, regional, national and/or basin-based.

13.6 Acceptability

The public consultation sought views on the two initial policy options related to cost-recovery assessment and the application of the WFD Article 9. The first option, i.e. to develop CIS guidance for the next cycle of River Basin Management Plans that would provide a methodology for the calculation of an adequate contribution of the different water uses to the recovery of the costs of water services, including environmental and

[398] Report on project to gather SCG members' views of the experience in the implementation of the economic aspects of the WFD – questionnaire and interview results, presented at the CIS-workshop on WFD economics in Liège, 19-20 October 2010

resource costs and ecosystem services' benefits, was supported by 59% of respondents. The option, for an amendment (annex) of the WFD (containing a mandatory methodology for the calculation of an adequate contribution of the different water uses to the recovery of the costs of water services, including environmental and resource costs and ecosystem services' benefits, was supported by 24% of respondents only.

A voluntary approach, developing guidance on water cost calculation through the WFD Common Implementation Strategy, receives strong support. In contrast, a regulatory measure is strongly opposed.

In their written comments, some national administrative bodies argue that sufficient guidance is available, and that national conditions differ. However, another national body says that greater harmonisation in this area would create a level playing field, avoiding distortion of competition.

It is assumed that that similar reactions would have taken place if options for the assessment and reporting of costs & benefits would have been discussed, i.e. a larger share of respondents supporting guidance as opposed to a mandatory technical annex. In the comments collected, however, some issues relevant to the assessment of costs and benefits were raised,

The need to include also the benefits of water uses, including food production, when assessing benefits (industry); EUROCOAL states that the costs and benefits of water-related measures are already understood. It also does not support the use of reducing environmental impacts by pricing water. However, the Country Landowners Association supports the integration of knowledge of ecosystem services into WFD cost benefit approaches and that there should be consistency of approach across Member States.

The need to enhance the understanding of the socio-economic benefits of implementing the WFD (NGOs) as these benefits are not well known. Some call for further research in this area, arguing for example for the launching of a specific 'water-TEEB' study or additional work on the value of water for future generations. Grune Liga has reviewed all German RBMPs based on an own questionnaire on WFD economic instruments[399]. It considers that water pricing must aim to achieve better cost recovery of all water uses and thus stop the ongoing cross-subsiding unsustainable water uses in sectors such as agriculture and energy industry. It found that in German RBMPs virtually no consideration was given to estimating the benefits of implementing the WFD for nature and society. This is a lost opportunity to advocate restoration and other ecological improvements as well as sustainable water management in general. The recreational and touristic use of river landscapes, nutrient retention in wetlands, flood mitigation in floodplains and, of course, bathing in lakes and coastal waters provide great economic value for society. Improved cost-benefit analysis

[399] Grune Liga (2011). Economic Instruments of the Water Framework Directive: An Opportunity for Water Protection. Shortcomings in the First Management Cycle and the Need for Action. Berlin.

should be part of second cycle of RMBPs, of any infrastructure or development project threatening to deteriorate the ecological status of rivers, lakes and coastal waters, and in particular of all measures implementing the Flood Risks Management Directive. WWF suppots improved assessments as this has been one of the weakest parts of WFD implementation. The focus needs to be on environmental and resource costs methodologies.

Some responses related to the powers of RBD authorities, and for the strengthening of the EC role in international RBDs so implementation could be improved. This could also apply to the assessment and reporting of costs and benefits, in particular when transboundary (negative or positive direct and indirect impacts) might take place. The Royal Institute of Chartered Surveyors supports the development of improved understanding of environmental, social and economic values concerned with water. Verband Kommunaler Unternehmen states that methodological guidance on the implementation of the "adequate contribution" by water uses to the cost recovery of water services would be helpful to get a better grasp of the concept, in particular regarding the interlinkages to environmental and resource costs.

The need for additional guidance by the European Commission on environmental and resource costs, a component of cost and benefit assessments, was also stressed during the Third Water Conference concluded[400].

Published positions of organisations also provide views relevant to these options. The European Environment Bureau[401] states that 'so far there wasn't enough attention given to estimate the improvement in socio-economic benefits which would result of implementing the WFD', that a cost-benefit analysis is often missing in RBMPs, creating the impression that WFD implementation is disproportionately costly. The EEB, therefore, argues for improved cost-benefit assessment in future RBMPs, in line with the two options proposed for IA.

13.7 Conclusions

This analysis has examined the impacts and acceptability of two options which are similar in scope, but different in the legal basis – being either guidance or a WFD amendment approach.

A guidance approach has some advantages at this time. It is able to be more flexible and explore a range of different CBS issues (as well as tools) to assist Member States in developing very different measures in very different circumstances.

Furthermore, there is no prospect of an early amendment of the WFD – this would only be possible within the future WFD review, so legal amendment would, at the earliest, only be

[400] http://waterblueprint2012.eu/sites/default/files/Key%20Messages_English_1.pdf

[401] EEB (2012). EEB's main priorities of the Blueprint to Safeguard Europe's Water.

able to influence the 3rd RBMP cycle. Stakeholders are also strongly in favour of a non-legislative approach.

Taking forward the issue of CBA within the Blueprint is, therefore, best done using the guidance option, although the subject could be returned to if necessary during the WFD review. There would also be benefit in seeking synergies between promoting CBA for the next round of RBMPs under the WFD with CBA for PoMs under the MSFD. Such synergies would range from sharing of methodologies to using the experience of the MSFD as justification for improvements in WFD decision making at river basin level.

Table 35. Summary of the effectiveness, efficiency and coherence of the options relating to the costs and benefits of inaction

Note that for ease of comparison the two options amending the WFD are treated together in this table.

Description of the option	Option 11a for the Commission to produce guidance for the calculation of costs and benefits of reference scenario and programme of measures	Option 11b for the Commission to adopt a technical annex to the WFD on the calculation of costs and benefits of reference scenario and programme of measures.
Effectiveness towards specific Objective	+ Stimulates the application of coherent and sound methods for assessing costs and benefits	++ Streamlines the systematic and coherent assessment of cost and benefits so the programmes of measures and exemptions are more coherently justified (whenever relevant) on economic grounds
Effectiveness towards other specific objectives	+ Integration: increases correct understanding of the exemptions proposed in line with Article 4 + would increase transparency which opens to higher governance efficiencies + dissemination of practical experience on a voluntary basis improving knowledge If developed jointly with other EU water policies (WFD but also Floods and MSFD), larger effectiveness expected.	Technical annex: ++ ensures correct understanding of the exemptions proposed under Article 4 +/++ would increase transparency more widely, which opens to higher governance efficiencies ++ 'obligation' to learn from practical experience improving knowledge If developed jointly with other EU water policies (WFD but also Floods and MSFD), larger effectiveness expected.
Efficiency	+ efforts are aimed towards filling the gaps in knowledge. Limited burden on Member States who already use a correct methodology	- A technical annexe will be time consuming to implement and a high burden on Member States who already use a correct methodology
Coherence	+ aids coherence in approach between MS which can provide a firm basis for other policy interventions If developed jointly with other EU water policies (WFD but also Floods and MSFD), large coherence gains can be expected.	+ aids coherence in approach between MS which can provide a firm basis for other policy interventions If developed jointly with other EU water policies (WFD but also Floods and MSFD), large coherence gains can be expected.
Acceptability	++ Public consultation: A guidance approach appears as receiving significant support (supported by 59% of respondents when guidance on cost-recovery assessment is proposed. It is unclear how this percentage would change when dealing with the assessment of costs and benefits Acceptability might be even higher if the technical annex is developed jointly with other EU water policies (WFD but also Floods and MSFD), as this would reduce the overall transaction costs and might have positive outcomes within MS.	-- Public consultation: A mandatory technical annex receives limited support (supported by 24% of respondents) when a technical annex on cost-recovery is proposed.. It is unclear how this percentage would change when dealing with the assessment of costs and benefits. Acceptability might improve if the technical annex is developed jointly with other EU water policies (WFD but also Floods and MSFD), as this would reduce the overall transaction costs and might have positive outcomes within MS. .

14 KNOWLEDGE BASE

14.1 Introduction and problem definition

Environmental information systems provide the knowledge base that underpins policy decisions and action. At present, vast amounts of environmental data are collected through Member State monitoring programmes as well as research projects. Yet, policy makers at all levels generally perceive a lack of data and information. Among the problems are the high costs of data collection, the need for comparable data across jurisdictions, incompatibility of data collected by different organizations or limited degree of data sharing, in particular of raw data. At present, this wealth of information is stored in 'electronic silos' and is neither made available in a timely manner nor in a format that policy makers and the public can readily understand and use due to a range of obstacles of a legal, financial, technical or procedural nature. This inevitably leads to inefficiencies, duplication of effort, and perceptions of redundant reporting efforts, double and overlapping data and consequent low use of the submitted data.

In addition, some key areas of information are lacking at EU level (and in some cases, not fully gathered and utilised at Member State and RBD levels). This is the case in particular for information related to water quantities, including data on abstractions, on river flows, and on water accounts. The need exists for an information system based on the latest information and communication technology (ICT) that serves:

- To fulfil the legal obligations of the MS under EU and international environmental policies and legislation.
- To provide decision-makers at all levels (local to European) with real-time environmental data, thus allowing them to make immediate and life-saving decisions.
- To make environmental information available to the public in a way that everyone can understand the changes to the environment and their impact.

Interoperability is the key to allow communication and integration of distributed data, allowing data – and particularly spatial data - generated by one software to be read by another without special effort on the part of the customer[402]. A non-interoperable system impedes the sharing of data, information and computing resources and can lead to user disappointment and system failure. To ensure effective interoperability, it is not only a matter of technology and infrastructure but also of semantics (common understanding), human willingness, funding mechanisms, institutional capacity, cooperation, coordination and an enabling legal/policy environment.

[402] Open Geospatial Consortium (2004). The Havoc of Non-Interoperability.

EU-scale water assessments

Many EU-scale water assessments already exist. For the Blueprint, two initiatives are particularly relevant: 1) the 'water accounts' approach[403] of the EEA and 2) the EU-scale water resources modelling and optimisation by the Joint Research Centre (JRC). Both approaches are complementary and support mutually.

Water accounts approach

The water accounts (WA) take stock of reality and provide a EU-wide set of water balances (volumes) and serve as the baseline scenario (period of 8 year available; 2001-2008). The water accounts are calculated at the river segment level (average catchment size: 92 km²) and then aggregated firstly to the basin and sub-basin scale (about 10,000-20,000 km²) and secondly at the river basin districts. The water accounts are available at a monthly time interval.

The production of water accounts at the European level requires the combination and aggregation of different data from local to regional level so that the final information is statistically representative, thematically consistent and politically relevant, hence also including socio-economic aspects. The focus of water accounting is on the interactions between water resources and the economy, where the economy is thought of as the system which abstracts water for consumption and production activities, and puts in place the infrastructure to mobilize, store, treat, distribute and return water into the environment.

The following types of input data are needed to develop water accounts:

- Characteristics of the catchment: land cover, river network, lakes.
- Meteorological data, mostly rainfall.
- River discharge: to assess the accuracy of the water accounts and important to assess changes in the water regime.
- Water flows to the economy: water abstractions, return flows and inter-basin exchange of flows).

The following more or less aggregated sources of information exist and have been used:

- Eurostat water statistics, which provides only country level aggregated figures of volumes per category.
- ETC/ICM water uses data collection, which provides figures ranging from individual uses (very rare) to river district lumped figures.
- WFD reporting using the Water Information System for Europe (WISE).
- European Catchments & Rivers Network System (ECRINS)[404] a fully geo-referenced and connected system of watersheds, rivers, lakes, monitoring stations (quality and

[403] The Water Accounts system has been developed by Pöyry and VITO in June 2012 and hosted by the EEA

[404] ECRINS : see EEA report for full description http://eea.eionet.europa.eu/Public/irc/eionet-circle/ecrins/home

quantity), dams and serves as the central reference system for the calculation of the water accounts.

- The discharge database of the Global Runoff Data Center (GRDC), for comparison of discharge values and locations of flow gauges.

For the development of the water accounts, several tools are used: ECRINS, the *System of Environmental-Economic Accounting for Water* (SEEAW) and the NOPOLU model. SEEAW provides a conceptual framework for organizing the hydrological and economic information in a coherent and consistent manner and has been used to develop the "water uses and supply" part of the water accounts. NOPOLU is a relation database which enables data processing and accounting procedures for integrated emissions and impact assessments to be carried out for large data sets. It was originally designed to calculate soil surface nitrogen balances and has been recently extended with a water account module (NOPOLU WA) and water uses module, based on the NOPOLU Integrated Emission Inventory (IEI) in order to be able to deal with complex relation between where water is abstracted and by who to who use it and where water is return which is partly directly to the environment and to sewage systems.

Water resources modelling and optimisation

A modelling approach is useful when data values are to be simulated that would otherwise be too costly or not possible to measure. Modelling has following advantages:

- To develop seamless and full-coverage maps.
- To assess integrated parameters such as e-flows, in-stream water quality, water and pollution load balances.
- To assess the impact of scenarios e.g. from climate change or policy measures.
- To structure the data requirements, convert and store data in a format useable for further work.
- To better assess temporal trends, spatial heterogeneity and potential measuring errors.
- To integrate data of different type (e.g. time series of point value measurements, remote sensing data).

Simulations provide data values continuously (compared to distinct monitoring times) and at all locations (compared to a mostly limited monitoring network). While the water accounting approach offers the baseline (current state), a modelling approach can do projections for the future and can assess the impact of measures or drivers of change. The performance of models depends to a large extent on the quality of the available input data.

Specifically for the Water Blueprint, the JRC[405] has developed a modelling environment for continental Europe consisting of the agricultural CAPRI model, the LUMP land use model, the LISFLOOD water quantity model, the EPIC water quality model, the LISQUAL combined water quantity, quality and hydro-economic model, and a multi-criteria optimisation routine. Simulations have been carried out to assess the effects of water retention measures, water savings measures, and nutrient reduction measures on several hydro-chemical indicators, such as the Water Exploitation Index, Environmental Flow indicators, N and P concentrations in rivers, the 50-year return period river discharge as an indicator for flooding, and economic losses due to water scarcity for the agricultural sector, the manufacturing-industry sector, the energy-production sector and the domestic sector. Also, potential flood damage of a 100-year return period flood has been used as an indicator.

Although the first results of the optimisation tool are quite promising and already indicate which scenarios are the most beneficial ones for different objectives, it also shows some shortcomings which were already identified by the individual runs. To get meaningful results, more effort has to be put in describing the objectives like environmental flow, Water Exploitation Index, flood risk and especially in the economic part of cost calculation.

14.2 Baseline and justification for EU level action

The EU is seeking to improve its approach to environmental information. The overarching initiative in Europe is the '**Shared Environmental Information System' (SEIS)**. The underlying aim of SEIS is also to move away from paper-based reporting to a system where information is managed as close as possible to its source and made available to users in an open and transparent way. Reportnet, developed and hosted at EEA, is the reporting component of SEIS. Specifically for water, the **Water Information System for Europe (WISE)** is operational, and has made some important steps in information for water policy. The information to be reported and shared is defined by each of the water-related Directives.

Under **INSPIRE**, a European Union Spatial Data Infrastructure is to be implemented by 2019. When fully implemented, it will, theoretically enable data from one Member State to be seamlessly combined with data from all other States. The European Commission Joint Research Center (JRC) has the responsibility of the overall technical coordination of the Directive.

The '**Global Monitoring for the Environment and Security' (GMES)** serves as the European capacity for earth-observation-based environmental services, in which water is a component. GMES Services are currently in their initial phase, covering the period 2011-

[405] De Roo et al., 2012. A multi-criteria optimisation of scenarios for the protection of water resources in Europe. Support to the EU Blueprint to safeguard Europe's waters. Joint Research Centre (JRC), European Commission, Italy

2013: the pilot services which have been developed so far are in fact expected to become actually operational and be provided on a larger scale by 2013, while a fully-fledged GMES programme is expected to be in place in the course of the next multi-annual financial framework, starting in 2014. Within the GMES programme, some initiatives contributing to sustainable water management are already on-going. At present, under the GMES Initial Operation Programme (2011-2013) the GMES Land Service is currently working on a series of new pan-EU land cover datasets, which cover the 39 partner countries of the EEA. As the new datasets will include five pan-EU high resolution layers[406], namely on water, wetlands, grasslands, forest and imperviousness, the provided information will be extremely relevant in supporting water management and water policy.

EU water Directives set several requirements for the Member States to report information to the Commission. This allows the Commission to examine the legal transposition, the status of implementation, and compliance and public information. The Fitness Check has highlighted, however, highlighted the administrative burden that arises from the fact that the reporting cycles of the Directives are not synchronised (in particular those of the UWWTD and Nitrates Directive are not synchronised with the WFD). Table 36 outlines the reporting requirements under the Directives.

Table 36. The reporting timetable frequency for selected EU water Directives

Directive	Frequency	Next report due
UWWTD	Every 2 years	31/12/2013
Nitrates Directive	Every 4 years	30/06/2012
Water Framework Directive (RBMPs)	Every 6 years	22/12/2015
Groundwater Directive	Every 6 years	22/12/2015
Priority Substances Directive (EQSD)	Every 6 years	22/12/2015

There is, therefore, a clear justification for EU level action in four areas. The first is providing better access to existing data, not previously reported through additional reporting requirements and statistical obligations, either additional legal requests or voluntary requests. This can only be developed at EU level, adding value to the individual activities of the MS. The second area for EU level intervention is to reduce the administrative burden of the current reporting requirements following implementation of EU law. The third area is the provision of data generated by EU level initiatives, in this case GMES and EU-scale water assessments. Finally, a platform is needed for the efficient and effective sharing of data.

[406] Layers' resolution : 1 ha

14.3 Objectives

The objectives regarding the knowledge base for water are two fold: to provide the information and tools necessary to support the application of current EU policy as well as those new initiatives being taken forward in the Blueprint and, secondly, to ensure that obligations for data supply/reporting on the Member States do not impose unnecessary burdens.

The following SMART indicators have been developed specifically for each of the policy options set out in the following section:

Option 12a

- A shared water knowledge system is operational and the data are inter-operable
- Extent of data sharing: number of Member States and river basins and number of parameters shared addressing data gaps

Specific indicators have been developed for the sub-options, namely:

Option 12a1

The indicator focuses on the assessment of better use of data and tools by water managers

- Number of river basins that use results of the water accounts and JRC modelling as a data source for their RBMPs.

Option 12a2

The indicator focuses on the level of participation of decentralised data sources and platforms

- Number of Member State, catchment and local models integrated to the EU-wide model.

Option 12b

- Agreement on more reporting requirements (either mandatory or voluntary) to address the current data gaps.
- Number of river basins and Member States reporting the agreed additional data on a timely basis.
- Number of river basins and Member States whose raw data is integrated into an interoperable WISE system.
- The administrative burden for reporting has decreased.

14.4 The options and their elaboration

Several policy options to address the problem of knowledge base were developed to be considered within the Blueprint and subject to IA. These options were subject to a SWOT analysis (see Annex D). In considering policy options to enhance the knowledge base, capacity and processes, detailed prescription is not possible. Rather options should encourage the overcoming of the deficiencies in the use, presentation and interpretation of knowledge and its accessibility to Member States; suggesting softer options instead toward guidance and harmonisation in the use of knowledge available and in the effective integration and synthesis of recommendations coming from the broad spectrum of knowledge transfer and production activities of the European Institutions.

This report has identified a number of deficiencies in the use of knowledge as well as raising concerns over the relevance and operability of much of what is already produced. There is clearly a need for a higher level of integration, cohesion and synthesis in knowledge production and a refinement of the objectives of much of these activities. A greater articulation and rationalisation of the knowledge base is suggested

All of the options build on existing technical, policy or funding developments. There is, therefore, an important strength in this regard.

- There is on-going work to examine the future of WISE.
- The legal amendment option has strong support from stakeholders within the Fitness Check and would reduce costs without reducing environmental protection. However, the opportunity for legal amendment is unlikely to occur until at least the review of the WFD.
- A SEIS based water knowledge system would have major advantages in its ability to upload data, early data sharing, compliance assessment, etc. However, there would be a need for upfront investment and while some Member States might support such a development, this may not be universal. However, the potential benefits mean that this option deserves further analysis.
- Stakeholders view better targeted research as an important objective and, therefore, this option is likely to be supported.

Table 37 describes the options as originally developed in the project and submitted for the public consultation together with the final elaboration of options included within the IA, following further discussion with the Commission. The GMES option has been included here from the problem on pricing. Options on reporting requirements in water law and a shared information system are retained. The WISE option was not retained as this improvement is taking place already. Furthermore, the option on the research roadmap is unnecessary as future FP programmes would be developed taking account of policy priorities and IA is not needed.

Table 37. The options originally considered and final options to address issues concerning the knowledge base for water management

Options originally considered	Final options for the IA
• Improve the sharing of data and other information by further developing the Water Information System for Europe (WISE) Implementation Plan • Enhance minimum WFD reporting requirements and statistical obligations (e.g. trough the Framework regulation on environmental accounts/statistics), especially with regard to inter-operability of data. This includes harmonising the reporting timetables of the Urban Waste Water Treatment, Nitrates and Water Framework Directives • Develop a fully inter-operable, SEIS (Shared Environmental Information System) based, shared water knowledge system for use by Member States and EU institutions, reducing reporting requirements while prescribing interoperability standards for the information produced at local and national level and through GMES. • Develop a roadmap for water research priorities to be integrated in the next research funding cycle at EU and Member States level taking into account the need to improve the science policy interface.	• Option 12a: Develop a fully inter-operable, SEIS based, shared water knowledge system, reducing reporting requirements while prescribing interoperability standards for the information produced at local and national level and through GMES. • Option 12b: Enhance minimum WFD reporting requirements and statistical obligations (e.g. through framework regulations on environmental accounts and statistics), especially with regard to inter-operability of data. This includes harmonising the reporting timetables of the Urban Waste Water Treatment, Nitrates and Water Framework Directives.

