

Collaborative Research Programme
On River Basin Management Planning Economics

Report on Screening of Water Pricing Policies, Cost Recovery Mechanisms and Economic Instruments for Inclusion in Programmes of Measures and in Relation to Article 9 of the Water Framework Directive

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May 2006

CRP Project 1c: Screening of Water Pricing
Policies, Cost Recovery Mechanisms and
Economic Instruments for Inclusion in
Programmes of Measures and in Relation to
Article 9 of the Water Framework Directive

A Final Report for DEFRA

NERA

Economic Consulting

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1. Introduction

1.1. Study Objectives

NERA has been commissioned for Project 1c of the Collaborative Research Programme (CRP), a coordinated series of economic analysis projects on behalf of the main UK stakeholders in the Water Framework Directive (WFD). The aim of Project 1c is to provide an initial screening of economic mechanisms in England, Wales and Scotland that have the potential to contribute to cost-effective programmes of measures to reduce the risk of failure of water bodies to meet “good ecological status” under Article 4 and towards compliance with Article 9 of the WFD. The mechanisms identified by the present study as having this potential may be carried forwards for the national cost-effectiveness assessment in 2006.

By “economic mechanisms” we here understand pricing policies and other instruments which create economic incentives and thereby impact on private agents’ behaviour or which serve to recover the costs of a product or service from agents. An example of an economic mechanism in this sense is a charge on polluting activities. By contrast, we use the term “measures” to refer to technical means or initiatives taken to achieve a specific, often locally restricted, purpose. An example of a measure is a scheme to clean up a particular polluted water body. Measures may be “driven” by economic mechanisms which encourage their adoption.

1.2. Background

The project follows on from work already undertaken on the economic analysis of water uses and the impact of human activity on the water environment in each river basin district to comply with Article 5 of the WFD. Key Article 5 reports linking into the present study include:

- ERM, Stone and Webster, “*Assessing Current Levels of Cost Recovery and Incentive Pricing*”, 2004;
- Environment Agency “*Assessing Risks to the Water Environment: River Basin Characterisation – Results 2005*”, 2005;
- Scottish Environment Protection Agency, “*Scotland River Basin District: Characterisation and Impacts Analysis Required by Article 5 of the Water Framework Directive*”, 2005.

The first of these reports focuses on the current degree of compliance with the cost-recovery and incentive pricing objectives set out in Article 9 of the WFD. The other two reports provide an assessment of the risk of failing to meet the environmental objectives set out in Article 4 of the WFD in each river basin district. Together, the reports describe the status quo with regard to Article 9 and Article 4 compliance, which economic mechanisms may help to maintain or to improve.

In addition, the following report provides the basis from which we develop the screening criteria for the potential inclusion of economic mechanisms in programmes of measures:

- UK Collaborative Research Programme, RPA Consortium, “*Development of a Methodology to Determine the Cost-effectiveness of Measures and Combinations of Measures for the Water Framework Directive*”, Project 2a, 2005.

Beyond the reports listed above, the study has drawn on numerous government, regulatory and academic papers to develop the long list of candidate economic mechanisms that are screened in this report. This list contains mechanisms which have been implemented already in England, Wales and Scotland, constitute modifications of existing mechanisms or have been sufficiently worked up to qualify as policy proposals.

In accordance with guidance from Defra, this study does not include any instruments related to the control of pollution from agricultural sources. Mechanisms to reduce diffuse water pollution from agriculture are appraised under the Catchment Sensitive Farming programme. Current research to underpin this analysis is looking at the environmental effectiveness of a range of agricultural measures, and the cost-effectiveness of different policy mechanisms to encourage them. All options remain under consideration in this process and therefore the policy mechanisms include regulatory mechanisms as well as economic instruments such as supportive approaches (e.g. agri-environment schemes, grant aid, catchment officers) and trading schemes. We are advised that HM Treasury continues to review evidence for potential tax measures for environmental issues as part of the normal budget process.

This report does not map economic mechanisms to the wide range of measures that could be taken in the course of implementing the programmes of measures required by the Directive. We note though that our organization of economic mechanisms by environmental pressure is consistent with the organization of economic measures by environmental pressure provided by:

- UK Collaborative Research Programme, “*Economic Analysis and Decision Making for Programme of Measures under the Water Framework Directive – Identification of Processes and Issues*”, Project 1a, 2005.

Future research will need to explore the complex relationships between economic mechanisms and selected measures to achieve WFD compliance.

1.3. Report Structure

This report is structured as follows:

- Section 2 summarises research on the risks to achieving WFD compliance;
- Section 3 provides an overview of our methodology for screening economic mechanisms against the requirements of Article 9 of the WFD and for inclusion in cost-effective programmes of measures to achieve Article 4 objectives;
- Section 4 summarises results from screening candidate mechanisms against the requirements of Article 9;
- Section 5 summarises our assessment of the potential of candidate mechanisms for inclusion in programmes of measures to reduce the risk of failure of water bodies to meet good ecological status as specified in Article 4;

- Section 6 concludes the main body of the report with a synthesis of our results.
- Annex A contains the full terms of reference for this project;
- Annex B contains the text of Articles 4 and 9 of the WFD;
- Annex C reviews the EA's and SEPA's environmental risk assessment in relation to Article 5 requirements;
- Annex D presents the full list of candidate economic instruments we consider in this study;
- Annex E sets out the differences between the criteria we use for screening economic mechanisms and those used in RPA (2004);
- In Annex F, we screen candidate mechanisms against criteria relating to Article 9 compliance;
- In Annex G, we screen candidate mechanisms which may play a role in reducing the risk of failure of water bodies to meet good ecological status required under Article 4;
- Annex H from Defra describes the Catchment Sensitive Farming programme to develop policies to tackle diffuse water pollution from agriculture;
- Annex I sets out the Steering Group's and Peer Reviewers' comments on the Interim Report and the Draft Report for this project as well as NERA's responses;
- Annex J is a bibliography.

2. Issues in Achieving WFD Compliance and the Role of Economic Mechanisms

The WFD sets a framework for the protection of water bodies from the harmful effects of human activities, promotes sustainable and economically efficient water use based on long term protection of available water resources, and contributes to mitigating the effects of floods and droughts. The key requirements of the WFD for the present study are found in Articles 4 and 9. The text for these Articles is contained in Annex B of this report.

Below, we review the Article 5 reports on the current status in the UK of the risks of non-compliance with these requirements. Section 2.1 focuses on Article 9 objectives, Section 2.2 on Article 4 objectives. Section **Error! Reference source not found.** is a summary.

2.1. Current Status and Issues in Respect of Article 9 Compliance

ERM and Stone and Webster were commissioned by Defra in 2004 to examine current levels of cost recovery and incentive pricing in England and Wales.¹

On cost recovery, the study concluded that:

- An initial assessment shows that ‘financial’ cost recovery rates for each of the water service areas (water supply and sewerage collection and treatment) are 100%. There is effectively no subsidy of water services in England and Wales and the corporation tax that water and wastewater companies are subject to is close to the standard marginal rate of corporate tax of 30%.² Environmental and resource costs of water services were not estimated in the study.³
- The extent to which the contribution of key uses can be assessed is constrained by the data available on financial costs, transfers and subsidies and environmental and resource costs created and borne by different user groups. However, some cross-subsidies exist in water service pricing due to regional averaging, e.g. from urban to rural areas.⁴

On incentive pricing, the study highlights the following issues:

- The proportion of households using a water meter is only 1 in 5 and varies considerably across the UK. The use of volumetric and innovative incentive tariffs is therefore limited mostly to non-households and large users.
- Research suggests it may not be feasible to amend the current cost recovery charging system for abstraction charging so as to turn it into “an incentive charging system”.⁵

¹ ERM, Stone and Webster Consultants (2004), “Assessing Current Levels of Cost Recovery and Incentive Pricing”.

² ERM, Stone and Webster Consultants (2004), “Assessing Current Levels of Cost Recovery and Incentive Pricing”, p. 58 and p. 68.