Option 12a aims to develop and share EU-wide and comparable data estimated following a uniform approach.

More concretely, option 12a can be broken down in 2 sub-options:

Option 12a1 - shared water knowledge system based on EU-wide modelling. In this purpose, the models currently at the JRC will be used and extended to provide a range of information, in particular related to water quantity. Member States would be invited to review results and provide data to improve modelling. Results would be presented via WISE and could be viewed and freely downloaded.

Option 12a2 - decentralized shared water knowledge system: Fully inter-operable, SEIS based, shared water knowledge system at multiple scales including EU-wide models, catchment-scale and local scale models. For this purpose, a hierarchical and decentralized

spatial data infrastructure is setup where data can be stored, updated and simulated locally (e.g. in the MS or catchment) but can be easily visualised, accessed from the web through a joint portal similar to 'Eye-on-Earth' (using the Bathing Water Directive as a good example) or the 'EuroGeoss broker'

The proposed system is composed of a set of models that are working at different scales and different resolution (EU-wide, MS, catchment and local) and therefore has multiple layers of data with a different degree of detail in order to reflect the local priorities and data availabilities. The higher level model provides EU-wide coverage – and can also provide an assessment for the bigger catchments e.g. the Danube or Elbe. At lower levels, more detailed data can be plugged into the shared water knowledge system resulting in a patchwork of data. Such a hierarchy of models and spatial data infrastructures is envisaged by INSPIRE and GEOSS.

Data are fully shared and can be downloaded for further research or decision-making. This option requires intensive cooperation and coordination among the Member States, data providers and European Institutions (EEA, DG ENV, Eurostat and JRC). An organisational scheme needs to be developed to ensure the system is up-to-date, quality-checked data are available at near-real-time. All parties can upload data, if they fulfil certain quality criteria. This requires a novel funding and institutional scheme and requires substantial capacity building and political willingness towards sharing of raw data.

Option 12.b consists of three dimensions:

- Harmonizing reporting timetables, based on the reporting timetable of the WFD, by aligning the timetables of the UWWTD and Nitrates Directive.
- Additional reporting, specifically to cover the knowledge and data gaps
    - Water quantity data incl. water abstraction, use and consumption and high resolution flow data (incl. e-flows).
    - In-stream water quality and the impact of emissions on it, especially focusing on the impact of untreated waste water and diffuse pollution on the chemical and biological water status.
- Interoperability of data, basically focussing on data sharing and seamless web-visualization. This dimension focuses on the sharing of raw data by the Member States such that they can be integrated into WISE.

The three dimensions are interlinked and the three together would contribute to more efficient reporting. It is also possible, however, to implement only one or two of these components.

The first dimension, the harmonisation of reporting timetables, would require amendments to existing directives. The other dimensions could be put in place either through EU legal

action or through 'soft' law, such as decisions by the Water Directors. Legal amendments would result in additional 'mandatory' reporting requirements and thus a binding way to report on the data gaps. The soft approach results in an additional request for 'voluntary data'.

	Harmonizing timetables	Additional reporting	Interoperability of data
Legal amendments	X	X	X
Decision by Water Directors		X	X

14.5 Effectiveness, efficiency and coherence of the options

The options all aim to improve the knowledge base and tools and strategies to do so, specifically targeting improved data management, data access, sharing, harmonization, interoperability and seamless integration of data and services. A substantial share of the efforts is related to geographical or spatial data.

Effectiveness

Option 12a

A shared water knowledge system is expected to be highly effective to increase the knowledge base. The main purpose is to provide new information and tools to support water managers. Both sub-options are effective, but have a different purpose. Option 12a1 develops new data and tools at EU-scale using uniform EU-wide input data and consequent centralized assessment. The main aim is to generate consistent and comparable data across the EU. The main disadvantage for catchment-scale water managers is that local data may not be used as input data and that the resolution might not be sufficient for local-scale water management. A decentralised (sub-) catchment scale assessment (option 12a2) is based on own data and maps, tailored to local needs. Water managers might have more trust in local models. The main disadvantage is that local capacity for water assessments needs to be developed and that the results may not be comparable with other catchments. For decentralised water assessments, a trans-boundary approach needs to be ensured.

Option 12b

The enhancement of minimum WFD reporting requirements and statistical obligations would be effective to strengthen the information base for water managers and enhance the inter-operability of data. Option 12b aims at better sharing of existing data by Member States. Legal amendments are a highly effective way to improve reporting on data gaps by

'creating' additional mandatory reporting requirements. The soft approach to ask for additional 'voluntary' data request is less effective, but might be easier to be achieved.

Efficiency

All the options are expected to have a positive impact on efficiency. With respect to option 12a, the efficiency is expected to be strongest for option 12a1, as a centralised system will provide comparable outputs without the need for extensive coordination. In contrast, option 12a2 will require investment in new governance structures for decentralised water assessments, especially with respect to the necessary funding and cooperation schemes.

Increasing efficiency and reducing the administrative burden on MS reporting is the aim of option 12b. This option is therefore considered as highly efficient.

Coherence

All the options are considered to be coherent with EU policy objectives, both those for water as well as objectives related to resource efficiency. Option 12a1 provides a uniform approach and high comparability across the EU. For option 12b, better local ownership of the data supports subsidiarity and transparency of water assessments. Option 12b specifically aims to improve the coherence of reporting and is thus considered as coherent.

Contribution to operational objectives

All the options contribute positively, but indirectly, to fostering integration of water into sector policies by providing better information and maps for other sectors, in particular on water quantity and availability. With respect to supporting the use of economic instruments, the options again have an indirect effect through better information. Water data and maps may facilitate the use of economic instruments.

More efficient governance would be achieved through a shared water knowledge system (option 12a) and enhancing reporting requirements (option 12b) by addressing gaps and providing new information for water policy. A decentralized shared water knowledge system (option 12a2) is expected to be particularly effective as a consequence of the better ownership and tailoring of the data and tools by local/regional policy makers.

For the objective of improving knowledge and tools available to water managers, all options have this as a core aim. Option 12a will develop new knowledge and data through simulation, respectively at the EU-scale (option 12a1) or the catchment or sub-catchment scale (option 12a2).

14.6 Acceptability

The public consultation sought views on a range of options concerning the improvement of the knowledge base for water management. The results are summarised in Table 38.

Table 38. The results of the public consultation concerning options to address the knowledge base for water management

Option	Yes (%)	No (%)	Do not know (%)
Improve the sharing of data and other information by further developing the Water Information System for Europe (WISE) Implementation Plan	68	5	26
Enhance minimum WFD reporting requirements and statistical obligations (e.g. through the Framework regulation on environmental accounts/statistics), especially with regard to inter-operability of data, including harmonising the reporting timetables of the Urban Waste Water Treatment, Nitrates and Water Framework Directives	54	19	27
Develop a fully inter-operable, SEIS (Shared Environmental Information System) based, shared water knowledge system for use by Member States and EU institutions, reducing reporting requirements while prescribing interoperability standards for the information produced at local and national level and through GMES	44	18	38
Develop a roadmap for water research priorities to be integrated in the next research funding cycle at EU and Member States level taking into account the need to improve the science policy interface	77	14	9

Overall, the policy options are positively perceived by the respondents. Voluntary approaches – the development of the Water Information System for Europe to improve data sharing and of a water research roadmap to be integrated in the next funding cycle at EU and Member States levels – receive significant support.

For a regulatory measure, the enhancement of WFD reporting requirements, 54% of respondents are in favour. A combination of regulatory and voluntary approaches – i.e. the development of a fully inter-operable Shared Environmental Information System – is supported by 44% of the respondents.

For several options, however, a high share of respondents indicated 'do not know': for example, 38% for the fully inter-operable, SEIS.

In written comments, strengthening the collection and sharing of data is overall well-supported by respondents across the different categories. A respondent from the research sector underlines the need for a simplified, streamlined and inter-operable European reporting system and data base, which broad access. A couple of replies highlight the future availability of spatial data under the INSPIRE Directive; others call for better integration of existing data collection. Some industry stakeholders write that confidentiality issues, the cost of collecting and sharing information and the efficient use of the data should all be carefully considered, especially in the current economic situation.

Veolia (CZ) agrees with the principle of improving data availability and data sharing as does the Association Luxembourgeoise des Services de l'Eau, which also states that any specific actions need to be debated with Member States first. The Country Landowners Association also agrees with the proposals.

Maison Europeenne des Pouvoirs Locaux Francais considers that the European Environment Agency should promote the exchange of best practices on innovation and information systems. Furthermore, water issues should be a priority in the new FP research programme. The new European Innovation Partnership on water should assist in dissemination campaigns as well as developing innovation.

WWF supports improved data options. The quality and quantity of data are important criteria for RBMPs, but some Member States lack sufficient finance to collect enough data. Wetland International considers that the options need to look more broadly than just sharing reporting data, such as to ensure current science is available for practitioners and policy makers. This cuts across many of the problems and options highlighted in the Blueprint. Information is often difficult to obtain, people do not know it exists and it doesn't reach the people it should. WI considers that further developing WISE is not the only solution. Knowledge brokering is a better option, which needs also to consider how the data is used to improve water management. The data collected as part of reporting must also be used to shape the measures and implementation of RBMPs. Support for both formal and informal networks is essential for generating and sharing data. Examples include the ECRR network, the EU Life+ project RESTORE and the FP7 project REFORM.

The Royal Institute of Chartered Surveyors notes that the concept of spatial data infrastructures (SDI) has been developed to encompass the efficient and effective collation, management, access and use of spatial data. All cities and regions have problems with overlapping responsibilities amongst internal and external agencies, leading to operational dysfunction such as a multitude of agencies holding non-accessible spatial data. RICS supports the development of Inspire.

Electricite de France considers that WFD reporting obligations should not be enhanced due to the current financial crisis. However all actions improving the sharing of data are welcomed. Quality, homogeneity, validation and relevance of data are key issues before sharing data among Member States.

14.7 Conclusions

The options set out to address the knowledge base are not contrasting or alternative options. None, one or all could be taken forward. All of the options have strong potential positive outcomes. It is clear from the stakeholder responses that there is both a desire for improved information provision to support water management as well as concern over the burden of information supply. The development of inter-operable systems, better data sharing and reducing reporting burdens where these occur would all enable the choices in taking forward these options to maximise the utility of the supporting tools while minimising their disbenefits.

Table 39 compares and summarises how the options contribute to the effectiveness of achieving the operational objectives of the Blueprint and to the overarching objectives of improving efficiency and coherence.

Table 39. Overview of the effectiveness, efficiency and coherence of options concerned with improving the knowledge base for water management

Description of the option	Option 12a: Develop a fully inter-operable, SEIS based, shared water knowledge system, reducing reporting requirements while prescribing interoperability standards for the information produced at local and national level and through GMES.	Option 12b: Enhance minimum WFD reporting requirements and statistical obligations (e.g. through framework regulations on environmental accounts and statistics), especially with regard to inter-operability of data. This includes harmonising the reporting timetables of the UWWTD, ND and WFD.
Effectiveness towards specific Objective	++ Main purpose to provide new information and tools to support water managers respectively at EU-scale using a uniform EU-wide input data and centralized assessment (12a1) and (sub-)catchment scale assessment for 12a2, based on own data and maps, tailored to local needs and potentially in high resolution.	+ Sharing of existing data through reporting, thereby strengthening the information base for water managers
Effectiveness towards other specific objectives	12a1: ++ integration: Data and maps are available for other sectors + Better information can facilitate the use of economic instruments + Addressing gaps and provides new information for governance. 12a2: ++ integration: Data and maps are available for other sectors + Better information can facilitate the use of economic instruments	+ Better information on water quantity can support integration ≈ No direct effect on economic instruments + Supports governance by addressing gaps in reporting
Efficiency	++ 12a1: Uniform input data facilitates comparability. Economic cost falls in JRC budget + 12a2: Ease of adoption by local/regional policy makers. Very high costs: New funding and cooperation scheme needed	++ The main purpose of option to improve efficiency, reducing admin burdens on MS reporting.
Coherence	++ 12a1: provides uniform approach and high comparability across EU ++ 12a2: better local ownership of the data supports subsidiarity and transparency	++ The option specifically aims to improve reporting coherence.
Acceptability	++ Public consultation: 44% of respondents support this option with 18% opposed.	++ Public consultation: 54% of respondents support this option with 19% opposed.

15 SYNTHESIS AND CONCLUSIONS

15.1 Introduction

The previous section has described the impacts of a wide range of options to address the 12 problems identified in the problem analysis in order to provide a coherent basis for future action to protect Europe's waters. It is not the role of this project to suggest which options the Commission should take forward. However, it is important for the options to be compared and for the relationships between the options to be set out. This section will, therefore, firstly describe the relationships between the options and then provide a comparative analysis of the options as a whole.

15.2 The inter-relationships between the options

Introduction

The preceding section described the options being considered within the IA according to 12 specific problems and how these contribute to the effectiveness of achieving the operational objectives of the Blueprint and the general objectives of improved efficiency and coherence. However, it is important to stress that these problems are not isolated problems and the options that are developed under each problem may also contribute to addressing other problems and Blueprint objectives. The options need to be considered as individual potential actions contributing to an overarching set of the objectives, with each option contributing one part of the puzzle and that action across a range of different issues is needed to bring together all of the pieces of that puzzle to provide a coherent picture of action to deliver the Blueprint.

This section explains this interaction by examining how the different types of instrument, intervention or approach, and the options contributing to these, together help to achieve the operational objectives of the Blueprint. It should be noted that the discussion and the accompanying Figures are illustrative in how the options are addressed. Given the large number of options, not all can be included, but the aim is to illustrate how different types of options when brought together improve the effectiveness of the delivery of the operational objectives.

Foster integration of water into sectoral policies

Integration with sectoral policies is achieved through a variety of approaches. Some options directly seek to achieve water policy integration with specific sectoral policies. However, many other options establish mechanism, tools or preconditions which provide an improved basis for sectoral integration. This is illustrated in Figure 21.

A primary approach to delivering sectoral integration is to increase conditionality on the distribution of EU funds to sectors, such as use of cross-compliance under the CAP to ensure specific implementation requirements of the WFD are met. Funding itself can also be used as a tool to enhance integration, whether Regional Funds, Rural Development or EIB loans. These can encourage specific sectoral actors to undertake measures to deliver a range of water objectives. Economic instruments are themselves tools for integration – providing incentives for behavioural change. Options on water pricing, water rights trading and payment for ecosystem services are examples of these.

Some options directly focus on individual sectors, such as those on water efficiency in appliances (manufacturing sector) and buildings (construction sector). Some options directly aim to regulate these issues within these sectors, while others seek to influence the sectors by providing consumer information.

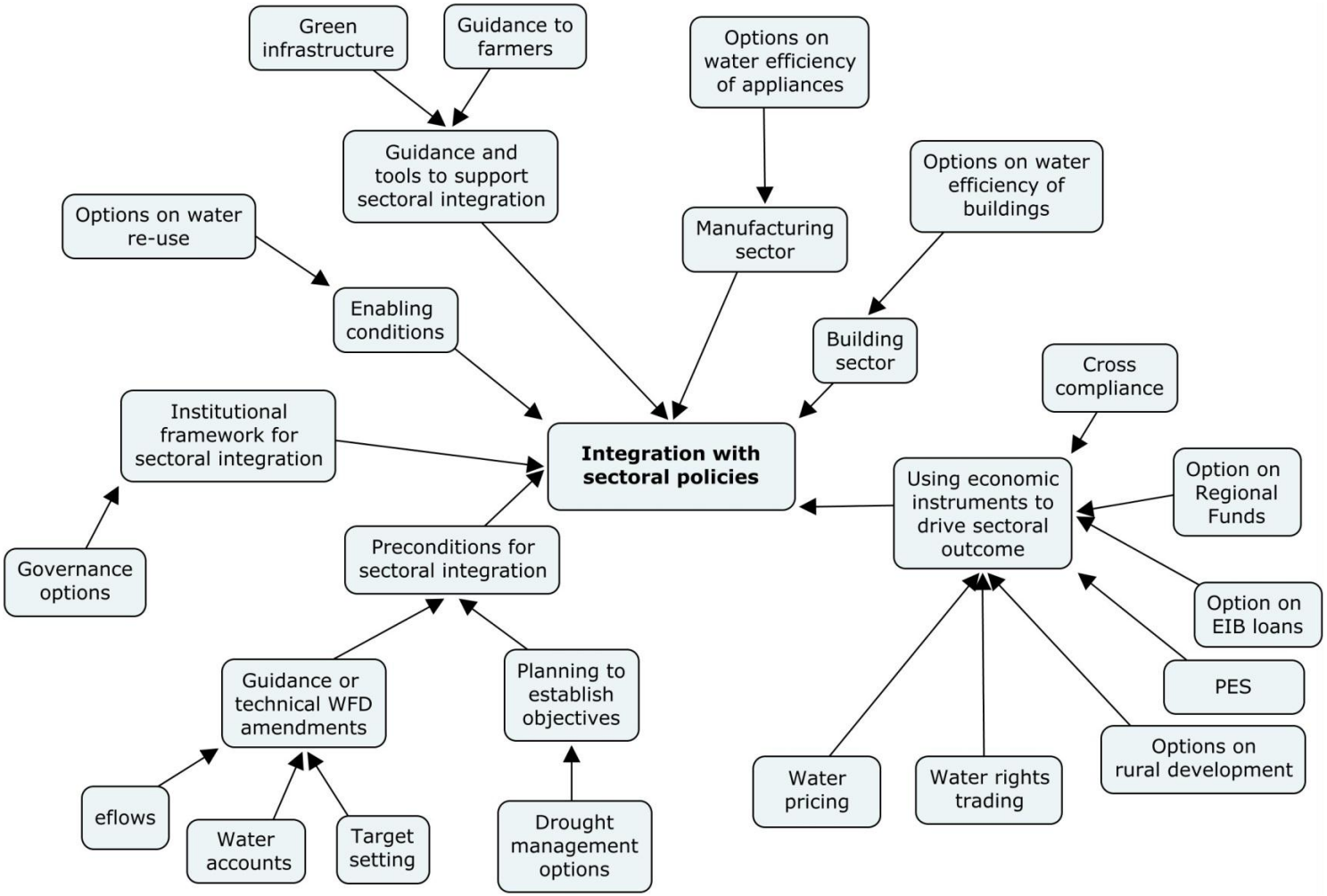
Sectoral integration is also assisted by establishing improved enabling conditions or preconditions. EU level standards for water re-use may provide confidence to farmers and thus provide a precondition for more efficient water use. Guidance to water managers on eflows, water accounts, target setting, drought management, etc., all provide a firmer evidence base for water management decisions and this is an important pre-condition to push forward measures for those sectors that may need to change to deliver the objectives of EU water law.

Improved knowledge and tools also can support sectoral integration. Some, such as guidance of green infrastructure, have to address aspects of sectoral interaction in the issues they address. Others, such as guidance for farmers to deliver water quality and quantity objectives specifically target a sector. These are not binding, but aim to provide tools and information for more effective decision making by different actors.

Finally, improved water governance must address institutional relationships and processes with public bodies responsible for individual sectors and the companies and individuals of those sectors. Therefore, the options to improve governance directly, such as peer review or better tools to support analysis of programmes of measures, can contribute to sectoral integration.

It can be seen, therefore, that sectoral integration can (indeed should) be improved by actions in a variety of different ways.

Figure 21. The contribution of different types of approaches and options to support these to deliver the operational objective of integration into sectoral policies.



Increase the use of economic instruments

A large variety of options contribute to the effectiveness of the objective of increasing the use of economic instruments. This is illustrated in Figure 22.

Several options directly aim to promote specific economic instruments, such as those on water pricing, payment for ecosystem services and water rights trading. A second group of options aim to influence consumer behaviour, thus using purchasing power to improve water outcomes. These include options on labelling of water footprints and water efficiency of appliances and efficiency ratings for buildings.

Funding is a particular type of economic intervention and, therefore, options that aim at prioritisation of funding on sustainable water management, such as Regional Funds or EIB loans, contribute to this objective. A particular type of option regarding funding is that of conditionality on the spending of EU funds, such as enhancing the effectiveness of cross compliance under the CAP.