³ ERM, Stone and Webster Consultants (2004), “Assessing Current Levels of Cost Recovery and Incentive Pricing”, p. 58.

⁴ ERM, Stone and Webster Consultants (2004), “Assessing Current Levels of Cost Recovery and Incentive Pricing”, p. 58.

⁵ ERM and Stone and Webster (2004), “Assessing Current Levels of Cost Recovery and Incentive Pricing”, p. 27.

However, the Environment Agency has considered proposals to refine the charging system by introducing additional incentive elements.

2.2. Current Status and Issues in Respect of Article 4 Compliance

A key part of the river basin characterisation process in compliance with Article 5 was an assessment of pressures on the water environment undertaken by the Environment Agency (EA) and the Scottish Environment Protection Agency (SEPA) in 2005.

In their assessment, the EA and SEPA

- gathered data and information on the pressures and impacts on water bodies, ecosystems and protected areas;
- clarified their quality objectives;
- explored whether these were likely to be achieved by 2015.

Table 2.1 and Table 2.2 below show the main results of this work, viz. information on the proportion of water bodies at risk of failing to achieve WFD objectives by 2015 in England and Wales and in Scotland, respectively.

Table 2.1
Percentage of Water Bodies at Risk of Failing to Achieve WFD Objectives
(England and Wales)

Pressures (% at risk)	Rivers	Lakes	Estuaries (Transitional water bodies)	Coastal Waters	Groundwater
Point discharges	23.1	20.1	48.5	18.2	3.9
Diffuse pollution	82.4	53	25	24.2	75.3
Abstraction	10.7	2.1	14	Not applicable	26.1
Physical changes	48.2	59.3	89.7	77.8	Not applicable
Alien species	21.1	9.3	36.8	45.5	Not applicable
Overall % of water bodies at risk	92.7%	84%	98.5%	84.8%	75.3%

Note: Water bodies can be at risk or probably at risk from more than one pressure.

Source: EA (2005), "Assessing risks to the water environment: River Basin Characterisation – Results 2005".

Table 2.2
Percentage of Water Bodies at Risk of Failing to Achieve WFD Objectives
(Scotland)

Pressures (% at risk)	Rivers	Lakes	Estuaries (Transitional water bodies)	Coastal Waters	Groundwater
Point discharges	14.2	12.3	45	24.7	16.0
Diffuse pollution	24.3	18.4	45	13.2	19.8
Abstraction	24.6	36.9	2.5	Not applicable	10.4
Physical changes	33.3	38.8	40	9.6	Not applicable
Alien Species	Further work required	Further work required	Further work required	Further work required	Further work required
Overall % of water bodies at risk	45.5	54	57.5	28.7	23.6

Notes: Water bodies can be at risk or probably at risk from more than one pressure. The analysis excludes Solway Tweed River Basin District.

Source: SEPA (2005), "Scotland River Basin District: Characterisation and impact analysis required by Article 5 of the Water Framework Directive – Summary Report".

As can be seen, the proportion of water bodies at risk from a pressure of some kind is high, ranging from 75.3% for ground waters to 98.5% of transitional water bodies in England and Wales and from 23.6% to 57.5% for the same water body categories in Scotland.

The results also suggest that:

- Point-source discharges affect a large proportion of estuaries as well as a significant proportion of other water bodies in England, Wales and Scotland.
- Diffuse pollution threatens a very large proportion of rivers and a large proportion of estuaries in England and Wales, as well as other water bodies. In Scotland, rivers appear to be less affected by diffuse pollution than in England and Wales.
- Abstraction activities pose a risk to a smaller proportion of the water bodies in England, Wales and Scotland than activities contributing to other pressures. However, with more than a third of lakes in Scotland at risk from abstraction, the importance of this pressure should not be underestimated.
- Physical changes threaten large proportions of water bodies across England, Wales and Scotland. However, the breakdown by category of water body at risk from physical changes in England and Wales is different from that in Scotland. For instance, a much smaller proportion of coastal waters are affected in Scotland than in England and Wales.
- Alien species put ecological pressure on a number of water bodies in England and Wales, particularly estuaries and coastal waters. In Scotland, the assessment in this area has not yet been finalised.

This assessment provides an indication of where the main problems for the aquatic environment lie in view of the WFD. However, uncertainties about the true status of water

bodies relative to WFD objectives remain. The EA (2005) notes the following issues in this context⁶:

- The definition of “good status” in the WFD requires further clarification. For surface water, the EU inter-calibration exercise, which will formally define where “good status” lies across Europe, has not yet been completed. In the absence of European-wide criteria for “good status”, the United Kingdom Technical Advisory Group (UKTAG) developed guidelines for the assessment in the UK, in line with Annex V of the WFD and relevant Common Implementation Strategy (CIS) guidance.⁷ For groundwater, the standards to be adopted under the daughter groundwater directives were not agreed at the time when the risk assessment was undertaken. Instead, indicative thresholds based on existing domestic and EU standards were applied to assess the risk of not achieving good chemical status.
- The impacts of a number of pressures relevant to the assessment, such as hydro-morphological pressures, have not been routinely monitored and researched across the UK. The risk assessment is therefore not always based on impact data but relies in some cases on pressure data, modelling or expert judgment. Validation of the assessment through site visits has not normally been possible.
- Prediction of risks of failing to achieve “good status” in 2015 relies, to some extent, “on the general assumption that if a body is at risk of not meeting the environmental objectives of the *WFD by 2015 due to pressures operating in 2004, [...] the same level of pressure will still exist in 2015.*”⁸ In addition, the EA and SEPA also factored some readily available trend data (e.g. on nitrates in ground water) and information on their water resource strategies and on planned water industry investments into their risk assessment.⁹ However, other factors not considered are likely to impact on future levels of pressure on water bodies as well.

An ongoing process of river basin characterization during 2005-2007 will take into account the establishment of a formal WFD monitoring regime, additional data, identification and characterization of further important smaller water bodies, a revision of the categorization of water bodies, the outcome of the EU calibration exercise and future EU legislation. As a result of this further work, the proportion of water bodies classified as “at risk” may alter.

2.3. Implications of Work to Date for This Study

In this section, we summarised Article 5 reports on the current status and issues in respect of Article 9 and Article 4 compliance.

⁶ EA (2005), “Summary Report of the Characterisation, Impacts and Economics Analyses Required by Article 5”.

⁷ UKTAG guidance can be found at www.wfduk.org/guidance.

⁸ EA (2005), “Summary Report of the Characterisation, Impacts and Economics Analyses Required by Article 5”, p. 3ff.

⁹ SEPA (2005), “Scotland River Basin District: Characterisation and Impacts Analyses Required by Article 5 of the Water Framework Directive”, Section 6.9.

The ERM/Stone and Webster (2004)¹⁰ assessment of current levels of *cost recovery* showed that the financial costs of water services are already fully recovered in England and Wales although it is unclear whether this is also true of the environmental and resource costs of water services. The assessment of current levels of *incentive pricing* suggested that the incentives created by current abstraction charging and water pricing policies to use water resources efficiently are limited. However, as guidance by Defra on the interpretation of the WFD had not been finalised at the time of the report, the potential implications for action required to achieve compliance with Article 9 were not fully drawn out in the report.

The environmental risk assessment by the EA (2005)¹¹ and SEPA (2005)¹² showed that a large proportion of water bodies in England, Wales and Scotland are at risk of failing to achieve the good ecological status required under Article 4. However, these results are preliminary and may change in the light of a clearer definition of good ecological status, additional data or a more forward-looking approach to future assessments.

The relevance of economic mechanisms to the achievement, or otherwise, of Article 9 and Article 4 objectives is clear.

The characteristics of economic mechanisms determine how aligned incentives are with social objectives – here WFD objectives – as well as the extent to which, and from whom, costs – here the costs of water services – are recovered. Hence, it is the economic mechanisms themselves that need to be assessed for their compliance with Article 9 of the WFD.

In order to comply with Article 4 of the WFD, water bodies must maintain good ecological status or reach it by 2015, except where the costs of achieving this are disproportionate. Programmes of measures need to be put in place by member states to address the pressures acting on the different types of water bodies as a result of human activity, viz., abstraction, point source pollution, diffuse source pollution, morphological impacts and the introduction of alien species. Economic mechanisms are to be included in the programmes of measures where they are cost effective. The national cost effectiveness assessment in 2006 will compare mechanisms at a national level for inclusion in programmes of measures, and the results from the screening undertaken in this study will contribute to deciding which mechanisms might be taken forward for that assessment.

¹⁰ ERM/Stone and Webster (2004), “Assessing Current Levels of Cost Recovery and Incentive Pricing”, Report for Defra.

¹¹ EA (2005), “Assessing risks to the water environment: River Basin Characterisation – Results 2005”.

¹² SEPA (2005), “Scotland River Basin District: Characterisation and impacts analyses required by Article 5 of the Water Framework Directive”.

3. Process and Criteria for Screening Economic Mechanisms to Achieve WFD Objectives

In line with the terms of reference for this project and after guidance on scope from Defra, we compiled a long list of candidate economic mechanisms that have been considered or implemented in England, Wales or Scotland and need to be screened for their contribution towards achieving WFD objectives. This long list of economic mechanisms can be found in Appendix D.

Our process for screening these mechanisms falls into two parts. In the first part, we screen candidate economic mechanisms and pricing policies for their compliance with Article 9 cost recovery and incentive pricing objectives. In the second part, we screen candidate mechanisms and pricing policies for inclusion in packages of measures to achieve good ecological status of water bodies, as required under Article 4 of the WFD.¹³ We use three criteria in this second part of the assessment: the effectiveness of the mechanisms in addressing pressures on the aquatic environment, their cost, and their distributional impact. Where relevant, we also take account of potential positive or negative synergies between mechanisms the assessment.

Below, we describe the different criteria and sub-criteria we use in each part of the screening process as well as the range of our screening values in detail. We discuss differences between our definitions of some of these criteria and sub-criteria and those chosen by RPA (2005)¹⁴ in Appendix E.

3.1. Article 9 Screening Criteria

Article 9 sets out a number of principles relating to the recovery of the costs of water services and to incentive-based water pricing. In particular, Article 9 requires

- Member States to “*take account of the principle of recovery of the costs of water services, including environmental and resource costs, having regard to the economic analysis conducted according to Annex III, and in accordance in particular with the polluter pays principle*” (Article 9.1. 1st Sentence).
- Member States to ensure that by 2010, “*water pricing policies provide adequate incentives for users to use water resources efficiently and thereby contribute to the environmental objectives of this Directive*” (Article 9.1. 2nd Sentence).
- Member States to ensure by 2010 “*an adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of costs of water services, based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle*” (Article 9.1. 2nd Sentence).

¹³ Fewer mechanisms are considered in the second part of the screening process than in the first part since some mechanisms that may have implications for cost-recovery objectives set out in Article 9 are not relevant to addressing environmental pressures.

¹⁴ RPA (2005) “Development of a Methodology to Determine the Cost-Effectiveness of Measures and Combinations of Measures for the Water Framework Directive”.

These Article 9 requirements are subject to several broad exemptions:

- Article 9.1. tailpiece to the effect that Member States may, in complying with Article 9.1, have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected;
- Article 9.3 ‘exemption’ for the funding of particular preventative or remedial measures to achieve objectives of the WFD¹⁵;
- Article 9.4 ‘exemption’ for a specific water use activity where Member States decide not to comply in accordance with established practices and this does not compromise the purposes and objectives of the WFD.¹⁶

We extract the following economic sub-criteria from Article 9 and from preliminary guidance from the WFD team in Defra on its interpretation¹⁷ for our screening purposes:

- *Recovery of the costs of water services*: Cost-recovery is achieved if payment for all costs of water services (as defined in Article 2.38)¹⁸ can be obtained. Preliminary guidance from Defra suggests that “costs” here include environmental and resource costs as well as economic costs.¹⁹ We note that the WFD merely requires Member States to “take account of the principle of cost recovery” and that the WATECO guidance on the implementation of the WFD acknowledges that the WFD “will not prevent Member States deciding on the level of cost recovery of the water services being identified” as long as this is “reported on in the river basin management plans”.²⁰
- *The adequate contribution of the different water uses, disaggregated at least into industry, households and agriculture to cost recovery*: Following preliminary guidance from Defra, we understand adequate contribution by a group of water users to cost recovery as amounting to a contribution which reflects the costs incurred in providing the particular customer group – industry, households, agriculture or a subgroup of these – with water services. As noted above, preliminary guidance from Defra suggests that ‘costs of water services’ includes the ‘environmental and resource costs’ mentioned in Article 9.1, 1st

¹⁵ According to preliminary guidance from Defra, it is unlikely that this means Article 4 objectives. It probably refers to Article 1 objectives.

¹⁶ Preliminary guidance from Defra does not express a definite view on whether this refers to Article 1 objectives only or also to Article 4 objectives.

¹⁷ Preliminary guidance of the WFD team in Defra on the implications of Article 9 requirements in England was provided to NERA to help steer this project. It does not represent the consolidated view of Defra as a whole or that of Defra Ministers or that of the project Steering Group as a whole.

¹⁸ Article 2.38 defines ‘water services’ as all services which provide, for households, public institutions or any economic activity (a) abstraction, impoundment, storage, treatment and distribution of surface water or groundwater or (b) wastewater collection and treatment facilities which subsequently discharge into surface water.

¹⁹ ERM and Stone and Webster (2004), “Assessing Current Levels of Cost Recovery and Incentive Pricing”, define ‘environmental costs’ as the residual environmental damage costs after current mitigation costs. A resource cost is seen to refer to both contemporaneous and inter-temporal user costs. Contemporaneous user costs are the costs imposed by user A on other current users in so far as A’s usage is not available for others to use. Inter-temporal user costs are the costs imposed by user A on future users in so far as A’s usage is not available to them.

²⁰ WATECO (2003), “Common Implementation Strategy for the Water Framework Directive (2000/60/EC: Guidance Document No 1, Economics and the Environment)”, p. 76.

Sentence. We note that the word “adequate” introduces some scope for flexibility in the application of the principle. The WATECO guidance in fact clarifies that Article 9 of the WFD does not prevent Member States from deciding on the contributions of water users as long as this is clearly stated in River Basin Management Plans.²¹

- *The polluter pays principle*: There is a question as to how widely this principle should be interpreted. Preliminary guidance from Defra suggests that given the definition of ‘water services’, the polluter pays principle invoked in Article 9 probably only applies to the costs of over-abstraction and treatment of waste water so that it can be discharged into surface waters.²²
- *Adequate incentives for users to exploit water resources efficiently*: Incentive-based pricing here relates to the sharpness of the price signal faced by users, which impacts on their use of water resources and thereby contributes to Article 4 objectives. Preliminary guidance from Defra suggests that the term “users” here is unlikely to refer to all those agents whose activities cause water pollution. Article 9 concerns ‘water services’ as defined in Article 2.38, i.e. services provided by the water and sewerage industries.²³ If so, the Article 9 incentive-pricing requirements will at most concern water resources abstracted for water services and discharges into surface waters from sewerage facilities. Again, the reference to “adequate” incentives for users to use water resources efficiently in Article 9 allows for flexibility in applying the principle. Besides, the WATECO guidance states only that a review of the incentive pricing properties of current prices may be necessary following the assessment of current levels of cost recovery.²⁴

In view of the scope for flexibility with regard to the implementation of Article 9 in the UK, we choose one of three broad and cautious “values” when screening economic mechanisms against Article 9 objectives, viz. “aligned”, “not relevant” or “questionable”. “Questionable” is emphatically different from “inconsistent with” Article 9 requirements. Where we judge a mechanism to be “questionable”, we merely indicate scope for further discussion of its consistency with Article 9.