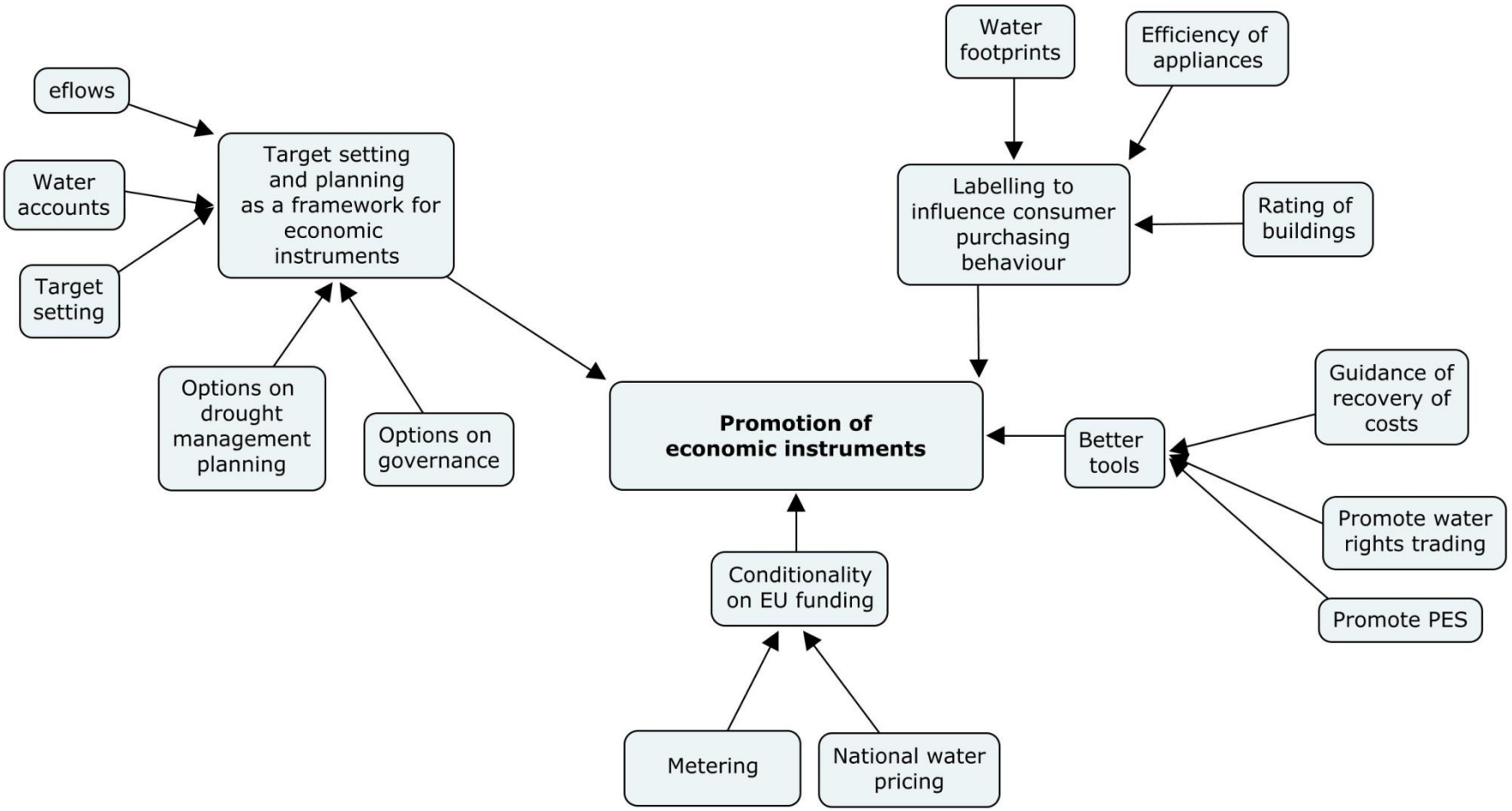
Options also aim to improve economic analysis within water management, such as the options to improve the assessment of the calculation of the adequate contribution of different water users to the costs of water services.

Several options aim to provide the necessary precondition of target setting within which economic tools can effectively operate. Tools and guidance for water accounts and target setting are examples of this. Another group of options also set preconditions for use of economic instruments, such as those on metering (to enable volumetric measurement of water use) and tools such as GMES to understand water use behaviour more accurately.

More widely, options to improve planning, such as the options concerned with drought management, can provide the framework within which economic instruments can be identified as effective measures to achieve the objectives of those plans. Governance options can also contribute by providing a more effective institutional context to develop and use appropriate economic instruments.

It can be seen, therefore, that delivering an increase in the use of economic instruments can (indeed should) be delivered by different actions in a variety of ways.

Figure 22. The contribution of different types of approaches and options to support these to deliver the operational objective of promotion of economic instruments.



Achieve a more efficient water governance

A large variety of options contribute to the effectiveness of the objective of achieving a more efficient water governance. This is illustrated in Figure 23.

Some of the options aim directly at improved governance, such as those on peer review, making RBMPs legally binding and a mediation role for the Commission in transboundary governance. Also in this category are options, such as on a shared inter-operable information system, which aim at improved efficiency in governance.

A number of options at specifically at supporting implementation of the Water Framework Directive which would have a direct impact of the effectiveness of governance. These options cover issues such as eflows, water accounts and target setting and are of two kinds – guidance or technical amendments to the Directive.

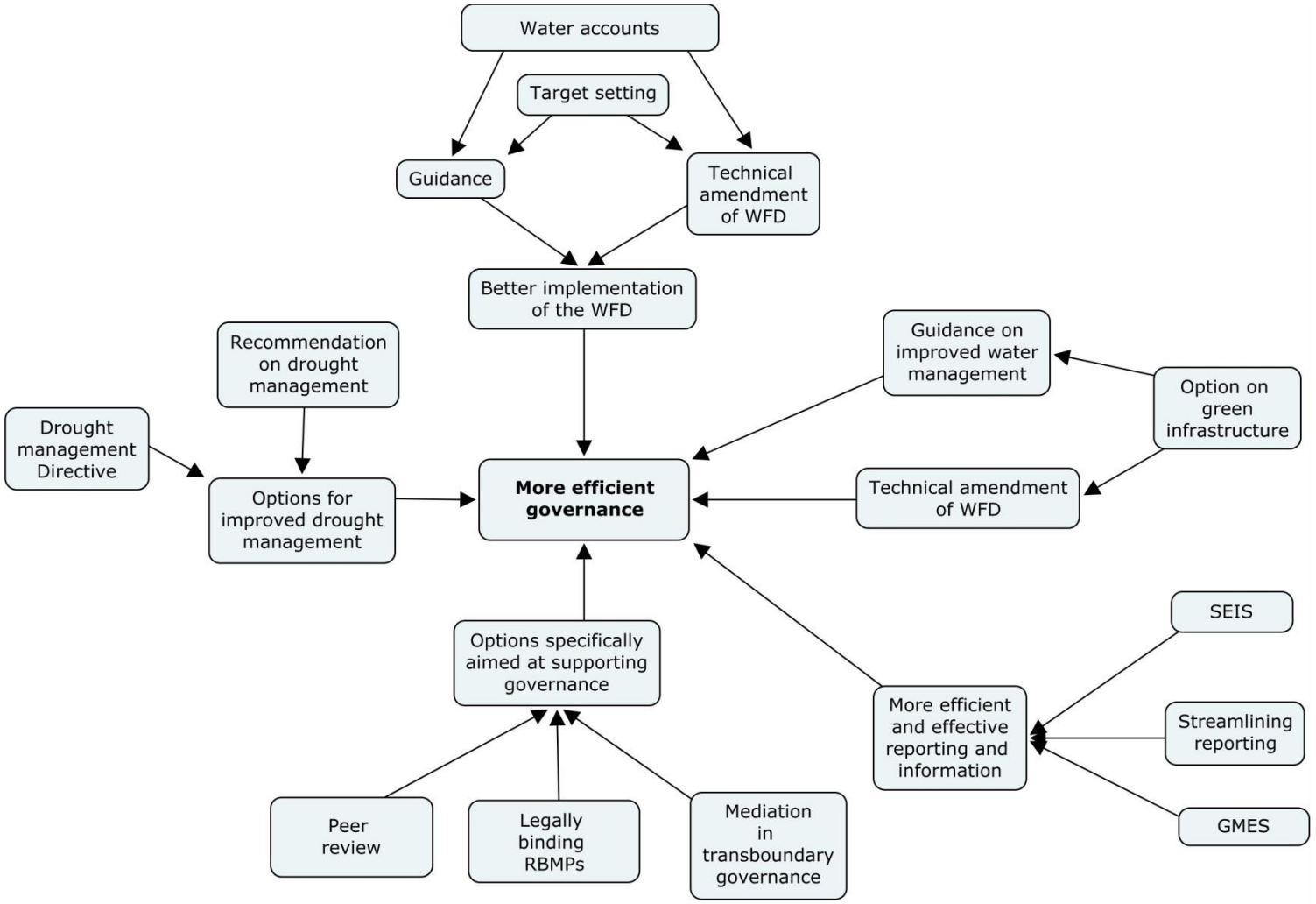
Some options also aim to support wider water management governance, such as the range of options on drought management and also those options (guidance or legally binding) on specific issues such as green infrastructure.

A number of options seek to provide new or improved tools, such as on water rights trading, GMES, method for leakage management, reporting and information systems, etc. Better tools increases governance efficiency.

Finally, it is important to note that improved sectoral integration (see above) is itself a positive governance outcome. Improved awareness by sectoral interests (public or private) aids institutional relationships and, thereby, effectiveness of governance.

It can be seen, therefore, that delivering improved effectiveness of governance can (indeed should) be delivered by different actions in a variety of ways.

Figure 23. The contribution of different types of approaches and options to support these to deliver the operational objective of more efficient water governance.



Improve knowledge and tools

Improved knowledge and tools contributes to improved water management and a variety of decisions by actors to contribute to the water management objectives. Options developed under the Blueprint contribute is a variety of ways to improve the effectiveness of the knowledge base and effectiveness of tools. This is illustrated in Figure 24.

Some of the options are specifically aimed at the development of individual tools. These include the option on use of GMES, harmonised method for leakage management, developing a shared information system.

Improved information (which may contain specific tools) is also achieved through options to develop guidance, such as on eflows, water accounts, target setting, cost-benefit assessment, green infrastructure and re-use certification schemes. Such guidance is primarily (though not exclusively) aimed at public administrations. However, guidance, such as the option to provide guidance to farmers to deliver water quality and quantity objectives aims to improve the knowledge of individual actors.

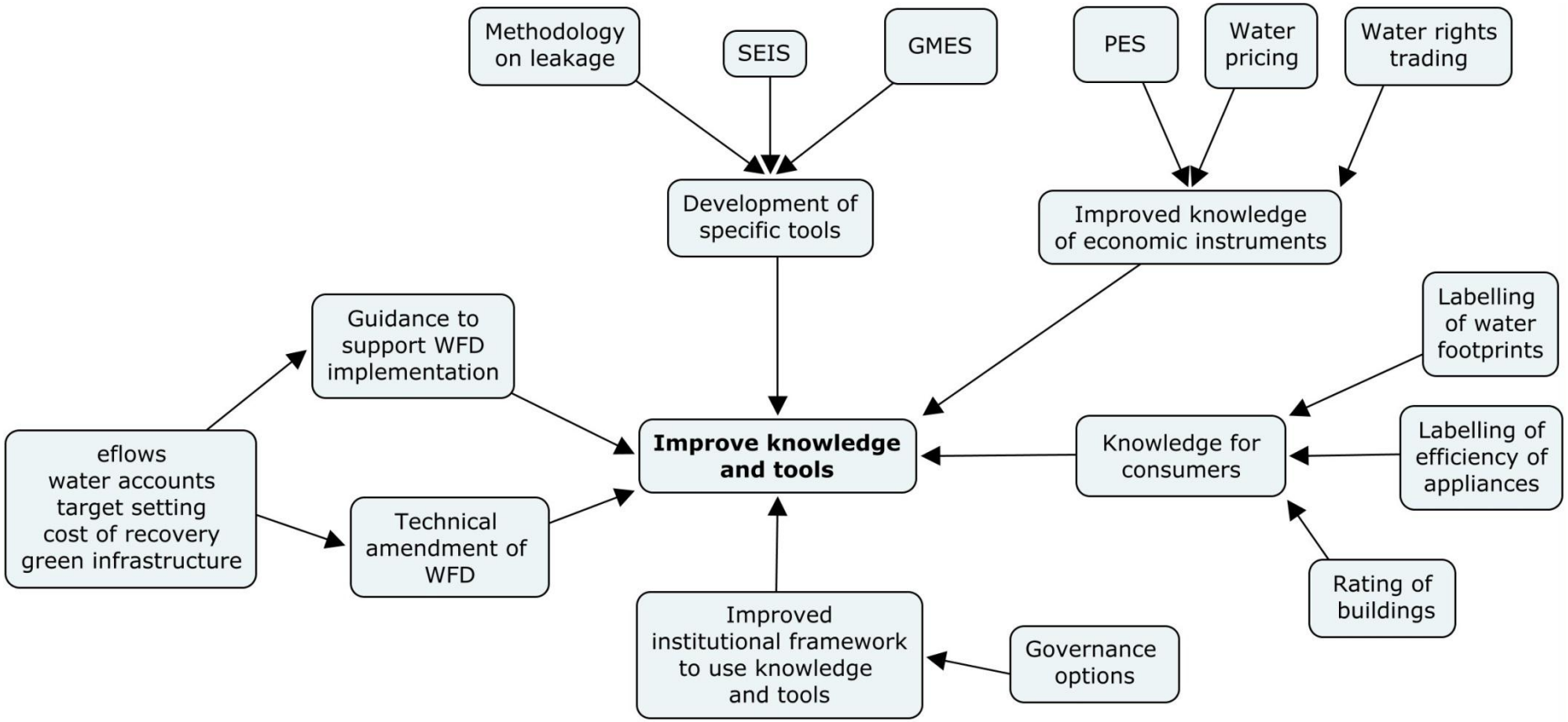
Many of the options for tools developed as guidance are paired with other options to set out these objectives as technical annexes to the Water Framework Directive. In terms of the provision of tools, these legal amendment options do not add to the number of tools (compared to non-binding options), but set the tools in a different regulatory context.

Options that seek to influence consumer behaviour (such as water footprint labelling, appliance labelling and buildings rating) all aim to contribute to the information available to the public to contribute to water objectives. Options to prioritise investment and funding, such as Regional Funds and EIB loans, will require additional project appraisal and this will encourage improved tools and knowledge.

The development of economic instruments, such as options for payment for ecosystem services, water pricing and conditionality of cross compliance, all require the development of specific tools and knowledge (such as on individual ecosystem services) and, thereby, will also contribute to improved knowledge and tools.

Finally, options to improve governance will focus on the effectiveness of governance which will necessarily need to consider the nature of the knowledge and tools that contribute to effective governance and how these are used within water management institutions and exchanged with other authorities and stakeholders. It can be seen, therefore, that delivering improved effectiveness of the knowledge base and tools can (indeed should) be delivered by different actions in a variety of ways.

Figure 24. The contribution of different types of approaches and options to support these to deliver the operational objective of improving knowledge and tools.



Synergies and trade-offs

The analysis above has show how options addressing several of the problems analysed in the IA contribute individually or together to deliver the various objectives of the Blueprint. Each option, of course, has been designed to tackle a specific aspect for a specific problem. It is, therefore, important also to consider how the options interact with each other, with potential synergies and trade-offs, with regard to their individual problems. This short section provides such an analysis, structured according to the 12 problems, indicating for each how options developed for other problems might interact with that problem. It does not specifically address the interactions between options developed for a single problem (such as a guidance option supporting a regulatory option) as this was addressed, where appropriate, earlier within the IA of the individual problems.

Pricing

Two options are considered to address the problem – guidance on water rights trading and conditionality for CAP funds for payment of national water prices.

Effective pricing requires effective volumetric measurement of water use and, therefore, the options regarding metering are supportive of improvements in application of pricing generally and of the two pricing options specifically.

Water rights trading requires a number of preconditions to be in place for it to be effective. Tackling illegal abstraction is necessary (and this is supported by the GMES option under metering). Furthermore, trading should aim to provide a means to reach an abstraction goal for a river basin and this requires a full understanding of flows and use and setting of objectives – all potentially supported by the options under water accounts and target setting as well as improved information that is supported by the options under knowledge base. The effectiveness of trading also reflects the effectiveness of water governance more generally. The peer review option under the governance problem has, therefore, the potential to support this.

The conditionality option clearly interacts with other possible conditionality options for metering and NWRM, but these can be considered separately. Together they have the potential to enhance farmers' awareness of water issues more than they can do separately. The issue of conditionality with national water pricing does not specifically interact with the other options in the IA.

Metering

The metering options, as noted above, directly support pricing. The options amending the WFD effectively aim to ensure metering is implemented consistently in applying the Directive. Other options do not significantly interact with these options, except in a limited way through improved governance and knowledge. The interaction of the conditionality option has been addressed under 'pricing'.

The GMES option has greater potential for interaction with other options. Most notably are the options for knowledge base as GMES is an information tool and GMES results and action on the ground in response to GMES information should be included within a SEIS for water. Furthermore, use of GMES data in decision making is a governance issue and support between Member States on this could be addressed by the peer review option under governance.

Labelling globally traded goods

The labelling (voluntary or mandatory) of globally traded goods with regard to their water footprint aims to promote water efficiency. Several problems are focused on water efficiency in the EU, but the options to support these (appliances, leaks, re-use, pricing, etc.) do not directly interact with labelling of products. The closest interaction might be viewed as the options concerned with water using appliances. However, it is important to note the distinction between the options. Those of globally traded goods consider the water used in their production or manufacture, while those under water using appliances consider the amount of water that is used when the appliance is used by the consumer. Thus there is a synergy in outcome, but not in development or application of the options.

Land use and NWRM

Guidance for farmers on NWRMs is likely to link to wider water management objectives. These would, on the surface, contribute to improved efficiency, better flood management, etc., but in practice there is only limited interaction with specific options under other problems. Improved drought management would be likely to support better guidance to farmers as would improved information systems under knowledge base. There are similar interactions with the option for regulatory change.

The conditionality option clearly interacts with other possible conditionality options for pricing and metering. Together they have the potential to enhance farmers' awareness of water issues more than they can do separately.

The option to prioritise spending on NWRMs within EU funding interacts with similar options for leakage reduction and water re-use. Prioritisation of all issues would result in a competition for limited funds (and indeed competition with other priorities for water spending that are already in place. It is, therefore, important that development of funding plans and proposals at river basin level reflect the priorities on the ground between the different problems.

Buildings and appliances

The options for addressing buildings and appliances have limited interactions with the options addressed for the other problems beyond the overall synergy of contributing to improved water efficiency. Water efficient buildings should have meters, but there is little direct interaction with the metering options. As noted above, the interaction between the options on labelling of globally traded goods and options on appliances is also limited.

Water efficiency in distribution systems

The options for addressing leaks in distribution systems have limited interactions with the options addressed for the other problems beyond the overall synergy of contributing to improved water efficiency. The option to develop guidance on SELL is a direct contributor to improved knowledge and governance, thus contributing to options under those problems. Furthermore, assessing SELL includes an assessment of alternatives for water provision and this interactions with options under land-use as well as wider use of SEA (under governance) which may be appropriate for the assessment of water transfer schemes, etc.

As noted under land use, the option to prioritise spending on leakage reduction within EU funding interacts with similar options for NWRMs and water re-use and that it is important that development of funding plans and proposals at river basin level reflect the priorities on the ground between the different problems.

Water re-use

Establishing standards, voluntary or mandatory, for re-use of water contributes to improved water efficiency (and therefore issues such as illegal abstraction, pricing, etc.). However, there is not a direct interaction with other options whereby they enhance the development of water re-use standards or inhibit their development.

As noted under land use, the option to prioritise spending on water re-use reduction within EU funding interacts with similar options for NWRMs and leakage reduction and that it is important that development of funding plans and proposals at river basin level reflect the priorities on the ground between the different problems.

Governance

The governance options are highly specific. Efficient and effective governance is a pre-requisite to delivering many of the objectives of the Blueprint, tackling the 12 problems and taking forward many of the options to address those problems. The options under governance focus on individual issues.

Peer review is focused on water management authorities. None of the other options in the IA support or are antagonistic to taking forward peer review itself. However, a number do enhance the capacity of water management authorities to deliver water outcomes, which is the purpose of peer review. These include the options on improving drought management, assessing costs and benefits and knowledge base, together with specific options on guidance for water rights trading and SELL.

Making RBMPs binding is not supported or impeded by other options. It would, however, support application of other options where these translate into specific measures within a RBMP. Similarly, there is little interaction with the option on a Commission role of transboundary water management.

The option to ensure SEA applies to hydropower is supportive of the options on land use as delivering NWRMs requires a strategic interaction with impoundment projects.

Water accounts and target setting

Effective water accounting and target setting are at the basis of good water management. The options under this problem, therefore, underpin many other options, such as water rights trading, guidance on NWRMs, guidance on SELL, funding on water re-use, governance options, improved drought management, assessment of costs and benefits, etc.

The options are supported by those options which deliver information, such as those under knowledge base and the option on GMES. Also improved governance, such as through peer review, can enhance the effectiveness of the application of the options.

Drought management

The options for a recommendation or binding legislation on drought management planning have limited interaction with other options. Drought management itself interacts with issues such as NWRMs, water rights trading, knowledge base, etc. However, drought management is already promoted by the WFD and CIS guidance. The options specifically seek to strengthen Member State action. Improved knowledge, for example, can strengthen

the case for the options. Once an option is adopted, however, the interaction is similar to the existing interactions with drought management, except for a change in legal basis.

Assessment of costs and benefits

The assessment of costs and benefits options (guidance or WFD amendment) aim to simulate improved development of measures in PoMs, overcoming the lack of ambition by some Member States. All options that enhance the evidence base for CBA support these options – those under knowledge base, GMES, SELL, etc. The options on costs and benefits provide the basis for sound arguments to take forward measures and these could support many of the problems in this IA – expansion of metering, NWRMs, leakage reduction, water re-use, etc. The issue would depend on the river basin and the particular outcome of the cost-benefit assessment.

Knowledge base

The knowledge base options support many of the options developed under the other problems. Some of these other problems have knowledge generating options themselves (GMES, SELL, etc.) and these therefore contribute to the knowledge base options. Furthermore, peer review, for example, can support improvements in how authorities use information and support information systems, so contributing to the knowledge base options. The options are also closely related to those for water accounts and target setting, as without information accounts and targets cannot be developed, but also water accounting helps to identify specific information needs and requirements for the way information platforms present data.