²¹ WATECO (2003), “Common Implementation Strategy for the Water Framework Directive (2000/60/EC: Guidance Document No 1, Economics and the Environment”, European Communities, p. 76.

²² This interpretation of the polluter pays principle is limited to its use in Article 9. In other contexts (e.g. other EU directives), the polluter pays principle may have a wider scope.

²³ This probably goes wider than statutory water and sewerage undertakers.

²⁴ Atkins (2003), “Scoping Study for Water Framework Directive Annex III (Economic Analysis)”.

Table 3.1
Article 9 Sub-Criteria and Screening Values

Sub-criterion	Analysis Required	Range of Screening Values
Cost recovery	Analysis of implications of the mechanism for total cost-recovery from users for water services provided.	Aligned Not relevant Questionable
“Adequate contribution” by user groups to cost recovery	Analysis of the implications of the mechanism for the recovery of financial, environmental and resource costs caused by different customer groups (industry, agriculture and households) from these customer groups.	Aligned Not relevant Questionable
Polluter pays principle	Analysis of implications of mechanism for the recovery of the cost of pollution treatment from the polluter.	Aligned Not relevant Questionable
Incentive pricing	Analysis of implications of mechanism for incentives for users to use water resources efficiently.	Aligned Not relevant Questionable

NERA summary.

By way of conclusion, we state whether the mechanism under consideration is aligned with, not relevant to or questionable with regard to Article 9 requirements.

3.2. Article 4 Screening Criteria

We assess mechanisms that can contribute to Article 4 objectives in a cost-effectiveness analysis framework. The relevant assessment criteria are set out below. Throughout, we assess mechanisms that are currently used against a hypothetical “discontinuation” benchmark (where the current mechanism is no longer maintained) and new mechanisms or modifications of current mechanisms against a “status quo” benchmark (where all and only current mechanisms are used).

3.2.1. Effectiveness with Regard to Environmental Objectives

Our effectiveness sub-criteria for mechanisms all serve to describe different aspects of the environmental effect brought about by the mechanism. These sub-criteria include:

- *Magnitude of the relevant environmental effect:* This is the power of a mechanism to address pressures and sub-pressures by way of encouraging appropriate actions (e.g. by households, water companies, industry or agriculture). Relevant considerations for assessing the magnitude of the effect of a mechanism are the price signal created, the responsiveness of agents’ behaviour to this signal, and the environmental impact of the behavioural change.

- *Timeline:* We consider whether the mechanism could deliver environmental improvements or prevent deterioration by 2015 or only thereafter.
- *Responsiveness:* We assess the adaptability of a mechanism in response to new information as “high” (can adjust impact as much as desired), “medium” (some adjustments possible) or “low” (few adjustments possible).
- *Adaptability to local circumstances:* We assess the adaptability of a mechanism to local circumstances as “low” (same throughout country), “medium” (minor variations possible) or “high” (can be tailored to local circumstances).
- *Uncertainty about the effect:* We identify sources of uncertainty about the environmental impact of a mechanism and where possible, give an indication of its extent (“high”/“medium”/“low”).

The assessment is based on a detailed description of the mechanism at issue and a brief review of the empirical literature and experience with a mechanism where possible.

**Table 3.2
Effectiveness Sub-Criteria and Screening Values**

Sub-criterion	Analysis Required	Range of Values or Screening Results
Magnitude	Nature of price signal created	High
	Responsiveness of agents to price signal	Medium
	Impact of actions encouraged by the mechanism on environmental parameters	Low
Timeline	Time required to implement mechanism	Effect achieved by 2015
	Time required until the mechanism becomes environmentally effective	Effect achieved after 2015
Responsiveness	Extent and ways in which the mechanism can be adjusted in response to new information	High
		Medium
		Low
Adaptability to Local Requirements	Extent and ways in which mechanism can be adapted to local circumstances	High
		Medium
		Low
Uncertainty about Effect	Sources and extent of uncertainty	High
		Medium
		Low

NERA summary.

When summarising conclusions on the potential effectiveness of a mechanism, we focus on the likely magnitude of the effect achieved by 2015.

3.2.2. Cost

We consider the following cost components:

- *Financial costs:*²⁵ Non-recurring financial costs are one-off financial (operating or capital) outlays incurred by private agents generated by the adoption of an economic mechanism, e.g. investment in metering equipment. In addition, there can be recurring financial outlays that arise on a regular basis as long as the mechanism is in place. These include costs of “running” the mechanism (e.g. meter reading costs) as well as adaptive costs associated with changing behaviour in response to price signals entailed by the mechanism (e.g. reducing water abstraction or emissions). We describe the financial costs associated with a mechanism and provide a rough indication of their size (“high”/“medium”/“low”).
- *Transfers:* Not all financial costs are economic costs. Some economic mechanisms such as charges, taxes and subsidies involve transfers from the private to the public sector or vice-versa. Transfers drive a wedge between the financial costs born by private sector agents and the economic costs of a mechanism. In considering costs, we assess the extent of transfers. In addition, we consider the stability of the associated revenue streams for the public sector where this is a concern.
- *Regulatory costs:* These are economic costs borne by the regulator in order to set-up, administer, monitor and enforce an economic mechanism. Again, we characterise these costs and provide an indication of their importance (“high”/“medium”/“low”).
- *Wider net economic effects:* The actions incentivised by economic mechanisms may have one economic or environmental motivation, but also impact on the extent of market failure in related markets. This can create net economic gains or losses. As an example of a negative wider economic effect, trading schemes might be used to erect barriers to entry in the absence of appropriate regulation. We discuss likely important wider economic effects of a mechanism and their impact (“positive”/“negative” and “high”/“medium”/“low”).
- *Non-WFD environmental effects:* Some of the economic mechanisms we consider may have environmental effects other than those directly sought (i.e. compliance with WFD objectives). We gauge any such wider environmental costs or benefits of the mechanisms in the screening process. Our screening values for overall effects are “high”, “medium” and “low” as well as “positive” or “negative” where required for clarification.

We also discuss:

- *Uncertainty about costs:* We identify the sources and the extent of uncertainty surrounding different cost components. Our screening values for overall uncertainty are “high”, “medium” and “low”.

²⁵ These are private financial costs. Regulatory costs are a separate cost category in our taxonomy.

Table 3.3
Cost Sub-Criteria and Screening Values

Sub-criterion	Kind of Analysis	Range of Screening Values
Financial Costs	Identification and description of financial costs	High/medium/low
Transfers	Identification and characterisation of transfers	High/medium/low Stable/varying
Regulatory Costs	Identification and description of regulatory costs	High/medium/low
Wider Net Economic Effects	Identification and assessment of wider net economic gains	High/medium/low Positive/negative
Non-WFD Environmental Effects	Identification and description of these environmental benefits	High/medium/low Positive/negative
Uncertainty about Costs	Identification of sources of uncertainty and assessment of the extent of uncertainty	High/medium/low

NERA summary.

When drawing overall conclusions from our cost-analysis, the concept of interest is the expected present value of the total incremental costs of adopting a mechanism net of benefits (other than those captured in the effectiveness analysis), though quantification of most of the elements of this calculation is well beyond the terms of this study.

3.2.3. Distributional Impact

We also consider the distributional impact of a mechanism. A full assessment would require the choice of an economic welfare function and the derivation of appropriate weights on the costs and benefits of the mechanism from the welfare function according to their distributional impact.

Our aim is more modest. We want to flag up potential distributional issues of concern that could arise as a result of the implementation of a particular mechanism. For example, the economic mechanism may:

- adversely affect vulnerable or sensitive customer groups, such as, in the household segment, the sick, pensioners, and other people on a low income, and in the business segment, small and medium-sized water reliant enterprises;
- have a severe negative impact on another group which may affect the social and political acceptability of the mechanism.

Consistent with this aim, our screening values for this criterion are “gives cause for concern” or “does not give cause for concern”, as shown in the table below. The national cost-effectiveness assessment in 2006 could take the analysis further for selected mechanisms.