Enhanced information and sharing of information supports decision making, whether this is strategic (e.g. drought management, use of SEA, application of NWRMs, etc.) or specific, such as on metering priorities.

15.3 Comparing the options

Introduction

The analysis of the options in the previous sections for each problem compared the impacts of the respective options. However, no comparison was made between options addressing different problems. It is clearly difficult to provide an overall comparative analysis treating all of the options separately given the large number that have been identified. Furthermore, the options are designed to address very different issues and, therefore, comparison of many individual options is of no or little value. For example, there is no benefit to comparing an option for peer review for governance with one for performance rating for buildings.

However, it is beneficial to compare the types of approaches adopted by the options. This returns the analysis to the intervention logic set out earlier in this report – the types of approaches that can be taken at EU level and the impacts these have. These approaches are:

1. **Support tools** – the development of guidance, analytical tools, exchange of best practice, etc., that aim to increase the knowledge and capacity of water managers and other actors better to deliver the objectives of EU water policy as well as national priorities for water management.
2. **Regulatory change** – the amendment of existing legislation or adoption of new legislation to clarify existing requirements, reduce the burdens of existing requirements, or add new obligations to ensure water policy objectives are met.
3. **Conditionality on EU funds** – the introduction of requirements on the spending of existing EU funds (e.g. CAP or Cohesion funds) that those in receipt of such funds comply with specific existing obligations of EU water law.
4. **New or improved funding** – the identification of new or modified priorities for the spending of EU funds to support infrastructure or other projects considered necessary to meet the objectives of EU water policy.

The following text sets out comparative conclusions for the options according to each of the 12 problems. It then draws the analysis together by providing some overall conclusions regarding the effective, efficiency and coherence of the options as a whole (with particular reference to the four types of approaches) and the economic, social and environmental impacts.

Problem 1: Water pricing

Two options are considered. The first (option 1a) is to add national water pricing obligations for farmers as a cross-compliance requirement under the CAP and the second (option 1c) is to develop guidance and tools on the use of trading in water rights.

Water rights trading would impose administrative burdens on authorities supervising trading and those undertaking it, while potentially delivering more equitable and economically justified distribution of water allocation between users. The environmental benefits that would result would need to be set within a system where environmental targets (environmental flows – see problem 9) are respected. However, these points reflect the operation of a trading system, while the option is to develop guidance, which would be able to explore the respective costs and benefits of different approaches and Member State administrative contexts. The public consultation found strong opposition to water rights trading, leading to opposition to the development of guidance on the subject.

Option 1c adds no new obligations to farmers other than to demonstrate appropriate payments in cross-compliance checking. Compared to other aspects of cross-compliance, this is relatively simple and low cost. The benefits of complying with national water pricing are economic (ensuring others do not pay for illegally used water), social (ensuring equitable water use for all sectors) and environmental (reducing illegal abstraction). The prices paid are not influenced by the option. Within the public consultation, opinion was equally divided between those opposing and supporting the option.

Problem 2: Water metering

Option 2a on GMES would enhance water governance at the river basin and local level. New governance structure will be needed. Investment costs are expected to be outweighed by benefits in terms of effective water management. The approach is expected to be more effective and efficient than ground-based inspections alone.

Metering is necessary for the volumetric measurement of water use and is, therefore, necessary for an effective pricing policy. The three options would promote metering by making funding (CAP or Cohesion) for irrigation projects conditional on the installation of a meter (option 2c), amending the WFD to make explicit that Art. 11 includes mandatory metering (option 2b1) and amending the WFD to require metering of significant individual water consumption in water scarce areas (option 2b2).

The WFD amendments both aim to require that metering is expected to meet the requirements of the WFD for significant water users in areas where there is water scarcity. Installation of meters would impose costs either to users or utilities, but this would vary significantly depending on the Member State, given current metering practices. However, the options are designed to ensure WFD implementation rather than an additional obligation and, therefore, the wider environmental, social and economic impacts are those of the WFD.

The option for conditionality in EU funds would result in small costs to those affected to demonstrate compliance, but the presence of a meter would be easy to demonstrate. The impacts would be both to help control illegal abstraction and ensure national obligations for water payment are met, stimulating greater water efficiency. The impacts of business would depend on national price levels, as would the impacts on local water resources. The public consultation found strong support for the introduction of metering as a condition for EU funding to farmers.

The public consultation found strong support for option 2a, opinions to be equally divided on option 2b1, while overall that there was strong support to option 2c in the public consultation, but opposition from agricultural stakeholders.

Problem 3: Global

The options address the issue of embedded water in products through either raising business and consumers' awareness of the water footprint of products (option 3a) or requiring mandatory labelling of most embedded water intensive products (option 3b).

A voluntary option would enable the development of critical thinking by consumers and businesses on embedded water and so inform the choices they make. This can have knock-on benefits in other areas of water use (and indeed other aspects of the environment). The issues that would be raised by the option are equally applicable to products from inside and outside the EU. However, the option simply raises awareness and does not ensure delivery of any particular outcomes.

A mandatory labelling option would be binding across the EU and uniform across the EU, thus providing a common reference framework for consumers and businesses. It would stimulate similar critical thinking to a voluntary awareness raising option, but this would only be achieved if a labelling option was backed-up by an information campaign. Labelling would impose costs on producers (inside and outside the EU). While the labelling itself imposes some costs, the majority of costs would arise from determining the water footprints which form the basis for the label classification and, in particular, about relating water use to water stress (i.e. distinguishing where water use is or is not an issue). This poses methodological challenges as well as financial challenges.

The public consultation found very strong support for the option to raise awareness of the water footprint of products, but opposition for the option for mandatory labelling.

Problem 4: Land use

The options focus on stimulating the uptake of natural water retention measures (NWRMs) as effective tools for delivering water management objectives. Option 4a seeks to achieve this through guidance, option 4b by mandatory application through a WFD amendment, option 4c by including NWRMs as conditions on the spending of CSF funds, particular the CAP and Cohesion Funds and option 4d by prioritising support for NWRM is the spending of EU Regional Funds.

NWRMs have a wide range of environmental impacts. With regard to water, they help to control water quality, prevent and manage floods, protect soils, etc. They also provide wider

environmental benefits such as biodiversity protection in riparian areas. The impacts vary significantly depending on the nature of the NWRM, from riparian grassland to forests. NWRMs are also considered 'no-regret' measures in the context of climate change adaptation and can help to mitigate current climate impacts. NRWMs can also reduce the rate of carbon loss through carbon storage/sequestration.

The economic impacts of each option are tightly linked to the specific NWRM. The costs of implementing green infrastructure projects and NWRMs vary considerably, depending on the scope and local conditions. For example, freshwater and wetlands management and restoration the average project costs is about 575.5 € million, with a minimum cost of about 128,000 € and a maximum cost of over 4€ billion. The largest impact of these costs would be potentially on the affected land users, mainly farmers. They would need to go through a learning process and adapt their land practices, decreasing operating income and potentially increasing operational costs. The extent of these impacts and the impact on the internal market will depend on the availability of support from a land compensation scheme or service payments. The increased adoption of green infrastructure could also negatively impact the construction sector, by shifting away from grey infrastructure.

However, there are also important economic benefits. In France, the economic benefits of natural water storage were calculated in terms of the replacement costs of building grey infrastructure like dams. Several studies indicate benefits ranging from € 37/ha/year to € 617/ha/year. A number of case studies have shown the benefits of natural water storage in floodplains and wetlands in terms of economic value. A cost-benefit analysis found that natural measures lead to flood protection benefits of around €740 million, recreational benefits of around €22 million and provide ecosystem services to the tune of around €130 million.

Social impacts of natural water retention measures arise from an increase in temporary jobs due to project implementation and in full-time jobs for maintenance and from increased tourism opportunities and local recreation opportunities.

Option 4d (funding) is not an alternative to other options, but can accompanying this option or be taken forward independently. Given public and private expenditure constraints, investment in natural water retention and ecosystem restoration measures is constrained in some regions. Indeed, finance could be targeted at those locations where co-benefits are more evident and NWRM constitute a cost-effective alternative to infrastructure-based flood protection or water storage measures. The effectiveness of this option (and the resulting economic, social and environmental impacts) would be directly proportional to the level of available investment.

Depending on the policy instrument used, the economic costs and benefits will be different. Option 4b would most likely lead to the most economic benefits, given its mandatory

nature, although the timing of these benefits are long term. However, with option 4a, Member States will decide themselves whether to implement NWRM, based on issues such as cost-effectiveness. The public consultation found strong support for a voluntary approach to promoting NWRMs and for greater use of CAP Pillar I and II measures. The consultation did not seek views on a possible WFD amendment.

Problem 5: Buildings and appliances

Seven options are considered under this problem. Three concern appliances: voluntary labelling of water efficiency (option 5.1a), mandatory labelling (option 5.1b1) and setting minimum water efficiency requirements using the Ecodesign Directive (option 5.1b2). For concern buildings: voluntary performance rating (option 5.2a), mandatory performance rating (option 5.2b1), minimum performance requirements (option 5.2b2) and a directive on water efficiency requirements in buildings (option 5.2b3).

The effectiveness of the options for both appliances and buildings depends on their ability to influence both producers/constructors and consumers. Mandatory labelling could be more effective than a voluntary approach, but only if consumer choices would be based on such labels. This is more likely to be the case for an appliance than a building. Furthermore, appliances are traded within the internal market where buildings are not, so that there is a stronger case for minimum mandatory performance requirements of traded appliances than for buildings – ensuring a level playing field. The environmental impacts of all options are to deliver increased water efficiency (with knock-on energy efficiency benefits) which benefits water resources in water scarce areas.

The costs to meet the appliance options will arise for manufacturers to develop more efficient products. These would be one-off costs for development, re-tooling, etc. Replacement of appliances by landlords, house owners, etc., is highly dependent on house specific circumstances. Appliance options do not require replacement, rather that new appliances meet new standards. If installed, reduced water use (e.g. from showers) results in lower water bills. The estimates of household savings depend on the actual water charges. For example, in Sweden, fitting water efficiency appliances would save about $226/year based on both reduced water bills and reduced heating of water that is saved. Awareness raising costs would arise, but these would be lower for mandatory design requirements than for labelling. The social impacts would arise from lower household bills. The public consultation found that there was majority support for options for voluntary labelling and for adopting minimum efficiency requirements using the Ecodesign Directive. However, a mandatory labelling scheme was not supported in the consultation.

Implementing labelling or minimum requirements will incur costs during building or refurbishment and for the certifier to verify compliance, but also to set up the scheme against which the building is audited. In the case of mandatory labelling and minimum

requirements, constructors will bear compliance costs. Audits in the EU cost between €4,000 for buildings smaller than 2,000 m^2 and €24,000 for 50,000 m^2 and more. Improved water efficiency does translate into potential increased house values and savings in water bills, which can offset the costs of improved building design. Social impacts potentially vary – such as benefits to lower income households, issues of data protection with smart meters and health issues if water recycling systems are not properly maintained. None of the building options received majority support in the public consultation – all being opposed except for the option on minimum performance ratings for which opinion was equally divided.

Problem 6: Leakage

Leakage in water distribution systems is a waste of water, an economic loss for the water industry (and consumers) and wasteful for chemicals and energy. The options aim to assist Member States in tackling this problem not by setting targets (which is not appropriate at EU level), but by provision of a tool for assessing the sustainable economic level of leakage (option 6a) and through provision of funding through Cohesion Funds and/or EIB loans (Options 6d1 and 6d2). The impacts of leakage are common to all of the options and largely only differ to the extent that the options would be effective at addressing the problem.

Disruption from leaks affects individuals and communities negatively. Furthermore, leaking pipes can allow for ingress of contaminated water with potential health impacts.

Leaking water places additional pressures in water stressed and drought areas as more water needs to be abstracted to meet the same water demand. Furthermore, such wastage is not viewed positively by consumers who may be asked to take water saving measures during drought and who may become resistant to this if leaks are not addressed. Energy losses due to transported lost water are a source of unnecessary greenhouse gas emissions (and potentially other air pollutants).

Controlling leaks, therefore, can bring a variety of economic, social and environmental benefits. The level of appropriate leakage control is addressed by option 6a, which aims at a common method to determine the level of leakage control that is economically justified (e.g. that is cheaper than alternative new water sources). This option would not only provide the basis for delivering the above benefits, it is focused on optimising the economic performance of utilities. However, this option is voluntary, so application cannot be guaranteed and, indeed, would be unlikely to be taken up at an early stage where finance for investment is particularly constrained.

Options 6d1 and 6d2 (funding) are not alternatives to option 6a, but can accompanying this option or be taken forward independently. Given public and private expenditure

constraints, investment in improvements in water supply infrastructure is constrained in some regions. Indeed, finance could be targeted at those locations where leakage reduction is most justified, such as through using a tool developed under option 6a. Areas eligible for Cohesion Funds and EIB loans can benefit from additional investment support. The effectiveness of these options (and the resulting economic, social and environmental impacts) would be directly proportional to the level of available investment.

In conclusion, all of the options can be progressed, supporting each other to support leakage reduction. All of the options received support in the public consultation. None (or indeed all) of the options can ensure widespread leakage control in water stressed areas, but they constitute important interventions that are appropriate at an EU level.

Problem 7: Water re-use

The options concerned with water re-use all seek to stimulate the re-use of waste water in agriculture as a means of providing an alternative water supply and so reduce the pressure on surface and ground water sources and provide a stable supply to users in times of scarcity and drought. The impacts of water re-use are, therefore, common to all of the options and largely only differ to the extent that the options would be effective at stimulating water re-use.

The primary economic benefits of water re-use are to the agriculture sector and water industry sector. A secure water supply ensures that farmers and horticulturalists do not suffer economic losses during times of drought. Waste water generation is relatively constant and so certainty in economic investment is achievable. Furthermore, farmers can benefit from nutrients contained in waste water, so reducing their costs for the use of fertilisers. The water industry sector benefits from alternative water treatment requirements, which can be less stringent and, therefore, less costly than requirements for treatment for discharge to surface waters.

The economic benefits translate into social benefits. Security of the agricultural producers enables jobs to be secured, providing benefits to local communities. Furthermore, it can enable traditional agricultural production to continue in water stressed areas that would otherwise be under threat from water scarcity and so maintain cultural traditions. However, health concerns do arise from the use of re-use waste water for agricultural products. Therefore, the standards proposed to be adopted for options 7a1, 7a2 and 7b would all be required to meet the necessary health standards. Furthermore, funding (option 7d) should only be provided to schemes which guarantee health standards are to be complied with.

The environmental benefits are proportional to the reduction in pressure on surface and ground waters from supply of re-used waste water as an alternative to abstraction.

Environmental flows are more likely to maintained, protecting aquatic ecosystems and, therefore, helping to meet WFD requirements. Furthermore, diversion of waste water to agriculture may result in less discharge of nutrients, etc., to surface waters.

The extent of these impacts is proportional to the effectiveness of the options. The primary problem facing water re-use is the lack of EU-level standards which could result in different standards across the Member States, leading to barriers in the trade of agricultural products. Voluntary standards (option 7a1) developed at EU level would provide a basis for a common approach, but the option cannot prevent Member States adopting a different approach and, therefore, cannot prevent barriers in the internal market. CEN standards (option 7a2) night be more likely to be adopted by Member States, but they suffer the same flaw as option 7a1. A Regulation (option 7b) does not have this problem and would guarantee that internal market barriers would not arise. The development of each of these options has similar costs, although the direct applicability of a Regulation would have lower burdens on Member States as it would not require transposition. The public consultation and stakeholder views all show more support a binding Regulation as the effective means to overcome the problem compared to the other options. The option would be fully coherent with other EU water law and policy.

Option 7d (funding) is not an alternative to the other options, but can accompanying any of the other options. Given public and private expenditure constraints, investment in water treatment and distribution for irrigation is constrained in some regions. Areas eligible for Cohesion Funds and EIB loans can benefit from additional investment support. The effectiveness of this option (and the resulting economic, social and environmental impacts) would be directly proportional to the level of available investment.

Problem 8: Governance

Governance problems cover a range of issues and a number are addressed by options set out under other problems (e.g. improving information and tools for water management). The options specific to governance are not alternatives addressing a similar point, but are focused on specific issues that were identified in the problem analysis. These are developing a peer review process for Member State water management authorities (option 8a), amending the WFD to make RBMPs legally binding (option 8b1), amending the WFD to enhance the mediation role of the Commission in transboundary river basins (option 8b2) and amending the SEA Directive to ensure major development plans for hydropower, navigation, desalination, etc., are subject to SEA (option 8b3).

Peer review has proved to be an effective process in other areas of EU law. Sharing of experience between colleagues allows for a problem-solving approach to be taken. The option is entirely voluntary based on the needs of those authorities which wish to have a

peer review. Costs from other peer review process are small, impacting on both the recipient authority and those from other Member States conducting the review. However, results from other peer reviews are positive and this option is likely to be effective. The public consultation showed support for this option.

Option 8b1 aims to address the problem of ensuring measures set out in RBMPs are binding across Member State institutions. A WFD amendment would enhance this objective and so may ensure better RBMP implementation in some cases. However, a WFD amendment would take several years and the option would not, therefore, be able to enhance WFD implementation in the short-term.

Option 8b2 promotes the mediation role of the Commission in disagreements in transboundary river basins. The opinion of the Commission would not be binding – it is not an arbitration role. The effectiveness of the option is not clear, as it would depend on individual circumstances, although it is likely to be positive.

Amending the SEA Directive to address plans for hydropower, navigation, new water supply infrastructure, is entirely consistent with the approach of the Directive and would be effective in allowing for an integration of the SEA analysis with the analysis, objectives and measures within RBMPs. It would also stimulate institutional integration between water management and land-use planning. SEA sets out impacts and alternatives, but does not prescribe decisions. Therefore, outcomes cannot be guaranteed. The public consultation found a little more support than opposition for amending the SEA Directive.

Problem 9: Water accounts and target setting

To address the problems of water accounting, identifying environmental flows and target setting, four options are considered. Options 9a1 and 9b1 are to develop a model for water accounting either at Member State level or at European level and support this with guidance on its use, including establishing environmental flows. Option 9a1 is a voluntary option, setting out the approach in guidance, while option 9b1 achieves this through amending the WFD. Options 9a2 and 9b2 support water allocation and target setting in river basins, again either through a voluntary/guidance approach (option 9b1) or by WFD amendment (option 9b2).

It is important to stress that options 9a2 and 9b2 can only be effectively taken forward where there is good water accounting and, therefore, require that one of options 9a1 and 9b1 are progressed.

An EU level water accounting system is being developed to allow for accounting at sub-catchment level. However, this requires provision of data from Member States and these

are not effectively delivered in all cases. Guidance (option 9a1) is unlikely to be effective in this regard. However, a WFD amendment would not be developed until the WFD review and, therefore, not come into force for several years. As a result, the two options need not be viewed as alternatives. A voluntary approach better supported by guidance from the Commission could be taken forward and the regulatory option proceeded with if Member States fail to supply data or otherwise support water accounting where it is needed.

Effective water allocation and target setting is needed in water scarce river basins. This can ensure not only the maintenance of environmental flows, but also an economically and socially equitable distribution of water. Option 9b1 aims to support Member States authorities' action in this area through guidance. There is some lack of information and tools and the option would be effective where this is currently a barrier. Furthermore, guidance is able to explore a wide range of different aspects of target setting (different sectors, types/sizes of river basin, water rights contexts, etc.), maximising its usefulness. It can also be taken forward relatively quickly. A WFD amendment, however, would be binding and ensure target setting respects environmental flows as part of Good Ecological Status. However, it would take several years to enact. As with options 9a1 and 9b1, the two options can be viewed together as a voluntary option, followed by a regulatory option if target setting remains a significant problem in the EU. The public consultation demonstrated support for a voluntary guidance approach, but opposition to a regulatory one, emphasising the need for flexibility to take account of different circumstances in the EU and for transparency in application.

Problem 10: Droughts

Drought management requires a coherent assessment of the causes and consequences of drought, including impacts and contributions to and from specific sectors, ideally integrated into wider water management planning. The WFD already encourages such activity and guidance has been produced, yet to date drought management planning is poor in a number of Member States. The options, therefore, do not include a guidance option (as this is already in place), but seek to encourage or prescribe drought management through a Recommendation (option 10a), a WFD amendment (option 10b1) or a stand-alone drought management Directive (option 10b2).

The options all seek to encourage drought management planning of the same kind that is currently the subject of guidance. The impacts of all options, if implemented, would be similar in providing better drought management, but the options differ is how likely they are to be implemented and when, i.e. in their effectiveness.

A Recommendation is not a binding instrument, but it can be viewed as a stronger message than CIS guidance. It can also stimulate more detailed reporting from Member States. It is,

therefore, more likely to stimulate change in drought management in some cases. However, where there are barriers (institutional, financial, cultural, etc.) to taking forward drought management, a Recommendation may not overcome these and, therefore, be ineffective.

The other two options are binding and, therefore, should stimulate significant changes in drought management practices. Implementation failure can be pursued by the Commission. Depending on how each is drafted, the options could cover similar issues and, therefore, be similar in their impacts. However, a WFD amendment is only likely to be taken forward during the WFD review and, therefore, would not influence drought management for several years. A stand-alone Directive could be developed at an earlier date. The public consultation was, overall, not supportive of a regulatory option, but did support further action on drought management within the next round of RBMPs.

Problem 11: Costs and benefits

The two options seek to overcome the lack of assessment of the costs and benefits of measures in WFD programmes of measures (POM) or lack of assessment of not taking measures through the development of guidance (option 11a) of assessment of costs and benefits or of requiring a cost/benefit assessment of potential measures through a WFD amendment (option 11b).

The options both seek to ensure implementation of the WFD and, therefore, the economic, social and environmental impacts are those of the WFD and are not subject to separate assessment. The review of RBMPs has shown the lack of ambition of Member States in developing measures and in many cases a failure to show any analysis to support the lack of measures or justification for exemptions. Thus the options aim to overcome this and deliver the benefits that would arise from implementing the WFD and ensure transparency in decision making to all stakeholders.

As a means of ensuring that Member States undertake a cost/benefit assessment, a WFD amendment would be more effective – it would be binding where guidance is not. Furthermore, such an option would be similar to a provision already contained in the Marine Strategy Framework Directive and so be coherent with other water law. However, a WFD amendment was not supported in the public consultation. Furthermore, if an amendment were taken forward in the WFD review, it would be too late to influence the 2nd round of RBMPs.

Guidance on cost/benefit assessment can be taken forward at an early stage and could influence the next round of RBMPs. Furthermore, such guidance can explore different methods of assessment and particular problems or issues with assessing particular types of

measures, economic sectors, etc., in a way that is not possible in writing law. It can also facilitate exchange of experience between Member States and link to options addressed in this IA (such as the peer review option under governance). However, as noted above, guidance is not binding. This option was strongly supported in the public consultation.

Therefore, both options are more or less effective in different ways. Guidance is flexible and quicker to adopt, while a WFD amendment is binding. Finally, although the two options are presented as alternatives, they could be taken forward sequentially – guidance at an early stage to help Member States, followed by a regulatory change if improvements in assessment of measures is not forthcoming in the next round of RBMPs.

Problem 12: Knowledge base

The options are to develop a fully inter-operable, SEIS based, shared water knowledge system and to enhance minimum WFD reporting requirements and statistical obligations (e.g. through framework regulations on environmental accounts and statistics and harmonise the reporting timetables of EU water Directives.

The options all aim to improve the knowledge base and tools and strategies to do so, specifically targeting improved data management, data access, sharing, harmonization, interoperability and seamless integration of data and services. A substantial share of the effort is related to geographical or spatial data.

Regarding effectiveness, all the options contribute positively, but indirectly, to fostering integration of water into sector policies by providing better information, in particular on water quantity. The effects are expected to be strongest for option 12b, which provides significant new data on an EU wide basis.

More efficient governance would be achieved by addressing the gaps in reporting. A decentralized system shared water knowledge system is expected to be particularly effective as a consequence of the better ownership and tailoring of the data and tools by local/regional policy makers. The options are expected to have a positive impact on efficiency. This is expected to be strongest for a shared centralised system which will provide comparable outputs without the need for extensive coordination.

All of the options were strongly supported in the public consultation, including the need for regulatory amendment (option 12b).

Effectiveness, efficiency and coherence

Regarding **support tools**, they include the development of guidance to support water managers in target setting, planning for drought management and assessment of recovery of costs of water services. These tools seek to address the knowledge barrier for water managers. Regarding the effectiveness, efficiency and coherence of this approach, a non-binding approach, including a possible Recommendation, cannot be guaranteed to deliver results. However, where authorities do lack information or tools, the type of intervention should have a positive impact. Improved tools developed at EU level not only would empower the local water manager to achieve better decision making but also help to harmonise approaches across the EU leading to a more consistent picture of the problems facing Europe's waters thereby enhancing further policy development. However, the degree to which a consistent EU-level picture would emerge would depend upon the uptake of the tools by the MS. Where water managers are already asking for such tools, uptake is likely, but when this is not the case uptake may not occur, e.g. where MS already have their own tools.

Guidance and tools are also able to explore alternative and novel approaches and describe best practices in a way that cannot be achieved through a legislative approach. Options include a peer review process for water authorities, which is only practicable in a non-binding instrument and would help sharing experience in ways that would be more effective than a top-down approach. In this respect the appropriate EU level action is for the Commission to act as a facilitator. This option would only deliver benefits where MS authorities request peer review and, therefore, cannot be guaranteed to address those authorities which could benefit most from it. Effectiveness would need to be enhanced through communication and dissemination.

The effectiveness of a non-binding approach depends on the active participation of Member States and stakeholders, both in the development but especially in application of the guidance and tools. Given the barriers which exist to proper implementation and as uptake of this policy option is voluntary, there is no guarantee that they would be implemented and the impact will depend on the level of ambition of the MS. Depending on the barriers at hand, the option will have potentially mixed results in delivering improvements in water outcomes. The non-binding options can be potentially helpful to overcome barriers in terms of skills and knowledge. A voluntary approach is likely to be much more effective where new instruments are to be tested (e.g. water trading, PES) and where tools are needed by MS to help improve the cost-effectiveness of decision making (e.g. water leakage). The development of guidance does not require significant budget and the administrative burden could be regarded as limited. The majority of the start-up costs for developing guidance falls at EU level (both in terms of one-off costs and time spent), and also on the lead Member

States coordinating the guidance document (in case of a CIS guidance) and for all Member States contributing to the guidance.

The ability of the non-binding options to encourage MS implementation will also depend on the timing of the option being available. CIS guidance may take around 2 years to develop, which would create an impact starting at the end of 2nd cycle. This means that some aspects of this voluntary option (Guidance on NWRMs and on water rights trading, methods for leakage reduction) could be useful as an early initiative to move forward the objectives of the Blueprint. One of the options would aim to raise consumer awareness of water footprints in a non-binding way. The effectiveness of this approach would depend on uptake by MS, companies, etc., and this cannot be guaranteed, so that uptake is likely to be patchy.

One of the options concerns the possibility of increasing the added value of current information systems through an enhanced shared information system and improved remote sensing data (GMES). Both these approaches would deliver better and more timely data and reporting platforms, enhancing effectiveness of the use of data for practical decisions and providing opportunities to reduce costs. Shared information through a common platform is not only of value to the river basin manager, it also allows for a far more rapid sharing of data between MS (e.g. in transboundary contexts) and for the EEA and the Commission, thus enabling a more timely and reliable understanding of status and trends for water. The effectiveness of the option would depend on use of the information systems by MS. For remote sensing data, the value of the information should ensure rapid uptake. Regarding an information platform, the existence of the Water Information System for Europe (WISE) should greatly facilitate take up at MS level.

However, if barriers arise from the institutional set-up within Member States or if there is a lack of political ambition and stakeholder acceptance, it is unlikely that a voluntary policy option will be able to unlock strategic measures where they are needed (e.g. in water scarce areas or in areas where implementation is lagging). This situation would be probable in the case of trying to unlock natural water retention measures without a regulatory and/or financial incentive. Also where barriers exist for products (e.g. water appliances), voluntary approaches can be regarded as less effective in removing obstacles to the single market. Linked to this, if a barrier consists of a lack of market confidence, such as in the case of the development of EU level standards for water re-use, voluntary standards are unlikely to deliver sufficient confidence and therefore universal adoption. Voluntary approaches could also be less effective where there are already implementation barriers, such as for adequate water pricing. Suboptimal outcomes may still be expected in cases of divergent or incompatible interpretations e.g. in relation to the notion of water services or cost recovery.

The regulatory intervention approach aims to address the barriers through amended or new legislation. In several cases the options contrast with the support tool options by

proposing that methods for target setting or assessment of cost-recovery of water services be prescribed in technical annexes of the WFD rather than guidance. Such an approach would ensure that these tools are used. However, to prescribe such tools now would require that they are ready to be set in law, which is not the case at present, and exploration of best practices would not be possible. A common legally required tool would, however, have to be implemented and the objective of a harmonised approach for an EU level comparative assessment would be achieved if there is no big implementation failure. With regard to drought management planning one of the options proposes either to produce a new stand-alone directive or to amend the WFD. Drought management planning is already encouraged in a voluntary way by the WFD and WSD policy and supported by guidance, but its application (in drought affected areas of the EU) is patchy. A regulatory approach would be more likely to ensure that such planning is undertaken and would be more effective than a non-binding instrument. The option of a stand alone directive would however place drought management planning as distinct from river basin planning (WFD) thereby contradicting the integrated approach of the WFD.

Further WFD amendments on transboundary governance would address very specific deficiencies in current implementation and would have the potential to enhance the effectiveness of implementation. Enhancing transboundary co-operation between MS is a specific role for the EU institutions and one of the options enhances the Commission mediation role by requiring MS to resort to it in case of disagreements concerning transboundary basins. This has the potential to improve effectiveness of water management even though the possibility or resorting to Commission mediation already exists under the WFD.

On reporting, one of the options proposes a legal amendment to harmonise legal reporting obligations to reduce administrative burden on the MS. This is only possible in a legal amendment and, therefore, only this option would be effective.

In the framework of improving assessment processes, the option includes the enlargement of the scope of the SEA Directive to better cover hydropower development planning. This amendment is consistent with SEA objectives and could be looked into.

On consumer awareness, one of the options would require mandatory labelling of water footprints of products. While this would be effective in raising awareness, the methodological uncertainties behind the water footprint could undermine the effectiveness of such labelling in protecting water resources.

Compared to a voluntary approach, the options taking forward within regulation would be stronger and would be able to push implementation, although it would not be able to prevent implementation failure. This means that correct and wider implementation would

be required but may still not materialise. Binding measures will be more likely to improve governance as well as ensure that economic instruments are supported and that water management priorities are integrated into sectoral policies. A legal option may be appropriate in cases where a universal approach needs to be taken forward and national approaches are not widely implemented because they are incompatible to solve market barriers. In this light, the development of common standards for re-used water in agriculture and industry uses by means of an EU regulation would ensure removal of the market barrier more rapidly compared to a voluntary approach. The same advantage applies for products traded in the single market, where binding efficiency standards, labelling and rating for appliances can be regarded more effective than voluntary approaches, delivering EU wide impact and a level playing field.

In certain cases a WFD amendment could contribute to water outcomes, e.g. prescribing metering would make explicit a precondition that is needed to meet the existing pricing obligation. Therefore, this coherence with the law would make the option effective in delivering water efficiency objectives. A WFD amendment would also be more likely to ensure the implementation of NWRMs (by integrating them in the PoM) in the MS compared to guidance, whereas flexibility would remain in terms of which measures to choose and in their application. A mandatory approach could also reduce some of the institutional barriers to NWRM implementation such as resistance to their take up by different administrative departments. However, it would take considerable time before a number of the regulatory policy measures are implemented. A revision of the WFD would be needed for a number of measures, such as the inclusion of NWRM in the PoM and mandatory metering. As mentioned before, a revision of the WFD is not foreseen before 2019, its impacts would not be realized until at least the 3rd planning cycle commences in 2021. Moreover, a further IA accompanying the proposed amending Directive would need to be undertaken. An amendment would require changes to national legislation as well as training on the ground, which would imply a significant administrative burden.

Besides amending the WFD, a regulatory option would also require changes to other legislation. In order to include water efficiency requirements for appliances, the work programme of the Ecodesign Directive work plan would need to be amended. This is likely to be possible within a reasonable timetable. Finally, with regard to a Regulation on re-use standards, this is not linked to other policy cycles and so could be developed as soon as is desired and the timetable limited to the usual legislative development and adoption process.

It is clear that administrative costs are involved with the implementation of the regulatory policy option. This burden would be more severe where new legislation is needed, such as the introduction of a Directive on water efficiency requirements in buildings and, to a lesser extent, an EU regulation for the development of common standards for re-used water in

agriculture. The administrative costs of an amendment of the SEA Directive depend on whether this would be included in a planned overall revision of the Directive or not.

The current financial crisis limits the ability of many MS and the private sector to fund the current investment needs in the water sector in order to meet existing legislative requirements, let alone to address the additional pressures on Europe's waters. In the light of this insufficient funding, two further types of intervention are considered: the policy options requiring **conditionality of EU funding** and the policy options which provide **funding support**.

The funding options have an opportunity to contribute to overcoming barriers linked with insufficient incentives for change in behaviour (in most of the policy measures farmers are specifically addressed). Options exploiting the possible conditionalities concern the rules proposed by the Commission for the post-2013 CSF Funds (ERDF, CF, EAFRD) and Pillar of the CAP. The conditions in question concern the streamlining of NWRM into those policies, the taking up of metering and adequate water pricing. This would be an effective instrument, given that compliance can be checked using existing surveillance processes and the financial incentive is large.

The Cohesion Policy and CAP proposals are currently the subject of negotiation with the Council of the European Union and the European Parliament. Therefore, modification to the legislation is not possible in the short-term, but it is important to note that the Blueprint will span more than the full timetable of the next MFF and, therefore, a longer-term view of the relative effectiveness of options needs to be taken. Conditionality clauses which are not currently covered by the Commission proposals could be relevant either for the period post 2020 or depending on the agreement to be reached by the co-legislators on the Commission proposals.

Funding options aim to include a range of sustainable water management priorities in the spending of major Cohesion and Structural Funds and EIB loans. These funds already focus on a range of aspects of sustainable water management and support major investments, which would specifically be relevant for investment in water-reuse and alternative water sources' infrastructure, NWRM and some water efficiency measures such as upgrades in distribution system efficiency and certain irrigation efficiency schemes. Without EU funding, such uptake of measures would be less likely to occur in some regions and would not occur at all in others where public/private funding is not available.

The options are relatively cost-efficient as they doe not require any change to the current legislative framework and the identification of priorities for funding is already planned for. Therefore the options would be cost-effective and could come into effect relatively quickly. However, the option cannot deliver sufficient unlocking of measures on its own as both

types of funding (Cohesion & Structural and EIB) have limitations (e.g. geographic for Regional Funds, overall sums available).

Effects on stakeholders

The options are addressed to a range of different MS authorities and would affect different stakeholders.

Support tools only impact stakeholders if the option is taken up. The options provide a range of tools and advice for public authorities at different governance scales to improve water management decisions. Where these authorities view these tools as beneficial, then uptake would have a positive impact. These tools primarily aim to contribute to better implementation of the WFD. Therefore, if inappropriate decisions can be avoided by use of these tools, there will be benefits to those that would be affected (farmers, industry, the public, etc.), depending on individual circumstances. Similarly, peer review is entirely directed at public administration. The information provisions will also be primarily beneficial to public bodies, but access to these data will also benefit others such as major utilities and other relevant companies to inform their business decisions.

Support for the non legislative options has been expressed by stakeholders in the Blueprint public consultation (Annex 4). On water balances and targets, 50% of respondents were in favour of the development of CIS guidance on water accounting, e-flows and target-setting. Moreover, 59% supported CIS guidance on the recovery of costs. On knowledge base, a strong majority (69%) supported improved data and information sharing through the Water Information System for Europe. About 60% of respondents were in favour or raising consumers' awareness of the water footprints of products.

Stakeholder consultation respondents strongly supported the use of information, guidance and best practices to support NWRM: 58% of the respondents supported the definition and provision of an EU framework for green infrastructure, supporting natural water retention measures. 62% of the respondents supported the preparation of guidance for farmers on the effective application of measures for water quality and quantity objectives. Voluntary labelling of water-using appliances was supported by 43% of respondents. Regarding leakage in water infrastructure, the largest share of respondents – 44% – were in favour of developing a harmonised method under the CIS for determining the level of water leakage.

A legislative approach would impose requirements mostly on public administrations. The technical WFD amendments on reporting and those on drought management are obligations on the processes public bodies should adopt. This would filter down to decisions on economic entities and the public, but whether these result in costs or benefits is a case by case issue (e.g. better drought management may restrict water supply to one economic

entity and ensure security of supply to another). Altering the reporting requirements of EU water law would deliver a reduction in administrative burden to administrations. Finally, obligatory footprint labelling of products would impose significant costs to importers of those products (including the determination of footprints).

Amendment of the WFD on pricing and metering would impose some costs on water users, but the extent of the impact should take account of the current implementation gap, which needs to be closed in any case as incentive water pricing is already required under the WFD. The major impacts of the option would be on the manufacturing and construction sectors which would need to adapt design to meet efficiency requirements. However, these would be one off costs which would be limited for those manufacturers who have already developed water efficient products. Moreover, this would result in lower water usage by domestic users, with potential cost reductions in both water and energy bills. A Regulation on water re-use standards would impact on the water industry and agriculture sector. In both cases the impact is positive, providing market confidence to drive forward investment and removing potential obstacles to agricultural products circulation.

In the stakeholder consultation, the use of regulation did not receive strong support, except in the area of knowledge base where 55% of respondents were in favour of the harmonisation of the reporting timetables under EU water directives. Amendments to the WFD did not gain much support. Support was also stronger for minimum requirements under the Ecodesign Directive where 39% were in favour and 29% against. Regarding water re-use, unlike in other areas a proposal for regulatory action, specifically for an EU Regulation establishing standards received slightly higher support.

The conditionality options would mainly affect farmers and those receiving CSF funds. However, for the former in particular the objective is, to a large extent, to ensure that current legal obligations are met, so that the obligation itself should not be an additional burden. There would be administrative costs to both farmers and administrations to oversee compliance but these would be a small share of already existing costs.

The funding options would contribute funds to support a range of infrastructure activities such as NWRM, leakage reduction and treatment for re-use. This would not necessarily entail a funding re-direction from other policy areas but rather a refocusing of water related expenditure from traditional grey infrastructures (e.g. dams, dykes, etc.) to Green Infrastructure. The immediate beneficiaries of these funds would be the utilities (public and/or private) responsible for water facilities. However, there would be cost reductions and/or improved security of supply or flood protection (with economic and social benefits) for most major water users – farmers, horticulture, domestic users and industrial activities.

In the stakeholder consultation, the opportunity to establish conditionality for EU funding, and in particular to require metering on agricultural water use, received strong support. One-half of respondents supported requirements such as a condition for EU funding of irrigation projects, and about 45% supported the proposal for making CAP direct payments conditional upon the installation of metering devices. In terms of funding support to promote leakage reduction, 47% of respondents were in favour of prioritising actions through the Cohesion and Structural Funds in water stressed areas; 43% were in favour of loans from the European Investment Bank for leakage reduction.

Opportunity

The options within the support tools type of intervention could be taken forward at any time. The only constraints are the resources and MS expert contributions for developing guidance, tools, etc. Indeed, the potential for early development of some of the tools in the option is particularly attractive as these could help enhance the capacity of water authorities as they will soon begin to develop the 2nd cycle RBMPs under the WFD due by 2015. Additional work would need to be undertaken in developing a shared information platform not only to ensure that the IT systems work, but also to explore different options and compatibilities with national information systems and lessons from these. However, existing experience with WISE, SEIS, and data sharing within the EEA and Eurostat provide a sound basis to move quickly on this action.

Where regulatory options include a completely new legislative instrument, this could be developed at any time, subject to the usual legislative development and adoption timetables. However, a number of options are via legal amendments of the WFD and this would not be appropriate in the middle of the first RBMP cycle and before the 2015 deadline for the achievement of good status. Moreover, since the necessary technical work is not mature enough, this is only likely to be possible at the time of the future review of the Directive foreseen in 2019 according to article 19. However, it may be possible to introduce a very specific administrative burden reduction amendment for reporting separately and, given its purpose, adoption could be relatively rapid.

Development and adoption of new law such as a Directive on water efficiency requirements in buildings and an EU regulation for the development of common standards for re-used waste water in agriculture could be taken forward at any time if the necessary technical and political commitment is in place. Some actions, however, include revision to existing EU law. The Ecodesign Directive work programme is currently being finalised, so that progress on this issue at this stage may not be possible.

The timing of the actions in conditionality options is specifically linked to the timing of the adoption and review of the relevant Regulations covering the CAP and Regional Policy and

implementing rules. The option cannot be progressed outside of this timeframe. Given the current stage of adoption of new Regulations on these issues, this could pose a barrier for early uptake of this option, although it may still be effective at a later stage.

With regard to funding options, Regional Funds and EIB loans, the former would need to be taken forward within the existing procedures of these funds without additional costs.

Environmental impacts

The principle focus of many of the options is to increase the efficiency of use of water (appliances, buildings, distribution systems, pricing, metering, etc.) or provide alternative sources (water re-use). These options do not change the quantitative objectives of EU water policy (e.g. within the WFD), but contribute in their own ways to achieving it. Therefore, the options (depending on their relative effectiveness as explored above) can contribute to improved quantitative status and address scarcity and drought issues. These benefits would be enhanced further in combination with options within the support measures, such as on environmental flows.

Improved quantitative management also has a knock-on benefit for water quality (e.g. in low flows) and additional measures (on NWRMs) are specifically targeted at reducing pollution at source. This would benefit surface freshwater, groundwater and coastal water bodies.

Addressing quantitative and qualitative water challenges has further benefits for the environment, such as contributing to biodiversity protection and the 2020 EU biodiversity goals.

Limited impacts are expected on air quality, notably through reduced energy use for water efficiency measures (where such energy sources result in air pollutant emissions) and where NWRMs, etc., are proposed which address the levels of nutrient application which can result in release of ammonia from agricultural systems.

Many of the options have limited impacts on soil. However, those relating to NWRMs can improve soil protection, such as better managing run-off (reducing erosion) or better managing nutrient balances. Options for water re-use will impact on soils, but this will depend on the standards adopted and whether these protect soils from any contaminants in waste water. This would need to be addressed as those options are taken forward.

The impacts on climate change are positive for some measures. Those that reduce energy use for water efficiency measures (buildings, appliances, leakage reduction) should result in lower GHG reductions. However, water treatment uses energy. Therefore, improved

standards for re-use could result in higher energy use. However, this would depend on the current levels of treatment (and associated energy use). It is also important to stress that NWRMs enhancing protection of natural systems and the soils they contain would help to maintain existing carbon stores, contributing to climate mitigation.