Table 3.4
Distributional Impact Criterion and Screening Values

Sub-criteria	Analysis Required	Range of Values
Distributional Impact	Identification of distributional impacts which matter, either in view of their size or in view of their consequences for vulnerable groups.	Gives Cause for Concern Does not Give Cause for Concern

NERA analysis.

4. Summary of Screening against Article 9 Objectives

In this section, we summarise our initial assessment of the compliance of candidate mechanisms with Article 9 objectives. This assessment depends on the interpretation of Article 9 adopted.

What we refer to as the “close interpretation” of Article 9 requirements follows preliminary guidance given by the Defra WFD team, which will be finalised later in the year following consultation with other government departments. In Section 4.1, we state whether candidate mechanisms are aligned with, not relevant to, or questionable with regard to this close interpretation of Article 9.

While the close interpretation is likely to follow the letter of Article 9, the implications of widening the scope of the interpretation in particular respects is of interest at this stage of its implementation in the UK. These are explored in Section 4.2.

4.1. Screening against Article 9 Requirements, Closely Interpreted

We set out Defra’s close interpretation of Article 9 in Chapter 3. The following features of the close interpretation of incentive-pricing and cost-recovery requirements set out in Article 9 bear repeating here:

- *Article 9.1., 2nd sentence, 1st indent (“Adequate incentives for users to exploit water resources efficiently and thereby contribute to Article 4 objectives”):*
 - Preliminary guidance from Defra emphasises that only ‘adequate’ incentives are required, not complete or total ones. This leaves margins for Member State discretion in the application of Article 9.1., 2nd sentence, 1st indent.
 - Preliminary guidance from Defra states that Article 9 concerns ‘water services’ as defined in Article 2.38, i.e. services provided by the water and sewerage industries. According to the preliminary guidance, this suggests that the Article 9 incentive pricing requirement will at most concern water resources abstracted for water services, and discharges into surface waters from sewerage facilities. In that case, polluting activities which do not relate to ‘water services’ provided by the water and sewerage industries, such as direct discharges by industry, are not relevant to the Article 9 incentive pricing requirement.
- *Article 9.1. 2nd sentence, 2nd indent (“Adequate contribution of the different water users, disaggregated into at least industry, households and agriculture, to the recovery of costs of water services, based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle”):*
 - Preliminary guidance from Defra emphasises that only ‘adequate’ contributions are required, that the contributions only need to be ‘based on’ the annex III economic analysis, and that the analysis is conducted only ‘taking account’ of the polluter pays principle. This creates scope for flexibility in the application of Article 9.1. 2nd sentence, 1st indent.
 - Preliminary guidance from Defra suggests that required contributions to the costs of water services by different sectors (agriculture, industry, households) relate to the use

of water services by these sectors and not to other activities which cause particular environmental externalities. This would imply that the environmental costs of polluting activities which do not involve the use of water services are not covered by Article 9 cost recovery requirements.

- Preliminary guidance from Defra interprets the polluter pays principle in the context of Article 9 closely, stating that, given the definition of ‘water services’, it there probably relates only to the costs of harm caused by over-abstraction and the treatment of waste water so that it can be discharged into surface waters.

The table below summarises our initial assessment of candidate economic mechanisms against Article 9 requirements, taking into account Defra’s preliminary guidance. Detailed descriptions of these instruments and screening results can be found in Annex F. Our screening values are broad and cautious (“aligned” with, “not relevant” to and “questionable” with regard to Article 9 requirements) to reflect the discretion given to Member States with regard to the application of Article 9.

Table 4.1
Results of Screening of Economic Mechanisms Against Article 9: Narrow Interpretation

Mechanism	Status	Comment	Screening Result ²⁶
Abstraction Charging and Licensing			
Abstraction charges for licensed amounts abstracted, licensed impoundments and building and engineering works (within EA or SEPA regulatory cost recovery requirements) ²⁷	Currently used in England and Wales / Scotland	Incentives restricted by regulatory cost recovery requirement and by charging structure. Charges are not set with regard to the recovery of environmental and resource costs.	Questionable
Charges for abstraction from British Waterways Canals ²⁸	Currently used	Unclear whether the EA's regulatory costs associated with abstractions from BW are fully recovered given the discount. Also cf. comments above.	Questionable
Volumetric abstraction charges (within EA or SEPA cost recovery constraint) ²⁹	Proposal	Unlikely to create significantly better incentives to use water resources efficiently than current abstraction charging scheme. Unlikely to improve recovery of the environmental and resource costs of abstraction.	Questionable
Volumetric abstraction charges (in addition to charges based on EA or SEPA cost recovery charges) ³⁰	Proposal	Can create better incentives to reduce volumes abstracted than current charging regime but probably only if charges are set at a very high level. Likely to allow full recovery of environmental and resource costs.	Aligned
Stress-sustainability factor in EA abstraction charges ³¹	Proposal	Depending on size, could incentivise reductions in abstraction in locations where this is particularly environmentally desirable. Could help to recover environmental and resource costs of abstraction.	Aligned

²⁶ The overall screening result is “questionable” if the screening value for any sub-criterion we use (e.g. compliance with incentive-pricing requirements) is “questionable”. As noted earlier, “questionable” means no more than that critical questions may be asked about the compliance of a mechanism with Article 9 requirements. The overall screening result is “aligned” if at least one sub-screening value is “aligned” and all others are “not relevant”. The overall screening result is “not relevant” if all sub-screening values are “not relevant”.

²⁷ DETR (1999), "Taking Water Responsibly"; DETR (2000) "Economic Instruments in Relation to Water Abstraction: A Consultation Paper"; Defra (2001) "Tuning Water Taking", Decision; EA (2005) "Review of the Water Abstraction Charges Scheme", SEPA (2005) "Consultation on the Water Environment Charging Scheme 2006".

²⁸ Environment Agency (2004), “Review of the Water Abstraction Charges Scheme”.

²⁹ DETR (1999), "Taking Water Responsibly"; DETR (2000) "Economic Instruments in Relation to Water Abstraction: A Consultation Paper"; Defra (2001) "Tuning Water Taking", Decision; EA (2005) "Review of the Water Abstraction Charges Scheme".

³⁰ We did not find a reference for this particular proposal. We consider it a modification of the preceding proposal which is worth exploring.

Mechanism	Status	Comment	Screening Result ²⁶
Time-limiting Factor in EA Abstraction Charges ³²	Proposal	The incentives it creates are not direct incentives to use water resources efficiently. Does not affect extent of recovery of EA regulatory costs (achieved already).	Not relevant
Compensation Charge/Environmental Improvement Charge ³³	Currently used	Not relevant to incentive-pricing objectives. Serves to recover the EA's costs of compensation payments for license modification/retraction, which may or may not be part of the regulatory costs of water services.	Not relevant/ Aligned
Zero Compensation Payments to Public Water Companies ³⁴	Proposal	Not relevant to incentive pricing objectives Water companies contribute to the cost of compensation payments (via compensation charges), but do not receive compensation payments themselves (but instead additional allowances in price reviews). May raise issues regarding their contribution to the regulatory costs of water services.	Not relevant/ Questionable
Trading of Abstraction Rights ³⁵	To be implemented	May improve incentives to use water resources efficiently. May reduce resource costs of water abstraction that need to be recovered from users.	Aligned

³¹ EA (2004), "Review of the Water Abstraction Charges Scheme", Consultation Document.

³² EA (2005) "Review of the Water Abstraction Charges Scheme", Second Consultation Document.

³³ EA (2005) "Review of the Water Abstraction Charges Scheme", Second Consultation Document.

³⁴ Defra (2004), "Final Guidance, Periodic Review 2004" did not endorse this proposal.

³⁵ DETR (2000) "Economic Instruments in Relation to Water Abstraction: A Consultation Paper"; Defra (2001) "Tuning Water Taking", Decision; EA (2003) "Trading Water Rights - A Consultation Document"; EA (2004) "Water Rights Trading Consultation Response Document".

Mechanism	Status	Comment	Screening Result
<i>Discharge Charging and Consenting</i>			
Current charges on direct industrial discharges (within EA/SEPA cost recovery constraint) ³⁶	Currently used in England, Wales and Scotland	<p>Not directly relevant to Article 9 incentive pricing requirements, if these only concern water resources used for water industry abstractions and discharges into surface waters from sewerage facilities.</p> <p>Not directly relevant to recovery of costs of water services if the discharges are direct rather than into sewer.</p>	Not relevant
Charges on direct industrial discharges (to cover the cost of environmental damage) ³⁷	Proposal	<p>Not relevant to Article 9 incentive pricing requirements, if these only concern water resources used for water industry abstractions and discharges into surface waters from sewerage facilities.</p> <p>Not relevant to recovery of costs of water services if the discharges are direct rather than into sewer.</p>	Not relevant
Charges for trade effluent discharge into sewer (treatment cost based) ³⁸	Currently used in England, Wales and Scotland	<p>Charges do not reflect the residual pollution of the watercourse for which trade effluent discharges into the sewer are responsible. Some distortions in relative incentives remain for discharging to sewer or directly into the environment.</p> <p>Charges do not recover environmental costs of residual pollution. Charges also do not reflect the additional treatment costs caused by higher treatment standards resulting from the residual watercourse pollution for which discharges into sewer are responsible.</p>	Questionable
Charges for trade effluent discharge into sewer (treatment and environmental damage cost based) ³⁹	Proposal	<p>Charges can be set to internalise treatment and environmental costs of discharges into sewer.</p> <p>Charges can be set to recover treatment and residual pollution costs.</p>	Aligned

³⁶ Defra (1997), "Economic Instruments for Water Pollution"; Defra (1999), "Economic Instruments for Water Pollution Discharges", SEPA (2005) "Consultation on the Water Environment Charging Scheme 2006".

³⁷ Defra (1997), "Economic Instruments for Water Pollution"; Defra (1999), "Economic Instruments for Water Pollution Discharges".

³⁸ Defra (1997), "Economic Instruments for Water Pollution"; Defra (1999), "Economic Instruments for Water Pollution Discharges".

³⁹ Defra (1997), "Economic Instruments for Water Pollution"; Defra (1999), "Economic Instruments for Water Pollution Discharges".

Mechanism	Status	Comment	Screening Result
Trade-effluent reservation charge ⁴⁰	Partial in England and Wales	The scheme removes disincentives for companies that have their own direct discharge consents and their own treatment works that are cheaper but perhaps unreliable or unable to cope with occasional large peaks. Little effect on cost-recovery.	Aligned
Pollution, prevention and control charges ⁴¹	Currently used in England, Wales and Scotland	Not relevant to Article 9 incentive pricing requirements, if these only concern water resources used for water industry abstractions and discharges into surface waters from sewerage facilities. Not relevant to recovery of costs of water services.	Not relevant / questionable
Tradable direct industrial discharge permits ⁴²	Proposal	Not relevant to incentive pricing requirements if these relate only to 'water services' provided by the public water companies. Not relevant to the recovery of the costs of water services.	Not relevant
Trading of permits for discharges into the sewer ⁴³	Proposal	May create financial incentives to reduce discharges into sewer in order to trade permits. Not directly relevant to recovery of costs of water services.	Aligned

⁴⁰ Ofwat (2005), "Tariff Structure and Charges".

⁴¹ EA (2006), "Environmental Protection and Water Abstraction Charges 2006/07", website information.

⁴² Defra (1997), "Economic Instruments for Water Pollution".

⁴³ We found no source for this proposal. It is a modification of other mechanisms.

Mechanism	Status	Comment	Screening Result
Chemicals: incentive-based emission charge ⁴⁴	Proposal	Not relevant to incentive pricing requirements relating to 'water services' provided by the public water companies if the emissions go directly into the environment. Does not increase the recovery of costs of water services if the emissions are direct.	Not relevant
Chemicals: tradable permits ⁴⁵	Proposal	Not relevant to incentive pricing requirements relating to 'water services' provided by the public water companies unless the chemical emissions are into the sewer rather than direct. Trading of chemical emission rights does not increase the recovery of costs of water services.	Not relevant
Highway water drainage: charges to highway users or highway authorities ⁴⁶	Proposal	May create incentives for highway authorities or road users to limit volume/load of highway water draining into the sewer. Proposal would ensure that those benefiting from highway water drainage services provided by public water companies also pay for it.	Aligned

⁴⁴ RPA (2002), "Scope for the Use of Economic Instruments for Selected Persistent Pollutants", RPA (2003), "Interim Risk Reduction Strategy and Analysis of Advantages and Drawbacks for Bisphenol-A", RPA and BRE Environment (2004), "Perfluorooctane Sulphonate: Risk Reduction Strategy and Analysis of Advantages and Drawbacks", Reports for Defra.

⁴⁵ RPA (2002), "Scope for the Use of Economic Instruments for Selected Persistent Pollutants", RPA (2002), "Risk Reduction Strategy and Analysis of the Advantages and Drawbacks for Octabromodiphenylether", RPA (2003), "Interim Risk Reduction Strategy and Analysis of Advantages and Drawbacks for Bisphenol-A", RPA and BRE Environment (2004), "Perfluorooctane Sulphonate: Risk Reduction Strategy and Analysis of Advantages and Drawbacks", Reports for Defra.

⁴⁶ Ofwat (2006), "Tariff Structure and Charges: 2005-06 Report".

Mechanism	Status	Comment	Screening Result
Surface water drainage charge (households and non-households): Site-area based and/or rebates ⁴⁷	Partial in England and Wales	Site-area based charges generate continuous incentives to reduce surface water drainage into the public sewer. Rebates for customers not benefiting from surface water drainage create only discontinuous incentives. Site-area based surface water drainage charges can ensure that the contribution by each user group to surface water drainage corresponds to the extent to which they benefit from the service if set at an appropriate level.	Aligned
Surface water drainage charge (non-households): council tax / rateable value approach ⁴⁸	Currently used (Scotland) / partial (England and Wales)	Does not create incentives to let surface water drain away from public sewer. Consistent in principle with adequate recovery of the costs of surface water drainage from households, although it does not ensure it. Currently, probably fails to recover the environmental costs associated with surface water drainage.	Questionable
Surface water drainage charge (non-households): area bands approach ⁴⁹	Proposal (Scotland)	This approach can generate (discontinuous) incentives to reduce the area that drains in to the public sewer. Does not ensure adequate contributions by different user group (applies to non-households only).	Questionable
<i>Public Water Supply Charging and Licensing</i>			
Household charges: zonal charging ⁵⁰	Limited in England and Wales	May marginally improve incentives in zones which experience pressure. Not relevant to the overall recovery of the costs of water services, or to the overall contribution of households to cost recovery.	Aligned/not relevant
Household and non-household charges: expansion of metering and volumetric charging ⁵¹	Household metering limited in England and Wales and very low in Scotland Non-household metering comprehensive in England and Wales and being pursued in Scotland	Can improve incentives to use water resources efficiently. Can improve relative contributions of different user groups to recovery of the (financial, environmental and resource) costs of water services (in conjunction with non-household metering and volumetric charging).	Aligned

⁴⁷ Ofwat (2003), "Surface Water Drainage – Charging Policy", RD 35/03, Ofwat (2006), "Tariff Structure and Charges", 2005-06 Report.

⁴⁸ Ofwat (2006), "Tariff Structure and Charges", 2005-06 Report.

⁴⁹ WIC (2005), "The Strategic Review of Charges 2006-10: Draft Determination".

⁵⁰ Ofwat (2006), "Tariff Structure and Charges", 2005-06 Report.

⁵¹ Ofwat (2006), "Tariff Structure and Charges", 2005-06 Report.