Economic Impacts

It is important to note that some options which might on the surface appear as having possible costs to business in fact have limited impact. This is the case with those requiring conditionality for metering or pricing, which do not change the obligations on the agricultural sector.

Many of the options aim for improved water efficiency and the principle benefit of these options is to deliver improved security of supply both with regard to long-term scarcity and short-term drought management. These options improve the allocation of water resources and enhance the sustainability of business sectors and, by this, the wide local economy. Improved efficiency can also lead to lower water supply costs with wider economic benefits.

Several options impact on competitiveness and internal market concerns. Standards for water re-use are a single market issue, with the largest benefit delivered by a regulatory approach. Standards for appliances and buildings would affect the competitiveness of the respective industries, with benefits for technologically advanced companies and first movers, but disbenefits for others. Of course, the level of these impacts would depend on the option taken forward and the consequences for pan-EU approaches or lack of standardisation between MS.

The promotion of NWRMs on some agricultural land will result in loss of production on that land. This will affect those farmers (depending on whether rural development funding compensates for some actions), but this would be offset in many cases in the general economy through better pollution management (lower costs to water industry) and better flood control.

Social impacts

Several of the options have limited social impacts. However, a number have the potential for significant social consequences.

Consumers are the direct or indirect focus of several options – ranging from options for appliances and buildings to options for leakage reduction and water re-use. Indeed, where voluntary standards are considered, consumer behaviour is key to the success of those options. In most cases the aim of the option is to reduce water use, provide an alternative

supply or reduce unintended consequences of problems such as leaks. All of these impacts are positive for consumers, such as with water bills through reduce consumption. Furthermore, options targeted at other sectors (e.g. ensuring farmers pay for water) would have benefits for other water users.

Options of water re-use (alternative supply) and general options on reducing water use will allow for improved supply to traditional users, such as farmers. This is important to ensuring sustainability of employment in the longer-term, which is currently at risk. Furthermore, technical advances for water efficiency, water reuse, appliance standards, etc. are important for employment in the water industry and manufacturing sector, while implementation of ecosystem protection and natural water retention measures are labour intensive investments that can provide job opportunities in rural areas.

Health impacts are only significantly relevant in the context of water reuse. However, the options are designed to deliver standards to protect health and, therefore, a binding regulatory approach would be more effective in this regard (as well as delivering internal market objectives).

15.4 Conclusions

With regard to the options to address water management issues, the non-legislative options offer a number of advantages over the legislative options. The non-legislative options are able to deliver most of its instruments far more quickly than the legislative approach, in particular where the latter would need to be taken forward in the review of the WFD in 2019. The non-legislative approach is also likely to be able to deliver more nuanced tools and supporting guidance to help water managers at all governance scales, whereas the alternative legislative approach cannot be as flexible and case specific. In particular non-legislative approaches can more readily disseminate best practice and examine case specific issues, such as in individual water stressed areas. Voluntary approaches are effectively the only suitable approaches for the delivery of improved information systems for water managers and for peer review. However, some legal change might be justified, in particular to reduce the administrative burdens of reporting under EU water law as this cannot be achieved by voluntary approaches that do not alter current legal requirements. This is strongly recognised by stakeholders and, for example within the Fitness Check, where legislative change is generally not supported, except for specific issues such burden reduction and improved efficiency.

With regard to the options to deliver strategic measures, the non-binding options have a lower burden for MS and economic entities in many cases (but not all) and can be effective in some areas, such as the provision of guidance on NWRM and tools to enhance the

decision making such as cost-effectiveness analysis for leakage reduction. However, while non-binding approaches in the areas of water efficiency of appliances or water re-use standards are possible, they would not overcome the key barriers to their uptake. In such cases legislative options are more effective. Similarly, the barrier of lack of standards for water re-use and its interaction with the internal market is difficult to address without a legislative approach (again another example of specific stakeholder support for legislative change). Conditionality of EU funding is an effective tool and builds, to some extent, on existing legislation and practice and generally receives high stakeholder support (with some notable exceptions). The problems with this option are both of acceptability by Member States and timing of implementation, given the current on-going adoption of revised CSF and CAP regulations. Finally, prioritising use of EU funds is effective in all areas where budgets are a limiting factor, particularly in this time of economic crisis, and this is widely accepted.

In conclusion, as stated earlier, it is not appropriate for this project to propose specific options for the Commission to take forward in the Blueprint. Indeed, the problem analysis has noted that there are still other research projects ongoing which will add to the evidence based available to the Commission. Furthermore, the policy context is changing, such as with the current adoption of the new CAP and Cohesion policy, and this will affect the options to be taken forward. It is also important to stress that the choice of options needs to take account of the interactions between them, in particularly where they are mutually supportive or where action is needed on a number of fronts to deliver a desired outcome (e.g. on water scarcity).

Given the range of options covering a wide range of topics, as well as the fact that it is for the Commission to identify which options to take forward, it is not possible to set a specific monitoring and evaluation plan for these options. If any legislative options are taken forward, these should include specific reporting and review requirements. Beyond that individual options can contain review elements appropriate to those issues. Overall, it is suggested that the options/actions in the Blueprint are regularly reviewed as a package, in conjunction with the Water Directors. Such an overall assessment will also enable a coherent analysis of progress and this can be compared both to implementation reports of current legislation (e.g. WFD and Floods Directive) and to the synthetic analytical work of the EEA.

ANNEX A: WATER AND RELATED POLICIES IN A NUTSHELL

The policies described below play an influential role with regards to the issues addressed in this study. They appear throughout the report, and as such this section briefly describes their main objectives and implementation mechanisms to provide a basis to understanding the analysis within the individual sections.

The Water Framework Directive

The Water Framework Directive establishes an integrated approach to water management based on river basins. The key objective of the WFD is to achieve "good status" for all waters by 2015. A comprehensive framework is established that covers surface waters, ground water bodies, transitional waters and coastal waters. Further aims of the Directive are (a) to prevent further deterioration and to protect and enhance the status of aquatic ecosystems, (b) to promote sustainable water use based on a long-term protection of available water resources, (c) to progressively reduce discharges and emissions of certain priority substances and (d) to contribute to mitigating the effects of floods and droughts.

The target of "good status" relates to both qualitative and quantitative elements. Qualitative status is defined by biological, chemical and morphological criteria; and a combined approach is adopted that addresses both point sources (emission limit values) and diffuse pollution (quality standards). Good quantitative status of groundwater requires a balance between the abstraction and recharge of groundwater such that the available resource is not exceeded by the long-term annual average rate of abstraction. For surface water no such definition is provided.

To reduce pressures on waters, the Directive requires Member States to develop a River Basin Management Plan and a corresponding Programme of Measures for each river basin. The river basin management plans lay out the main impacts on water resources, the current state of waters, the number of exemptions to achieving good status and summary of the programme of measures. The programmes themselves must include both basic (minimum requirements such as existing policies) and supplemental measures to mitigate negative impacts on water from various sectors but especially agriculture.

Basic measures relate to existing daughter directives of the WFD and other water directives as well as other environmental directives, such as the Birds and Habitats Directive, the EIA Directive, the PPP Directive and the IPPC Directive. These basic measures are required to include in the PoMs but their ability to support in the achievement of WFD goals is weak: they have already been required for years without having a significant positive influence on the status of water. In addition to the directives, a PoM must include basic technical measures related to safeguarding water quality and preventing diffuse pollution. The main focus of the basic measures, however, is support actions establishing authorisation and control procedures for water abstraction, artificial recharge and point source discharges. Here, no specific technical measures are promoted but rather regulations and administrative control.

A first programme of Measures (PoM) had to be established by 2009 by the Member States and needs to made operational by 2012. As Programmes of Measures are river basin and Member State

specific, Member States chose which measures to apply to a water body based on the main pressures identified.

The WFD also calls for the application of economic principles, which can be summarised as follows:

- The polluter-pays-principle establishes how payments should be allocated among water users i.e. it looks at the adequacy of contributions from the different water uses towards the total cost based on their role in causing these costs.
- Incentive pricing deals with the way water users pay for their use and whether the right price signals are transmitted, i.e. it addresses the question how water is being paid for and how the water price affects the behaviour of water users. However, there are certain local and regional circumstances where a higher price for water may not lead to significant reductions in water use, due to low price elasticity of water demand (especially in the short term).
- Cost recovery establishes the overall amount that users are charged for water services. The principle, however, extends not only to the financial costs for the provision of a water service, but it also covers the costs of associated negative environmental effects (environmental costs) as well as forgone opportunities of alternative water uses (resource costs).

To help Member States implement the Directive, the Common Implementation Strategy was established, which produces guidelines to clarify methodologies and approaches to the Directive.

Floods Directive

Directive 2007/60/EC on the assessment and management of flood risks entered into force in 2007. The Directive requires Member States to assess if all water courses and coast lines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. As laid out in Article 1, the purpose of the Directive is to establish a framework for the assessment and management of flood risks, aiming at the reduction of the adverse consequences for human health, the environment, cultural heritage and economic activity associated with floods in the Community. The Directive, which applies to all kinds of floods (river, lakes, flash floods, urban floods, coastal floods, including storm surges and tsunamis), on all of the EU territory, requires Member States to approach flood risk management in a three stage process whereby:

1. By the end of last year (2011) Member States had to have finalized a preliminary flood risk assessment of their river basins and associated coastal zones, to identify areas where potential significant flood risk exists.
2. By 2013 Member States must develop flood hazard maps and flood risk maps for areas where real risks of flood damage have been identified. These maps will identify areas with a medium likelihood of flooding (at least a 1 in 100 year event) and extreme events or low likelihood events, in which expected water depths should be indicated. In the areas identified as being at risk the number of inhabitants potentially at risk, the economic activity and the environmental damage potential shall be indicated.
3. Finally, by 2015 flood risk management plans must be drawn up for these zones. These plans are to include measures to reduce the probability of flooding and its potential

consequences. They will address all phases of the flood risk management cycle but focus particularly on prevention (*i.e.* preventing damage caused by floods by avoiding construction of houses and industries in present and future flood-prone areas or by adapting future developments to the risk of flooding), protection (by taking measures to reduce the likelihood of floods and/or the impact of floods in a specific location such as restoring flood plains and wetlands) and preparedness (e.g. providing instructions to the public on what to do in the event of flooding). Due to the nature of flooding, much flexibility on objectives and measures are left to the Member States in view of subsidiarity.

Communication on WSD

The Communication from the Commission on Water Scarcity and Droughts (2007) is aimed at presenting an initial set of policy options which should be adopted at European, national and regional level to address and mitigate the challenge posed by water scarcity and droughts within the Union, by promoting a water-efficient and water saving economy and the improvement of water demand management.

The seven policy options to tackle water scarcity and droughts include:

- Putting to right price tag on water: Implement at the EU level the "user pays" principle in the water sector and full implementation of the Water Framework Directive (WFD), in terms of recovery of the costs of water services, in order to guarantee sustainable water use in the EU.
- Allocating water and water-related funding more efficiently: Policy options designed to allocate water and water-related funding more efficiently address two separate issues: (1) improving land-use planning and (2) financing water efficiency.
- Improving drought risk management: This policy option focuses on shifting drought risk management (DRM) away from a crisis response to a modern, comprehensive risk management approach, based on a profound understanding of the drivers and impacts of drought and making use of advanced monitoring and early warning systems at the European level.
- Considering additional water supply infrastructures: A possible alternative option to mitigate the impacts of severe drought, in regions where demand still exceeds water availability even after all prevention measures (water saving, water pricing policy etc.) have been implemented.
- Fostering water efficient technologies and practices: The main objective is to encourage all economic sectors to continue to develop water-efficient technologies and practices. In addition to improving technologies, the upgrading of water management practices is a necessary instrument in all sectors where huge quantities of water are used in particular agriculture, manufacturing and tourism.
- Fostering the emergence of a water-saving culture in Europe: The option seeks to (1) translate water-saving culture into concepts of corporate social responsibility; (2) include rules on water management in existing and future quality and certification schemes; and (3) attempt to expand existing EU labelling schemes whenever appropriate in order to promote water efficient devices and water-friendly products.
- Improve knowledge and data collection: Policy options aimed at improving knowledge gaps and enhancing data collection must address two different issues: (1) a water

scarcity and drought information system throughout Europe; and (2) research and technological development opportunities.

Within the water hierarchy for EU action, water pricing in the field of water scarcity and droughts policy is a high priority, second only to water saving.

However it should be noted that the Communication has not triggered any legal action so far and MS are not required to address water scarcity and drought issues, beyond what might be expected under the WFD.

Common Agricultural Policy

The Common Agriculture Policy takes a two-fold approach: pillar 1 provides direct support for agriculture activities, providing that farmers adhere to cross compliance, while pillar 2 focuses on rural development. Pillar 1 is regulated by Council Regulation (EC) No 73/2009 establishing common rules for direct support schemes for farmers and Pillar 2 is regulated by Council Regulation (EC) No 1698/2005 (RDR), both of which are currently under review.

Under Pillar 1, farmers receiving direct payments under the CAP must adhere to basic environmental standards comprising Statutory Mandatory Requirements (SMRs) and Good Agriculture and Environmental Conditions (GAECs), the so-called cross compliance; failure to comply these mandatory environmental standards can result in reductions in direct payments. Since 2005, all farmers receiving direct payments must respect Cross Compliance standards in two ways:

- First, they must respect the Statutory Management Requirements, which relate to specific provisions of 18 EU Directives and Regulations. The standards relate to the protection of the environment, public, animal and plant health, and animal welfare. With regard to water management, the most important directives covered by Cross Compliance are the Groundwater Directive (80/68/EEC), the Nitrates Directive (91/676/EEC)[407], Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna and to some extent the Sewage Sludge Directive (Directive 86/278/EEC), which will also be part of the River Basin management plans under the WFD.
- Second, all agricultural land and especially land which is not used for production purposes should be kept in Good Agricultural and Environmental Condition (GAEC). In general, GAEC's focus is on the protection of soil and its positive side-effects on the reduction of diffuse pollution. It is up to the individual MS to define minimum GAEC requirements, which may differ depending on local conditions. Since the CAP "health check"[408], new standards focusing on the protection and management of water have been introduced. Since 1 January 2010, MS have to ensure compliance with authorisation procedures in cases where the use of water for irrigation is subject to authorisation and by 1 January 2012, they have the obligation to establish buffer strips along water courses.

[407] Please note that only in seven MS (Austria, Denmark, Finland, Germany, Luxembourg, the Netherlands and Ireland) the whole territory is covered by an Action Program (see Art 3.5 of the Directive). In all other cases only specific nitrate vulnerable zones are designated.

[408] For details see http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2009:030:SOM:EN:HTML.

All farmers claiming direct payments, whether or not they actually produce from their land, must abide by standards established by their Member State following the EC Framework.

Pillar 2 aims to place agriculture in a broader context, which also takes into account the protection of the rural environment, the quality of produced food, and the attractiveness of rural areas to young farmers and new residents.

Rural development entails three main objectives:

- Improving the competitiveness of the agricultural and forestry sector by supporting restructuring, development and innovation.
- Improving the environment and the countryside by supporting land management. This axis includes, among others, agri-environmental measures.
- Improving the quality of life in rural areas and encouraging diversification of economic activity. Measures include, for example, covering the costs of establishing small enterprises in rural areas.

In addition to these axes, a fourth axis "LEADER", provides funding for local development strategies with a view to achieve the objectives of one or more of the tree other axes.

The current rural development policy, which co-financed by the European Agricultural Fund for Rural Development (EAFRD) and Member States, provides financial support under the framework of 37 measures into three axes corresponding to the three objectives. All programmes are also funded via national funds and for some measures private funding is also required. Member States must develop these programmes on a 5 year cycle. The Rural Development Programme (RDP) must include information on the current state of rural areas, i.e. strength, weakness, opportunities and threats. Based on this analysis, the Member States can choose which of the 37 measures to include in their plans; agri-environmental measures are, however, required to be offered in every MS.

In order to ensure that Member States consider the overarching European objectives and to give more guidance on how to implement the RDR in their national context, the Agriculture Council adopted EU strategic guidelines for rural development on 20 February 2006 (Council Decision, 2006). Based on the key priorities set out in the RDR, these guidelines set out a strategic approach and a range of options Member States should use in their national Rural RDPs. In order to ensure that the various RDPs are in line with the RDR and the strategic guidelines, Member States must get approval from the European Commission.

Structural and Cohesion policy

The Structural and Cohesion Funds are the main instruments of EU' regional Policy, and their main aim is to reduce the significant economic, social and territorial disparities that still exist between Europe's regions.

The current funding period started in 2007 and will end in 2013, and it is directed towards three main objectives:

- Convergence objective: to stimulate growth and employment in the least developed regions. It highlights innovation and the knowledge-based society, adaptability to economic and social changes and the quality of the environment and administrative efficiency. To reach

this objective funds have been allocated through all the three available funding instruments: European Regional Development Fund (ERDF), European Social Fund (ESF) and Cohesion Fund.

- Regional competitiveness and employment objective: it covers all the areas of the EU not eligible for the convergence objective. It aims to reinforce the region's competitiveness and attractiveness as well as employment, by anticipating economic and social changes. Resources to achieve this objective have come from the ERDF and the ESF.
- European territorial cooperation objective: to reinforce cooperation at cross-border, trans-national and interregional level. It aims to promote common solutions for the authorities of different countries in the domain of urban, rural and coastal development, the development of economic relations and the setting up of SMEs. The cooperation is centered on research, development, the knowledge-based society, risk prevention and integrated water management. Resources for this objective have been allocated through the ERDF.

All cohesion actions must respect environmental legislation and contribute to the EU's overall sustainable development. Funding supports investments in large-scale infrastructure development and should provide long-term benefits In the case of water management most include projects focus on water and waste treatment plants.

Birds and Habitat Directives

EU Nature conservation policy is implemented by two main pieces of legislation: the European Parliament and Council Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds (Birds Directive) and the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive). These two directives aim to provide protection for listed species and habitats and to create a 'coherent European ecological network' of sites – called Natura 2000 – to enable the maintenance or restoration of natural habitat types and the habitats of species at favourable conservation status (Art. 3, Habitats Directive).

The main objective of the **Habitats Directive** is to contribute to the maintenance and protection of biological diversity (biodiversity) in the European Union through the conservation of wild plants and animals as well as natural habitats. The Habitats Directive requires Special Areas of Conservation (SACs) to be designated for listed plant and animal species, and habitats. The Directive established the European ecological network "Natura 2000" in order to ensure habitat and species protection. Member States are required to carry out necessary conservation measures or management plans to ensure conservation of areas under the Natura 2000 network. It is co-financed through the Commission's LIFE Nature Programme[409] (set up in 1992 to develop EU environmental policy) and other Community financial instruments.

The main objective of the **Birds Directive** is to provide for the protection, management and control of naturally occurring wild birds and their nests, eggs and habitats, as well as to regulate the exploitation of these species within the European Union. It serves to ensure that all wild birds

[409] The new Financial Instrument for the Environment, the so called "LIFE+" (for the period 2007-2013), has entered into force with the publication of the Regulation in the Official Journal L149 of 9 June 2007. (For more detailed information see: http://ec.europa.eu/environment/life/funding/lifeplus.htm).

receive basic protection from trapping and killing; that sufficient habitat is protected for wild birds, especially to assure the survival of threatened and migratory species; that large-scale or non-selective means of taking birds are prohibited and that the sale or commercial exploitation of most species is prevented. To this extent, Member States are required to enact special conservation measures to ensure that wild birds and their habitats, in particular Annex I species, are protected. These include the designation, management and control of Special Protection Areas (SPAs) and prohibiting certain harmful activities (e.g. in agriculture or forestry). Besides creating SPAs, Member States shall maintain habitats, restore destroyed biotopes and create biotopes for naturally occurring wild birds.

Renewable Energy policy

In April 2009, the Council of the European Union adopted a directive setting a common EU framework for the promotion of energy from renewable sources (Directive 2009/28/EC). The aim of this legislative act is to achieve by 2020 a 20% share of energy from renewable sources in the EU's final consumption of energy and a 10% share of energy from renewable sources in each Member State's transport energy consumption. To achieve these objectives, the directive established, for each Member State, a mandatory national target for the overall share of energy from renewable sources in gross final consumption of energy. This target was set on the basis of the different starting points of the various countries. The 10% target for the transport sector was set at the same level for each Member State to ensure consistency in transport fuel specifications and availability.

To address growing concerns regarding the environmental impacts of pushing certain renewable energy source, Directive 2009/28/EC established a set of sustainability criteria for biofuels and bioliquids. According to the directive, only biofuels and bioliquids (including those imported and/or obtained from raw materials cultivated outside the territory of the Community) that fulfil these criteria can be taken into account for the following purposes:

- measuring compliance with the requirements of this Directive concerning national targets;
- measuring compliance with renewable energy obligations; and
- eligibility for financial support for the consumption of biofuels and bioliquids.

The sustainability criteria established by the directive relate mainly to the following environmental aspects/issues:

- biodiversity;
- the protection of rare, threatened or endangered species and ecosystems; and
- greenhouse gas emission savings.

Additional policies

The above mentioned directives influence the policy areas analysed here. Additional policies, economic instruments and reporting tools aid in the implementation of the issues addressed in this report. Unlike the directives and communications detailed above, their influence is more specific to only one of the issues and will therefore be described in more detail in the following sections. These include:

- 2010 Biodiversity Strategy.
- White Paper on Climate Change Adaptation.
- Environmental Impact Assessment Directive.
- Global Monitoring for Environment and Security (GMES).
- The 7th Environmental Framework Programme (FP7).
- Innovation Partnership on Water.

ANNEX B: LAND USE MEASURES UNDER THE RDR AND THE STRUCTURAL FUNDS

RD code	Technical measures	Support Actions
Measure 214: agri-environmental measures	- Input reduction: includes reductions in fertilisers and plant protection products. Expected impacts include: securing water quality, enhanced biodiversity and soil quality. - Organic farming: input reduction, rotation, extensification of livestock. Expected impacts include: enhanced soil quality, preserving water quality, and biodiversity enhancement. - Integrated farming schemes - Conversion of arable land into grassland - Setting up new wetlands. - Buffer zones - Extensification measures cover the promotion of extensive grazing and extensive livestock production and/or extensive grassland use. - Soil erosion measures such as stocking limits and maintaining terracing and soil cover.	
Measure 221: Support for non-productive investments on agriculture land	- Buffer strips - Wetlands - Measures to increase water level - Measures to slow down downstream water flows	- Supporting implementation of measures 214 - Supporting the implementation of Natura 2000 areas
Measure 221: First afforestation of agricultural land	- Afforestation	
Measure 223 First afforestation of non-agricultural land	- Afforestation	
Measure 225: Forest-environment payments	- Afforestation - Measures to prevent soil erosion - Flood prevention measures	
Measure 227: Non-productive investments on forest land	- Planting of native tree species	
Measure 323: Conservation and upgrading rural heritage	- Wetlands - Restoration of nature areas	- Supports the implementation of

	- Hydro-morphological restructuring – removal of weirs	management plans under Natura 2000
Thematic area	Technical measures	Support actions
Infrastructure linked to water supply and to the environment (ERDF)	- Improvement of irrigation systems - Reduction of evaporation during storage - Water reuse - Water efficiency in buildings - Rainwater harvesting - Reduction in leakages - Natural water retention measures - Buffer strips - Restoration of riparian area along watercourses	- Water pricing - Innovative economic instruments and marking mechanisms
Climate change adaptation (ERDF, Cohesion Fund)	- Decreasing soil evaporation - Reducing runoff - Watertable management - Natural water retention measures - Buffer strips - Restoration of riparian areas along water courses	- Innovative economic instruments and marking mechanisms
Nature protection	- Natural water retention measures - Buffer strips - Restoration of riparian areas along water courses	- Innovative economic instruments and marking mechanisms
Rural and urban regeneration	- Natural water retention measures - Buffer strips - Restoration of riparian areas along water courses	- Innovative economic instruments and marking mechanisms
Eco-innovation in SMEs		- Certification and foot-printing - Consumer-producer agreements

ANNEX C: WATER SAVINGS THROUGH IMPROVED IRRIGATION EFFICIENCY

In the irrigation sector, important water savings can be mainly achieved at two levels:

- At the resource side, except the construction of increased storage capacities. Increasing water resources can be achieved through recycling of treated wastewater;
- At the demand side, savings can be achieved at each level of the hydraulic system by reducing leakages in conveyance canals, applying more efficient irrigation practices at the field level, by selecting better agricultural practices reducing water stress/water demand or by changes crops and cropping pattern.

As irrigation constitutes the highest water consumption sector, technical measures for improving water use efficiency in irrigation systems are likely to entail large water savings opportunities. In a prospective study at the Mediterranean basin level[410], 65% of potential water savings are attributed to improvements in irrigation systems.

Theoretical Considerations

Technical water saving measures can be classified depending on the parameter in the total irrigation system water requirement (***WR tot***). WR tot can be estimated as: WR tot = IN / (Ec x Ea) where 'Ec' is water conveyance efficiency 'Ea' is field application efficiency, and 'IN' refers to irrigation needs (depending on crop water requirements, cropping patterns, soil type, agronomic practices and climatic conditions).

Conveyance efficiency refers to the percentage of diverted water from the source that is delivered to the field. There are large differences in conveyance efficiency depending on the irrigation network. In open channels networks, efficiency varies between 60 and 95% depending on the quality of maintenance, lining and length of channels. Average conveyance efficiency of an adequately maintained earthen channel of medium length (200- 2000m) is estimated at 75%. Field application efficiency is the ratio between water used by the crop and the total amount of water delivered to the fields. It informs how well an irrigation system performs in transporting water to the plant roots. Water application efficiency depends on the irrigation techniques implemented. The table below shows typical efficiency values for several irrigation methods found in the Guadalquivir Basin (Southern Spain)[411].

Table. Irrigation efficiencies according to water delivery and irrigation systems

Distribution and irrigation system	Water conveyance efficiency	Field application efficiency	Global 'gross' efficiency
Open channel main network + furrow etc.	70%	55%	39%
Pressurized + Sprinkler	90%	75%	68%
Pressurized + Drip	90%	90%	81%

[410] Plan Bleu (2004): L'EAU DES MÉDITERRANÉENS: SITUATION ET PERSPECTIVES. MAP Technical Report Series No. 158. PNUE/PAM: Athens.

[411] See the accompanying document to this report "Part II – Case studies"

Examples in water savings

The conversion from less efficient conveyance systems or field application methods represents a possible water saving measure. The comparison between the "optimal" system (pressurised network and drip irrigation) with the "traditional" system (open channels and furrows), shows that irrigation water requirements per hectare can be reduced by 50%. Examples of potential water savings through increased efficiency in irrigation can be found in Europe and in third countries:

- Efficiency gains have been estimated for the UK[412], where water savings can be obtained from replacing a hose reel with rain gun (60-70% efficiency) to a central pivot (75%-90% efficiency).
- In Greece, a significant proportion of cotton is grown using flood irrigation, which requires 20,000 litres of flood water to produce a kilogram of harvested crop due to high levels of surface runoff and evaporation. Drip irrigation of cotton can require 7,000 litres per kilogram of crop, thus a shift towards drip irrigation could potentially lead to a **35% savings in water use**. Similarly in India, a switch from flood irrigation to alternate furrow system can save half of the initial water requirements[413], with an **estimated potential water savings of 35%** as a result of a shift from gravity to sprinkler irrigation system for arable crops.
- Field measurements in Greece showed that losses from irrigation networks are significant and that 40%-48% of the irrigation water is lost when conveyed in canal systems. A recent pilot study under the I-ADAPT project[414] in Greece found that moving from open irrigation canals to underground piped networks increased conveyance efficiency up to 30%. Since the 1980s Israel has been using drip irrigation and micro-sprinkler techniques to expand crop output within the limits of existing water supplies. These techniques are mainly used for vegetables and fruit trees and are integrated into computerised systems that operate irrigation applications automatically based on information collected via plant moisture sensors. This technology, combined with the use of water-efficient crops, has resulted in an irrigation efficiency of 90%, as compared to the 64% efficiency of the traditional furrow irrigation system. As a result, **average water requirements were reduced by 40%** between 1975 and the end of the 1990s. At the same time, agricultural output increased twelve fold.

Improving irrigation scheduling so that irrigation follows crop water requirements as closely as possible can also lead to significant water savings[415]. There are different tools to monitor a soil's moisture level (tensiometers in particular), and computer software has been developed to simulate crop water requirement depending on soils and climate conditions. Examples include:

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412 Knox, J.W.; Weatherhead, E.K. (2003): Trickle Irrigation in England and Wales, R&D Technical Report W6-070/TR.

413 Sondhi, S.K. (no year): Irrigation water saving technologies for major agro-ecologies of the Indo-Gangetic Basin.

414 Makropoulos, C., and Mimikou, M. (2011): i-adaPT: Innovative approaches to halt desertification in Pinios: Piloting emerging technologidy. Final Results, Key Findings and Recommendations.

415 INRA (2006): Sécheresse et agriculture Réduire la vulnérabilité de l'agriculture à un risque accru de manque d'eau, available at http://www.inra.fr/les_partenariats/expertise/expertises_realisees/secheresse_et_agriculture_rapport_d_expertise.

- Under the DESIRAS (Addressing Desertification by Efficient Irrigation in Agriculture) project, the use of soil moisture sensors on three farms in Cyprus and Spain (producing lemon balm, catnip, thyme, potatoes, olives, etc.) has led to **water savings of over 50%** on almost all the crops tested compared to 2010 water use[416].
- Under the McDonald's Stewardship Farm Initiative[417], a lettuce farm in Almeria, Spain, uses soil moisture meters, which has helped to reduce water use by monitoring moisture levels in the soil. The programme has estimated that such technology enables irrigation to be **25% more efficient** than other irrigation methods as losses through evaporation are reduced.
- In Greece, the I-ADAPT project tested precision agriculture techniques that monitor irrigation needs on 3 cotton farms, resulting in a **reduction in water consumption by up to 35%** while at the same time increasing yields up to 31%.

[416] http://www.ewp.eu/activities/desiras/

[417] SAI Platform (2010) Water Conservation Technical Briefs. TB 8 – Use of drip irrigation. http://www.saiplatform.org/uploads/Library/Technical%20Brief%208.Use%20of%20drip%20irrigation.pdf

ANNEX D: SWOT ANALYSIS OF POLICY OPTIONS

1 Pricing

- Develop guidance and tools to promote trading in water rights.
- Add national water pricing obligations for farmers based on Art 9 as cross compliance under CAP.

Strengths	Guidance on water rights: The option explores potential new ways of allocating water which may open new opportunities for water managers. It would tackle head on the issue of historical water rights which is a major impediment to effective water management. The non-binding character of the option allows it to be flexible and more likely to be accepted. Cross compliance would simply ensure farmers comply with existing obligations – likely to be strongly acceptable to other stakeholders.
Weaknesses	Guidance on water rights: It is non-binding and, therefore, might not influence those basins where water rights issues are a major problem. Water rights and similar issues are not fully worked out for a European context yet. Conditionality option would only deliver to the extent that national water pricing drives efficiency
Opportunities	Guidance on water rights: The option is one of exploration of methods and approaches and therefore can be taken forward at any convenient time. New cross-compliance is not immediately possible and would require a new opportunity.
Threats	Guidance on water rights: Some MS and stakeholders are particularly resistant to water rights trading in particular. MS are likely to be strongly opposed to CAP obligations even though these are effectively already required.

2 Metering

- Mapping all EU river basins with GMES to enhance MS water management, including large irrigated areas to identify illegal abstraction and enhance enforcement.
- Amend WFD to make explicit that Art 11 includes mandatory metering.
- Amend WFD to require metering of individual consumption and/or use where relevant.
- Make RD and CP funding for irrigation projects conditional on use of meters.
- Make CAP Pillar I payments conditional on use of meters.

Strengths	GMES data readily available and are common across Europe. A legal amendment would place more binding obligations on Member States and so be more likely to be implemented. Cross compliance would simply ensure farmers comply with existing

	obligations – likely to be strongly acceptable to other stakeholders.
Weaknesses	Metering is not always possible or advisable e.g. in the case of water surpluses. The physical context is also important as for instance water metering is related to a number of practical and operational issues such as meter location, installation and meter reading possibilities etc. However, a legal amendment would be limited in the level of detail that could be prescribed.
Opportunities	Opportunity in place to take forward GMES option. This option would only be possible if there is the opportunity for the Commission to propose an amendment to the WFD. The option could be addressed again in 2018 when legal amendment to the WFD is more likely and if other options included here are adopted but are proven to be insufficient to deliver the necessary improvements in Member State implementation. New cross-compliance is not immediately possible and would require a new opportunity.
Threats	Member States may oppose adoption of legal prescription. A shift to metered systems may be difficult, especially in specific situations where there is no history of metering or in case of area-based systems (agriculture). The lack of capacity and/or resources to monitor and control metering may not prevent illegal abstraction. Metering can face rejection by water users because of additional costs and additional controls which are not accepted. MS are likely to be strongly opposed to WFD and CAP obligations even though these are effectively already required.

3 Global aspects

- Raise consumers' awareness of the water footprint of products.
- Mandatory labelling of most embedded water intensive products.

Strengths	The support for third countries is generally well received and has positive impacts. Introducing labelling or similar approaches is familiar to consumers and MS.
Weaknesses	Outcomes cannot be guaranteed. Labelling and information provision does not guarantee a change in consumer behaviour Changed consumer behaviour does not necessarily reduce impacts Capacity and institutional constraints affecting up-take of the options involving the benchmarking of best practice
Opportunities	Existing labelling legislation provides a good basis for addition of water labelling approaches.
Threats	Footprinting is still controversial and taking this forward may be resisted. Further ecolabels may be viewed as confusing for consumers beyond those that already exist.

4 Land use impacts

- Develop guidance and tools on EU framework to NWRMs including support PES and thereby NWRMs for administrations and users.
- Amend the WFD to require mandatory application of NWRM.
- Ensure NWRM measures are mainstreamed into CSF funds, including implementing rules of new CAP (Pillars I and II) support NWRMs.
- Promote the application of NWRM by prioritising it in the use of Cohesion and Structural Funds

Strengths	Guidance would be more easily accepted and could influence national guiding guidelines/principles. Guidance is able to explore the different land use planning and water objectives in the Member States in a flexible way. Amending the WFD would ensure implementation of measures. Mainstreaming in CSF funds is a strong measure to stimulate compliant behaviour and disseminate knowledge to recipients. Funding opportunities are able to target places where public spending restrictions are limiting investment.
Weaknesses	As there is no legal requirement to change practices with guidance (it is not binding) the impacts of such a guidance could be rather weak. Amending the WFD would take several years and the extent to which NWRMs and obligations related to them would be more restricted than in guidance. Mainstreaming in CSF funds still requires compliance checking and it cannot influence behaviour of farmers, for example, not in receipt of Pillar I funds.
Opportunities	Developing guidance can build on the existing CIS process for developing guidance. Amending the WFD will only be possible at the time of review. The CSF funds are currently being adopted, so opportunities would need to address subsequent implementing rules, mid-term review or even the next cycle of funds. Taking forward the funding option can be addressed as rules and strategies for funding priorities are established.
Threats	Developing effective guidance requires the full co-operation of a wide range of Member State authorities responsible for land-use and water planning which cannot be guaranteed, although it is reasonable to expect this to occur. There tends to be considerable resistance from some MS and some interest groups to extending integration of environmental objectives into CSF funds, especially the CAP. There is not significant threat to the funding options.

5 Water efficiency of buildings and appliances

No SWOT Analysis was undertaken as the options are derived from the 2009 project on Water Performance in Buildings

6 Leakage in water distribution systems

- Develop a harmonised method for determining SELL.
- Promote sustainable water management (including leakage) in use of SF and CF.
- Promote sustainable water management (including leakage) in EIB loans.

Strengths	A harmonised method is aimed at both environmental and economic benefits and will be useful to those that require it. Funding opportunities are able to target places where public spending restrictions are limiting investment.
Weaknesses	No option can guarantee leakage reduction to sustainable levels, not least because of the high costs across the EU.
Opportunities	All 3 options can be taken forward relatively quickly, building on current knowledge and practice/procedures.
Threats	It is not evident that there are any significant threats.

7 Addressing water reuse

The options here are derived from the Fitness Check and therefore have no SWOT Analysis. These include:

- Develop guidance on certification schemes for re-use
- CEN standards for re-use of recycled water in agriculture
- Adopt an EU Regulation establishing standards for waste water re-use
- Promote sustainable water management (including leakage) in use of SF and CF.
- Promote sustainable water management (including leakage) in EIB loans.

Strengths	Non-binding standards can be developed with less A Regulation would ensure a full level playing field within the EU single market and would be directly applicable, obviating the need for transposition. Funding opportunities are able to target places where public spending restrictions are limiting investment.
Weaknesses	Non-binding standards are unable to ensure operation of the single market and, therefore, ensure that the problem is addressed. A Regulation has no weaknesses.
Opportunities	All options can be taken forward at an early stage. If non-binding standards are not thought to be effective, then co-operation in their development might not be forthcoming. Conversely opposition to a Regulation could have a similar impact.

Threats	The threat to standards will come not from industry which supports a binding approach, but potentially from those opposed in principle to new EU law, whether justified or not. There is not significant threat to the funding options.

8 Governance

- To develop a peer review process within the context of the CIS.
- Amend WFD to make RBMPs legally binding.
- Amend WFD to introduce a stronger mediation power for Commission in transboundary river basin management
- Amend the SEA Directive to cover all hydropower development plans.

Strengths	The 'control' of the process of peer review is in the hands of the Water Directors and would be likely to be more acceptable than other options. The scope and process of peer reviews would be agreed (as with CIS guidance) by the Member States and Commission together. A legal amendment would place binding obligations on Member States and so be more likely to be implemented. It would ensure that measures and other requirements set out by water management authorities in the Member States are, where appropriate, legally binding on other authorities who might be required to implement them. A stronger mediation role for the Commission enhances its current position and yet is not binding, so enabling it to work to consensus. Amending the SEA Directive ensures full SEA where it is not currently ensured.
Weaknesses	Funding of the peer review option is not clear. Member States may oppose adoption of legal prescription. The amendment would need to be clear as to the consequences of an RBMP being legally binding, which might be difficult in the variety of administrative contexts in the Member States. An amendment would probably require a need for further WFD amendments – it is not likely that an amendment on this issue alone would be considered to be justified. A stronger mediation role cannot guarantee co-operation between MS. There is no obvious weakness (other than time) to amending the SEA Directive.
Opportunities	The forum to take forward the peer review option (the CIS) is well established. The option can be taken forward without significant delay. The legal options would only be possible if there is the opportunity for the Commission to propose an amendment to the WFD. Amending the SEA Directive will also take place at review.
Threats	Water Directors might not support a peer review approach. The less formalised approach will be less able to address Member States unwilling to take part in peer reviews. Member States may oppose an amendment to the WFD. There may be resistance to amending the SEA Directive.

9 Target setting and water accounts

- Develop guidance and tools on water accounting and eflows.
- Develop guidance and tools to support target setting in river basins.
- Adopt technical annexes to the WFD on water accounts and E-Flows that will require water accounting for river basins; specify the protocol for establishing E-Flows, and require the setting up of water efficiency targets on the basis of an agreed methodology.
- Adopt technical annexes to the WFD on target setting in river basins.

Strengths	The proposed options would address the Resource Efficiency Roadmap's target and assist Member States in its implementation. They would also assist in implementing the WFD. Guidance options can be more nuanced, while legislative options are binding and more likely to be implemented
Weaknesses	The effectiveness of non-binding schemes is heavily dependent on the actual uptake levels. Water supply and demand can vary across Member States and river basin districts also in terms of seasons. Methodologies at EU level would have to be flexible enough for their application to developing targets in quite different conditions.
Opportunities	The targets could stimulate innovation for water efficiency. Learning across Member States, for example through Interreg projects, could help to find common methods.
Threats	The implementation and effectiveness of water efficiency targets will depend on timely data availability and their comparability. Additional requirements stemming from the above policy options may be viewed as a burden by competent authorities.

10 Drought management

- Adopt a Recommendation to promote drought management planning.
- Adopt a new Directive on water scarcity and drought management.
- Amend the WFD to include provisions related to climate change impacts and adaptation.

Strengths	The above DM options would provide a more robust basis for decision making and for the implementation of EU climate change adaptation and in particular addressing water scarcity, while achieving greater consistency with other EU policies and, ultimately, the Europe 2020 strategy. Legal amendment would be stronger in its binding character, while a Recommendation could allow for a more nuanced approach.
Weaknesses	There is likely to be considerable resistance to a new Directive. For legislative action, additional compliance requirements may be perceived as a burden by Member States. The effectiveness of non-binding schemes is heavily dependent on the actual uptake levels on the part of Member States and river basins.
Opportunities	New law could be developed earlier than a WFD amendment. Options could stimulate the development of projects and programmes for climate change adaptation under the EU Structural Funds.
Threats	The development of options would need to be timely in order for the results to be available in adequate time before the preparation of the next round of RBMPs.

11 Costs and benefits of inaction

- Produce guidance and tools for recovery of costs of water services, including environmental and resource costs and ecosystem service benefits.
- Adopt technical annex to WFD on recovery costs of water services, including environmental and resource costs and ecosystem service benefits.

Strengths	Guidance can explore nuances between MS, different methodologies and best practice examples. A legal amendment would be binding on the Member States and ensure that the analysis is undertaken, thus delivering the necessary transparency to decisions on measures set out in RBMPs.
Weaknesses	Guidance is non-binding and cannot guarantee that MS undertake full CBA of measures, etc., within river basin planning. For legal amendment it would be necessary to prescribe the scope of the analysis in law (including methodologies) otherwise there would be inconsistency of approach in the Member States. However, agreeing the detail of the methodologies may be difficult to achieve. Member State authorities would require sufficient capacity and data to perform such analyses, which might be problematic in some cases (noting the deficiencies in the implementation of the WFD requirements on economic analysis already performed by the Member States).
Opportunities	There has been a significant amount of research for the Commission (and others) on the costs of policy inaction and on the benefits of implementing specific areas of water law to provide a foundation for adoption of requirements on Member States on this issue. Guidance based on this work could be developed at an early stage. Amendment to the WFD on this issue would only be possible if there is the opportunity for the Commission to propose an amendment to the WFD, which will be several years away.
Threats	The main threat to guidance would be opposition within the CIS process and lack of co-operation. Member States might not support a legal amendment to the WFD.

12 Knowledge Base and Innovation

- Develop a fully inter-operable, SEIS based, shared water knowledge system, reducing reporting requirements while prescribing interoperability standards for the information produced at local and national level and through GMES.
- Enhance minimum WFD reporting requirements and statistical obligations (e.g. through framework regulations on environmental accounts and statistics), especially with regard to inter-operability of data. This includes harmonising the reporting timetables of the Urban Waste Water Treatment, Nitrates and Water Framework Directives.