Mechanism	Status	Comment	Screening Result
Extension of seasonal variations in non-household charges to other companies and customers ⁵²	Proposal	May create incentives to adjust consumption pattern over the year in line with environmental/resource costs. Does not contribute to overall annual cost recovery.	Aligned
Non-household charges: interruptible tariffs for commercial customers ⁵³	Offered by some water companies in England and Wales	Makes customer inclined to use public water supply when water is plentiful, therefore efficient. Not relevant to cost recovery.	Aligned
Non-household charges: reservation tariffs for stand-by supplies ⁵⁴	Offered by some water companies in England in Wales	Option of reserving standby supplies enables use of less reliable own sources of supply by commercial companies. Could be interpreted as removal of a disincentive to use of own supplies. Charges for standby supplies ensure that commercial customers that benefit from them bear a reasonable proportion of their costs.	Aligned
Land-use Planning			
Planning Application Fees ⁵⁵	Currently used in England, Wales and Scotland	Not supposed to incentivise the efficient use of water resources. Not relevant to the recovery of the costs of water services.	Not relevant
Payment for New Flood Defence and Protection by Developers (Infrastructure Levy ^{56, 57})	Partial	Not supposed to create incentives to use water resources efficiently. Not relevant to the recovery of the costs of water services (though relevant to the recovery of the extra costs created by the development)	Not relevant

⁵² Ofwat (2006), “Tariff Structure and Charges”, 2005-06 Report.

⁵³ Ofwat (2006), “Tariff Structure and Charges”, 2005-06 Report.

⁵⁴ Ofwat (2006), “Tariff Structure and Charges”, 2005-06 Report.

⁵⁵ ODPM (2005), “Planning Permission: A Guide for Business”.

⁵⁶ This is the new name for the planning-gain supplement.

⁵⁷ HM Treasury (2005), “Planning Gain Supplement: A Consultation”.

Mechanism	Status	Comment	Screening Result
Flood Risk Mitigation: Subsidies to Farmers who Accept Additional Flooding ⁵⁸	Currently used in England, Wales and Scotland	Creates incentives, but these are not incentives for users to use water resources efficiently (but incentives for farmers to facilitate flood risk management). Not relevant to the recovery of the costs of water services.	Not relevant
Floodplain Development Charge ⁵⁹	Consent Proposed	Does not create incentives to use water resources efficiently. Not relevant to the recovery of the costs of water services.	Not relevant
Land Drainage Consent Charge ⁶⁰	Currently used in England, Wales and Scotland	Does not create significant incentives in its current form. If it did, these would not be incentives to use water resources efficiently on a close interpretation of this phrase. Not relevant to the recovery of the costs of water services.	Not relevant

⁵⁸ Defra (2004), “Making Space for Water: Developing a New Government Strategy for Flood and Coastal Erosion Risk Management in England”.

⁵⁹ Defra (2004), “Making Space for Water: Developing a New Government Strategy for Flood and Coastal Erosion Risk Management in England”.

⁶⁰ Defra (2004), “Making Space for Water: Developing a New Government Strategy for Flood and Coastal Erosion Risk Management in England”.

Mechanism	Status	Comment	Screening Result
Other			
Enhanced capital allowances for water technologies ⁶¹	Currently used in England, Wales and Scotland	Creates additional incentives to use water resources efficiently. Not relevant to the recovery of the costs of water services.	Aligned
Incentivising vessel owners/operators to use effective anti-fouling products ⁶²	Proposal	Not relevant to the efficient use of water resources. Not relevant to the recovery of the costs of water services.	Not relevant
Aggregate dredging charges (royalties to Crown Estate) ⁶³	Currently used in England, Wales and Scotland	Not relevant to the efficient use of water resources. Not relevant to the recovery of the costs of water services.	Not relevant
Tax on Household Detergent ⁶⁴	Proposal	May improve incentives to reduce use of phosphate detergents by households. Does not increase recovery of the costs of waste-water collection and treatment facilities. Perhaps increases recovery of the costs of the residual environmental damage caused by use of phosphate detergents.	Aligned
Chemicals: Product Charge / Tax ⁶⁵	Proposal	Not relevant to incentive-pricing requirements relating to 'water services' provided by public water companies if the chemical emissions are direct. If the emissions are indirect, it may be helpful. Does not increase recovery of the costs of waste-water collection and treatment facilities if chemical emissions are direct or if revenues from the charge are not received by public water companies.	Not relevant/ aligned
Construction-related FEPA Charges ⁶⁶	Currently used in England, Wales and Scotland	Currently, not incentive-oriented. Not relevant to recovery of cost of water services.	Not relevant.

⁶¹ Defra (2005), "Defra Scheme Awarded for Encouraging Innovation in the Water Industry".

⁶² Workshop on the Possible Practical Implications of the EU Water Framework Directive (WFD) for Shipping Interests Held at the Institution of Civil Engineers in London (2005), "Final Workshop Report".

⁶³ MCEU (2006), "Regulating Aggregate Dredging", Marine Network of Friends of the Earth (2006), "Marine Aggregate Dredging"

⁶⁴ Köhler (2000), "Detergent Phosphates and Detergent Eco-taxes: A Policy Assessment".

⁶⁵ RPA (2002), "Scope for the Use of Economic Instruments for Selected Persistent Pollutants", RPA (2002), "Risk Reduction Strategy and Analysis of the Advantages and Drawbacks for Octabromodiphenylether", RPA (2003), "Interim Risk Reduction Strategy and Analysis of Advantages and Drawbacks for Bisphenol-A", RPA and BRE Environment (2004), "Perfluorooctane Sulphonate: Risk Reduction Strategy and Analysis of Advantages and Drawbacks", Reports for Defra.

Mechanism	Status	Comment	Screening Result
FEPA Charges on Waste Deposits into Water Bodies ⁶⁷	Currently used in England, Wales and Scotland	Currently, not incentive-oriented. Not relevant to recovery of cost of water services.	Not relevant
FEPA Charges on Oil Spill Treatment Products ⁶⁸	Currently used in England, Wales and Scotland	Not relevant to incentives to use water resources efficiently. Not relevant to recovery of cost of water services.	Not relevant

Source : NERA summary.

⁶⁶ MCEU (2005), “Licensing of Marine Works and Disposal Waste at Sea”.

⁶⁷ MCEU (2005), “Licensing of Marine Works and Disposal Waste at Sea”.

⁶⁸ MCEU (2005), “Licensing of Marine Works and Disposal Waste at Sea”.

The table is sub-divided according to family of economic mechanism (abstraction charging and licensing, discharge charging and licensing, public water supply charging and licensing, land use planning and other). We draw the following conclusions for each family:

- *Abstraction Charging and Licensing:* The current abstraction charging arrangements were designed to recover the EA’s regulatory costs. They were not intended to and may not fully recover environmental and resource costs or incentivise reductions of abstraction within licensed amounts. This does not mean that the current charging arrangements are inconsistent with Article 9 requirements, closely interpreted. With regard to cost-recovery issues, the extent of environmental and resource costs from abstraction that may need to be recouped is unclear. Regarding incentive-pricing issues, it is difficult to use prices large enough to encourage reductions of abstraction within licensed amounts without over-recovering the (economic (private and regulatory), environmental and resource) costs of abstraction from abstractors given low short-run elasticities of abstraction. In any case, the flexible formulations of Article 9 are unlikely to require radical changes to the abstraction charging regime. At most, some refinements (e.g. the introduction of a stress-sustainability factor) may be called for.
- *Discharge Charging and Licensing:* Our screening of the current (“Mogden”) charging regime for discharges into the sewer highlighted some weaknesses in the incentives it creates. The charges may not fully reflect the residual pollution of the watercourse for which discharges are responsible. Moreover, despite some improvements in trade effluent charges’ reflection of costs, some distortions in relative incentives remain for discharging to sewer or directly into the environment. As with abstraction charges, we emphasise, however, that it is far from clear that the cautious formulations of Article 9 require amendments to the current charging arrangements for discharges into the sewer. Our screening of surface water drainage charges suggested that site-area based charges can help to ensure adequate contributions by different user groups and generate incentives to reduce water drained into the public sewer; however, alternative surface water drainage charging schemes are not necessarily ruled out by Article 9. We understand that at present, UK law prevents charging highway users or highway authorities for highway drainage; however, such arrangements might have beneficial incentive effects and impose costs of highway drainage services provided by public water companies on highway authorities or highway users. Some mechanisms in the discharge charging and licensing family – notably charges and trading schemes for direct industrial discharges or direct chemical emissions – turned out to be irrelevant to Article 9 requirements closely interpreted.
- *Public Water Supply Charging and Licensing:* Our screening of public water supply charging mechanisms highlighted the importance of metering and volumetric charging for incentive pricing. Expansion of metering and volumetric charging is an objective already pursued by government and regulators in England and Wales and in Scotland. The flexible formulations Article 9 are unlikely to require further measures to expand metering and volumetric charging.
- *Land-use Planning:* Our screening of mechanisms in this family highlighted no issues of concern.