Strengths	Inter-operability provides benefits to a wide range of users and greater acceptance of provision of reporting information. Greater operability at a river basin level of economic, flows and abstraction data sets as identified in the problem analysis. Enhance reporting requirements: The option would ensure coherence of reporting of EU freshwater law. Member States would benefit from harmonised reporting. The increased frequency of reporting would provide additional information to the Commission on implementation and the state of Europe's waters.
Weaknesses	The data desirable at river basin scale are not necessarily available, nor will they be so in the foreseeable future given the strict prescriptions in NACE 2 and WFD reporting requirements. Costly with high levels of uncertainty about effectiveness. Enhance reporting requirements: The improved frequency of reporting would reduce the information to the Commission on implementation and the state of Europe's waters.
Opportunities	Development of guidance can be taken forward within the existing CIS process for the development of guidance and, therefore, build on the existing involvement of Member State authorities. There has been a significant amount of research for the Commission (and others) on the costs of policy inaction and on the benefits of implementing specific areas of water law to provide a foundation for adoption of requirements on Member States on this issue. Research can be taken forward with the 7th Environmental Framework Programme and existing Science-Policy Platforms can be used. Enhance reporting requirements: The option would require a legal amendment to the Nitrates Directive, WFD, etc. and it is not clear if there will be an opportunity for a 'minor' amendment. MS are likely to support an option for reducing administrative burden.
Threats	Quality Assurance of data provision may become burdensome on the Commission and lead to maintenance issues and thereby poor data quality over time. Increasing amounts of economic data available at river basin level may not be available in future if path dependant on sectoral policy needs such as NACE 2 reporting; limiting the scope of compliance testing. Enhance reporting requirements: Member States might oppose an increase in reporting frequency.

ANNEX E: PUBLIC INTERNET CONSULTATION

Online consultation for the Blueprint – 12 March 2012 version

Policy Options for the Blueprint to safeguard Europe's waters

Introduction

The Blueprint to Safeguard Europe's Water Resources

This year, the European Commission will present a Blueprint to Safeguard Europe's Water Resources. This document will assess the implementation and achievements of EU water policy as well as identify gaps and shortcomings. On the basis of this analysis, the Blueprint will identify actions to strengthen water policy and to address ongoing vulnerability of the water environment.

The EU has developed a comprehensive water policy over several decades. The Water Framework Directive is a central component for the protection and restoration of clean water across Europe and its long-term, sustainable use.

The European Environment Agency warned in 2010, however, that due to the extensive human alterations in many river basins, 'the aim of the Water Framework Directive (WFD) to achieve good status by 2015 may not be met' (State of the Environment Report 2010). EEA also warned that Europe's waters face serious quantitative challenges, including over-abstraction and water scarcity and droughts; projected climate change impacts will exacerbate these problems in many parts of Europe, and also increase the intensity and frequency of floods.

The recent Fitness Check of EU Freshwater Policy and the ongoing assessment of the River Basin Management Plans of the EU Member States conducted by the European Commission in 2010-2012 show that, with a view to tackling the above mentioned challenges, the adequacy of the current water legislative framework is not questioned, nor is its coherence with the rest of environment policy. However, there exist fundamental weaknesses in the implementation of the current water legislation as well as conflicts between water policy and other EU policies' objectives.

The Blueprint will thus address implementation issues, the integration of water and other policies' objectives as well as the gaps in the current EU policy framework. The Blueprint will also strengthen links between EU water policy and the EU2020 Strategy, including the Roadmap to a Resource-Efficient Europe, and more generally improve the coherence between EU water policy and other policy areas.

More background on this consultation can be found in the accompanying consultation document.

This public consultation is to support the European Commission in developing the Blueprint to Safeguard Europe's Water Resources, it is necessary to obtain views and evidence on issues relevant to EU Water Policy from as wide a range of stakeholders as possible. This internet questionnaire provides an opportunity for everyone to comment on issues of relevance to the Blueprint.

The questionnaire

The questionnaire follows the major expected themes of the Blueprint on the challenges for future EU water policy: [tools for water management, unlocking measures, economic instruments, governance, knowledge base and global issues]. Questions are asked about specific options to address different problems arising within these themes.

The questionnaire begins with questions about you and your organisation. This is followed by 18 substantive questions on key issues for the Blueprint. Most questions use 'tick boxes', and there are also opportunities to elaborate on your responses.

If you have any additional comments or information that you think is relevant, we invite you to send them via email to ENV-BLUEPRINT-EU-WATERS@ec.europa.eu.

How we will use the results

The information that is provided through this public consultation will be fully taken into account by the European Commission in the preparation of the Blueprint.

An analysis of the results of the public consultation will be undertaken after the conclusion of the consultation period and this will be made available on the European Commission's web page for the Blueprint.

In addition to this internet consultation, water issues will be a theme of this year's Green Week, to be held in Brussels in the week of 21 May. Moreover, Green Week will include the Third EU Water Conference on 24-25 May, where policy options for the Blueprint will be discussed.

Introductory questions

Your name (optional)

Your country of residence (compulsory)

Which organisation do you represent (compulsory – please put 'none' if you are replying as an individual)

Please choose from the following categories the most relevant to the organisation you represent:
National Administrative Body
River Basin Authority or other water manager
Industry
International Organisation
NGO
Academic
Member of general public
Other

Overview

1. Assessment of the first round of river basin management plans

The first round of river basin management plans (RBMPs) has been a central element in implementation of the Water Framework Directive. A key common goal for this first round of RBMPs was to achieve good water status. However, the approaches across Member States vary greatly.

An analytical review of the RBMPs is underway. We would also like to hear from EU citizens and organisations concerning the results of this first planning exercise.

What do you see as the five most important achievements seen in the preparation of the first round of RBMPs?

What do you see as the five most important problems seen in the preparation of the first round of RBMPs?

Tools to improve water management

The Water Framework Directive calls for Europe's waters to achieve good status by 2015. This objective includes both qualitative and quantitative aspects. Water quantity is explicitly addressed for groundwater and is implicit for surface water as a minimum environmental flow is necessary to achieve good ecological status. However, there is, at the moment, no common definition and application of the concept of such environmental flows (Eflows) i.e. the quantity of water that nature needs for good ecological status to be achieved. Furthermore, the establishment of water balances and of targets on quantitative water management only takes place in a few river basins, often due to lack of data or inadequate tools.

2. Problem 1: water balances and adequate water allocation are poorly implemented at river basin level.

In many instances, river basin managers are not fully aware of how much water flows in and out of a river basin, due to lack of data, tools, capacity, etc. Without this understanding, it is difficult to take effective management decisions to protect waters and meet the needs of water users.

How should the Blueprint address this issue?
[Each item has the following boxes: yes/no/do not know]
1. Develop guidance through a working group under the WFD Common Implementation Strategy to support the use of water accounting and E-Flows at river basin level (including specific tests in pilot river basins); to agree a methodology for efficiency target setting at river basin level; and to update reporting to the EC to include E-Flows and river flows.
2. Develop a Recommendation on the use of water accounting, efficiency target setting and environmental flows at river basin level and an indicative EU water efficiency target.
3. Specific recommendations are considered for Member States on water accounting, efficiency target setting and environmental flows at river basin level in the context of the European Annual Growth Survey for the European Semester.
4. Adopt technical annexes to the WFD on E-Flows that will require water accounting for river basins; specify the protocol for establishing E-Flows, making the use of the E-Flows definition compulsory in all water stressed river basins; and require the setting up of water efficiency targets on the basis of an agreed methodology.
5. Other _____

3. Problem 2: Droughts have become increasingly damaging in many parts of Europe and are predicted to increase in frequency and intensity in the future

Droughts present a particular challenge to water managers who have to prioritise between different water users during a drought and take decisions to ameliorate the effects of droughts when they occur.

How should the Blueprint address this issue?
[Each item has the following boxes: yes/no/do not know]
6. Enhance drought management planning into the next cycle of River Basin Management Plans under the Water Framework Directive for all drought-affected, or potentially affected, Member States.
7. Develop a European wide early warning system for droughts to timely alert Member States on the need to take counter-measures.
8. Establish a drought emergency fund which would group in a single instruments and enhance the funding possibilities currently available under the EU Solidarity Fund and rural development funding. The Fund would include appropriate conditionalities on drought prevention measures being taken.
9. Establish a drought management directive to require Member States to develop and implement river basin drought management plans with specific drought measures to be reported to the Commission.
10. Other _____

Unlocking measures in key sectors to protect Europe's waters

In order to deliver objectives and targets for Europe's waters, a range of different measures in key policy sectors can be considered at EU level to improve water resource efficiency and sustainability.

4. Problem 3: Land use impacts and, in particular, agriculture's impacts threaten water quality and quantity across much of Europe.

Agriculture and other land uses are a major pressure on water quality and quantity. Agriculture is Europe's biggest land user/owner as well as the biggest water consumptive user. There is a wide range of possible measures that farmers, for example, can use to help protect water bodies such as more sustainable use of fertiliser and pesticide inputs, maintaining soil organic matter levels, changing crop patterns, enhanced use of buffer strips, improved irrigation practices, wetland restoration, restoration of riparian areas, etc. However, these are not used as widely as is needed to protect Europe's waters from agricultural pressures.

How should the Blueprint address this issue?
[Each item has the following boxes: yes/no/do not know]
1. The Commission to develop guidance clearly defining and providing an EU framework for green infrastructures that promotes natural water retention measures such as floodplains and wetlands restoration; sustainable drainage, the restoration of riparian areas and the re-meandering of rivers
2. The Commission to develop guidance for integrated water – land use management, bringing together spatial planning and River Basin Management Plans in co-ordination with other areas of EU environmental policy (Biodiversity, Nature, Soil)
3. Develop guidance through the agriculture working group under the WFD Common Implementation Strategy on the effective application of measures by farmers to deliver water quality and quantity objectives at catchment level. These measures include changing crop patterns, buffer strips, restoring riparian areas, increase irrigation efficiency, etc. In that respect, particular emphasis will be put on the use of the Farm Advisory System set up under the CAP
4. The European Innovation Partnership on Agricultural Productivity and Sustainability and the European Innovation Partnership on Water develop and disseminate innovative solution to ensure agriculture's negative impact on water are removed or minimised and beneficial effects are maximised
5. Enhance the application of Environmental Impact Assessment to irrigation projects.
6. Enlarge the scope of the Strategic Environmental Assessment Directive to cover all hydropower development plans
7. The Commission to ensure that the implementing rules for the post-2013 CAP Pillars I and II support and target the necessary measures to deliver water quality and quantity objectives.
8. Other _____

5. Problem 4: The design of building and water using appliances does not sufficiently factor-in water efficiency.

The lack of coherent approach to water efficiency in buildings and products causes water waste which is problematic in areas which are water stressed or at risk of becoming water stressed and also wastes energy.

How should the Blueprint address this issue?
[Each item has the following boxes: yes/no/do not know]
11. Voluntary labelling of water using appliances
12. Mandatory labelling of water using appliances
13. Establish a WFD Common Implementation Strategy working group on water use efficiency for preparing "BREF-like" notes on water use/conveyance efficiency.
14. Minimum water efficiency requirements for water using appliances, e.g. under the Ecodesign directive
15. Voluntary performance rating for buildings
16. Mandatory performance rating for buildings
17. Minimum water performance requirements for buildings
18. A directive on water efficiency requirements in buildings including a requirement on water companies to reduce final water consumption
19. Other _____

6. Problem 5: Significant amounts of water are lost from leakage in distribution systems.

Significant leakage in water infrastructure in some parts of the EU causes great waste of water (up to 50% of the water abstracted in some cases) which is problematic in areas which are water stressed or at risk of becoming water stressed.

How should the Blueprint address this issue?
[Each item has the following boxes: yes/no/do not know]
9. Promote leakage reduction in water stressed/potentially water stressed areas by prioritising it in Cohesion and Structural Funds spending
10. Promote leakage reduction investment on the basis of public/private partnerships and European Investment Bank loans
11. Develop guidance on best practices in leakage reduction
12. Develop a harmonised method for determining the level of water leakage under the WFD Common Implementation Strategy at EU level and encourage Member States to integrate it into their water management practices
13. Other _____

7. Problem 6: There are no common standards for waste water reuse

Waste water re-use has the potential to contribute to the irrigation requirements of agriculture in some river basins or to industrial uses. However, there are no EU level standards for water re-use and some Member States are adopting/have adopted their own standards while others have not done so. Without common EU standards, a potentially significant source of water is not being used. Moreover, there is a potential for some Member States to object to products grown with reused water thereby generating an

obstacle to the internal market. In addition, industry needs certainty for future use to make the necessary investments to enable water re-use. Note that all options below would need to fully respect relevant public health and environmental standards.

How should the Blueprint address this issue?
[Each item has the following boxes: yes/no/do not know]
14. Develop EU guidance on certification schemes for water re-use
15. The Comité Européen de Normalisation (CEN) to adopt standards for use of recycled waste water in agriculture
16. An EU Regulation establishing standards for waste water re-use
17. Other _____

Economic instruments

There are a number of issues relating to economic instruments and water management in Europe. These include:
- Current water pricing levels and structure do not provide sufficient incentives to increase water efficiency.
- There are gaps in the quantification of environmental and resource costs, including on the benefits of ecosystem services, which prevents the development of 'Payments for Ecosystem Services schemes' linked to reduced water resource depletion.
- In many cases there are insufficient tools to assess the costs and benefits of measures, which may lead to inappropriate decisions when comparing benefits to costs.
- Current water allocation schemes, where they exist, are often inefficient and are hampered by poor information and difficulties in operating schemes such as water rights trading.
- Many economic instruments cannot be introduced or work effectively if certain conditions are not met, such as metering to determine water use and controls on illegal abstraction.

8. Problem 7: The absence of metering for individual users is a key barrier for the effective implementation of pricing schemes that incentivise water efficiency. Illegal abstraction in some parts of the EU is a large phenomenon that puts at risk water availability.

How should the Blueprint address this issue?
[Each item has the following boxes: yes/no/do not know]
18. Mapping all EU large irrigated areas via the remote sensing (GMES) initiative and match these areas with water abstraction permits to help Member States enforce them and tackle illegal abstraction.
19. Making EU funding for irrigation projects conditional upon the installation of metering devices, e.g. via the CAP implementing rules.
20. Making CAP direct payments to farmers (Pillar I) conditional upon the installation of metering devices, e.g. via cross compliance rules for the WFD.
21. Amend the WFD to make it explicit that the Article 11 requirement of a permit for water abstraction also includes mandatory metering of the quantities abstracted.

22. Amend the WFD to require metering of individual water consumption and/or use where relevant.
23. Other _____

9. Problem 8: Current water pricing levels and structure do not provide adequate incentives to increase water efficiency. This includes the identification of subsidies e.g. in bio-energy and agriculture, which is a big water user as well as the biggest water consumptive user. In some cases, water users are either not charged at all or are not charged in relation to the quantity of water used/consumed. (Note: the options below should be seen as complementary to and not a replacement of the enforcement of the current provision on incentive pricing under article 9 of the WFD).

How should the Blueprint address this issue?
[Each item has the following boxes: yes/no/do not know]
24. Implement the proposed rules for Cohesion & Structural and Rural Development funds to make the establishment of incentive pricing compulsory for (relevant) projects in areas with water deficit
25. Add national water pricing obligations for farmers, based on Art.9 of the WFD, to cross-compliance rules under the CAP for the WFD
26. The Commission to promote the use of trading in water rights at river basin level through the development of guidance and tools under the WFD Common Implementation Strategy
27. The Commission to develop criteria for the sustainable production of bio-energy crops with specific reference to water protection
28. Specific recommendations are considered for Member States on water pricing policies in the context of the European Annual Growth Survey for the European Semester
29. Amend the WFD to require that the price of water reflects volumetric use.
30. Other _____

10. Problem 9: Costs and benefits of water related measures are not properly understood or quantified. There is a lack of a methodology to calculate the adequate recovery of environmental costs which, inter alia, prevents their incorporation into water price, charges, levies, etc.

How should the Blueprint address this issue?
[Each item has the following boxes: yes/no/do not know]
31. The WFD Common Implementation Strategy to develop guidance for the next cycle of River Basin Management Plans and a methodology for the calculation of an adequate contribution of the different water uses to the recovery of the costs of water services, including environmental and resource costs and ecosystem services' benefits
32. The Commission to propose an amendment of the WFD (an Annex) containing a mandatory methodology for the calculation of an adequate contribution of the different water uses to the recovery of the costs of water services, including environmental and resource costs and ecosystem services' benefits.
33. Other _____

Governance

Effective governance is necessary to implement existing and new policies that might be included in the Blueprint. Ineffective governance will undermine attempts to enhance target setting, unlocking specific technical measures and the application of some economic incentives. There are concerns over fragmented institutional structures, poor intra and inter-institutional relationships and capacity (personnel, technical capacity, training, etc.) which undermine the ability of authorities to perform the detailed analyses necessary to implement the WFD, perform the necessary monitoring, develop and implement RBMPs and develop amended plans in an effective adaptive management framework. Furthermore, the current financial crisis is impacting on the budgets (and capacity) of governmental bodies across the EU with unknown consequences for water governance. There is also a particular issue with governance of transboundary river basins. There are positive examples of co-operative assessment and planning, but this is not the case across the whole of the EU and more coordination and joint planning in transboundary river basins are necessary as evidenced by the RBMPs assessment.

11. Problem 10: Governance of water and sectoral policies at Member State level is, in some cases, fragmented and faces a lack of capacity and resources fully to address water management objectives.
There is lack of coordination in river basin shared between different administrative entities within Member States, between Member States and with third countries.

How should the Blueprint address this issue?
[Each item has the following boxes: yes/no/do not know]
34. On the basis of the Commission assessment of the River Basin Management Plans, the WFD Common Implementation Strategy to identify and disseminate best practices in the EU.
35. To develop a peer review process for river basin district authorities within the context of the WFD Common Implementation Strategy with a view to help them identifying ways of improving their coordinating role
36. Specific recommendations are considered for Member States on water governance in the context of the European Annual Growth Survey for the European Semester
37. Develop initiatives on inspections and surveillance to improve the means of detecting and responding to water-related implementation problems such as over-abstraction
38. Continue to promote the river basin management approach and the implementation of the EU water acquis through EU enlargement policy and international rivers agreements
39. To amend the WFD to strengthen the coordination powers of River Basin District authorities and the obligations for combined River Basin Management Plans in transboundary contexts.
40. Other _____

Knowledge base

EU Water Policy is an adaptive framework where measures are based on detailed analysis and require refining through a cyclical planning process. This is only possible on the basis of detailed and up to date information about a wide range of issues. A number of options addressing earlier problems above already seek to improve knowledge (e.g. on water accounts). However, further strategic action is needed to maximise the value of the data that we have and minimise the costs of producing and providing those data.

In addition to enhancing the knowledge base as such, there is also a need to improve knowledge sharing. As about 60% of the river basins covered by EU water policy are transboundary, it is essential to have an effective knowledge sharing system between Member States, European bodies and third countries with whom the EU shares such basin or inconsistent policies may be developed for the same basin.

12. Problem 11: There is insufficient dissemination and sharing of compatible data and other information between Member States, European bodies and third countries leading to an incomplete understanding of the problems facing Europe's waters or, potentially, to incoherent water management choices. Data provision is not timely and different systems prevent data access. New and emerging knowledge needs must be addressed through research activities..

How should the Blueprint address this issue?
[Each item has the following boxes: yes/no/do not know]
41. Improve the sharing of data and other information by further developing the Water Information System for Europe (WISE) Implementation Plan
42. Enhance minimum WFD reporting requirements and statistical obligations (e.g. trough the Framework regulation on environmental accounts/statistics), especially with regard to inter-operability of data. This includes harmonising the reporting timetables of the Urban Waste Water Treatment, Nitrates and Water Framework Directives
43. Develop a fully inter-operable, SEIS (Shared Environmental Information System) based, shared water knowledge system for use by Member States and EU institutions, reducing reporting requirements while prescribing interoperability standards for the information produced at local and national level and through GMES.
44. Develop a roadmap for water research priorities to be integrated in the next research funding cycle at EU and Member States level taking into account the need to improve the science policy interface.
o Other _____

Global aspects

The main focus of the Blueprint is the EU and the neighbouring countries with which it shares transboundary river basins. At global level, the EU to is committed to the achievement of the Millennium Development Goals (MDGs) of halving by 2015 the proportion of the population without sustainable access to safe drinking water and basic sanitation and is actively involved in the preparation of the Rio+20 Conference (June 2012).

The EU can contribute to addressing this problem by supporting integrated water management in developing countries in its development cooperation policy (e.g. via a renewed EU Water Initiative). This is particularly important if one considers the virtual flow of water embedded in traded agricultural and industrial products. Both virtual water importers and exporters share the responsibility of not depleting water resources in the exporting countries. Mismanagement and wastage of water in water scarce countries could have very negative consequences on local development and even be the cause of migration flows.

While the EU already has in place a framework for the sustainable management of water, the issue of virtual water is not only of global relevance but is also important within the EU, in relation to water balances for agricultural and industrial products. Therefore some of the options below are also relevant within the EU.

13. Problem 12: Competing demands for scarce water resources may lead to an estimated 40% supply shortage by 2030. Mismanagement and wastage of water in water scarce countries could have very negative consequences on local development and even be the cause of migration flows from developing countries.

How should the Blueprint address this issue?
[Each item has the following boxes: yes/no/do not know]
45. Help developing countries to put in place integrated sustainable water management through EU development cooperation
46. Raise consumers' awareness of the water footprint of products
47. Keep under review water foot printing tools with a view to test their usefulness for voluntary product labelling (e.g. as part of EU Ecolabel).
48. Mandatory labelling of most embedded water intensive products
49. Other _____

Other issues

14. Are there any other issues that you wish to raise or comments to make regarding the Blueprint to Safeguard Europe's Water Resources?