- *Other*: Our screening of other mechanisms highlighted no particular problems in achieving Article 9 compliance.

4.2. Implications of Broadening the Interpretation of Article 9 Objectives

In its preliminary guidance on Article 9, Defra interpreted the key obligations on Member States set out in Article 9 closely. While NERA does not wish to and is in no position to challenge this interpretation⁶⁹, preliminary as it is, we here consider the sensitivity of our screening results to potential changes in the interpretation of Article 9, or to formulations of policy objectives that aim to go beyond formal compliance with WFD legal obligations. We consider the following broader possibilities:

1. *Wider interpretation of incentives for users to use “water resources” efficiently (and the polluter pays principle)*: The expression “users ...[of] water resources” in the incentive-pricing objective set out in Article 9.1., 2nd sentence, 1st indent, might be interpreted so as to include all those whose activities cause water pollution, rather than only users of “water resources” for abstractions for water services and discharges into surface waters from sewerage facilities.

The polluter pays principle, too, may be given a broader and be considered to apply to costs other than those of over-abstraction and of the treatment of waste water so that it can be discharged into surface water. For example, it could be understood as applying also to waste water that is directly discharged and to the environmental costs of discharges.

Implications: If the incentive pricing requirement of Article 9 were to be broadened, our assessment of several discharge charging and licensing mechanisms would change. These include charges on direct discharges, tradable discharge rights, pollution, prevention and control charges, chemicals emissions taxes, chemicals product taxes, and tradable chemicals emission permits. All these mechanisms would move from “not relevant” to Article 9 incentive-pricing requirements to either “aligned” (if they signal the full costs of pollution to polluters) or “questionable” (if they do not, as with current charges on direct discharges and pollution, prevention and control charges, which are capped by cost-recovery requirements).

2. *Wider interpretation of the adequate contribution of the different water uses to cost recovery (and the polluter pays principle)*: Defra’s preliminary guidance relates the contribution to the costs of water services to be borne by different sectors (agriculture, industry and households) to that sector’s *use* of water services. We note that some economic agents increase the costs of providers of water services without directly using water services. Direct industrial discharges may impact on water body ecology. This in turn may change the treatment standards specified in consents to which water companies are subjected, and hence, their treatment costs. Therefore, direct discharges can affect treatment costs although direct dischargers do not, by definition, discharge into the sewer.

⁶⁹ NERA Economic Consulting is an economic consultancy and does not provide legal advice.

Implications: If the Article 9 cost-recovery requirement were to be broadened as described, our assessment of current and proposed direct industrial discharge charging arrangements and pollution, prevention and control charges would change. These mechanisms would all then be relevant to the cost-recovery requirement, but aligned only where the charges reflect the consequent effects on costs of water services.

4.3. Summary

We screened cost-recovery and incentive-pricing policies against Article 9 requirements, as interpreted in Defra's preliminary guidance. We noted that the current abstraction charges and the current charges for indirect discharges into sewer were not designed with Article 9 in mind. We also noted aligned efforts by the government and regulators in England and Wales and in Scotland to expand metering and volumetric charging. However, we believe it is unlikely that the cautious and qualified formulations of Article 9 as interpreted in Defra's preliminary guidance will *require* major changes to current abstraction, discharge or public water charging arrangements.

Our screening results may need to be revised in the light of any potential adjustments to Defra's preliminary guidance on Article 9. Our brief discussion of some possible implications of broadening the interpretation of Article 9 requirements indicates which policy issues may then become more relevant.

5. Summary of Screening of Mechanisms for Inclusion in Programmes of Measures for Achieving and Maintaining Good Ecological Status of Water Bodies

In this section, we summarise our assessment of candidate economic mechanisms to achieve Article 4 compliance. A more detailed discussion can be found in Annex G. Like Annex G, this section is organised by pressure, i.e. abstraction, point-source pollution, diffuse pollution, morphological impacts and alien species. We screen mechanisms in each category against a set of cost-effectiveness criteria.

5.1. Mechanisms to Address Pressure from Abstraction

The table below presents our screening results for economic mechanisms that deal with environmental pressure created by abstraction. We focus on their overall effectiveness, cost and distributional impact results. We do not attempt to aggregate these results into a single metric.

Table 5.1
Economic Mechanisms to Mitigate Pressure from Abstraction

Mechanism	Status	Effectiveness	Costs	Distributional Impact
Current charges for licensed amounts (within EA / SEPA cost-recovery constraint) ⁷⁰	Currently used in England and Wales / to be implemented in Scotland	<u>Low</u> : Not designed to create effective incentives to reduce abstraction, but to recover EA / SEPA regulatory costs.	<u>Low</u> : Charges imposed on abstractors are also source of revenue for EA.	<u>Unproblematic</u> : Impact limited by cost-recovery requirement and spread across large abstractor and customer base.
Volumetric abstraction charges (within EA cost-recovery constraint) ⁷¹	Proposal	<u>Low</u> : Within cost-recovery constraints, so unlikely to be high enough to create effective incentives.	<u>Medium</u> : Installation of new and more accurate meters where required, adaptive costs, considerable regulatory costs.	<u>Unproblematic</u> : Impact limited by cost-recovery requirement and spread across large abstractor and customer base.
Volumetric abstraction charges (in addition to EA cost-recovery charges) ⁷²	Proposal	<u>Low/medium</u> : Charges would need to be very high to create effective incentives in the short run. May create effective incentives in the longer run.	<u>Medium</u> : Installation of new and more accurate meters where required, adaptive costs, considerable regulatory costs.	<u>Maybe problematic</u> : Potentially much higher charges, but their impact is spread across a large abstractor and water customer base.
Stress-sustainability factor ⁷³	Proposal	<u>Medium</u> : Placing a large premium on abstraction in over-abstracted areas could incentivise reductions in abstraction where they are most needed.	<u>Low</u> : Some additional regulatory costs, charge factor itself constitutes a transfer from abstractors in stressed areas to the EA or to other abstractors.	<u>Maybe problematic</u> : Imposes higher costs on abstractors in stressed areas.

⁷⁰ EA (2004), “Review of the Water Abstraction Charges Scheme”, A Consultation Document, EA (2005), “Review of the Water Abstraction Charges Scheme”, Second Consultation Document”, SEPA (2005), “Consultation on the Water Environment Charging Scheme 2006”.

⁷¹ EA (2005), “Review of the Water Abstraction Charges Scheme”, Second Consultation Document”.

⁷² We consider this proposal to be a modification of the preceding proposal.

⁷³ EA (2004), “Review of the Water Abstraction Charges Scheme”, A Consultation Document.

Mechanism	Status	Effectiveness	Costs	Distributional Impact
Time-limit factor in abstraction charges ⁷⁴	Proposal	<u>Low</u> : Would facilitate license variation/revocation by the EA, which currently requires a compensation payment.	<u>Low</u> : Some additional regulatory costs, charge factor itself is only a transfer from holders of unlimited licenses to the EA or to other abstractors.	<u>Unproblematic</u> : Mechanism mildly benefits holders of time-limited licenses or imposes minor costs on holders of unlimited licenses.
Trading of abstraction rights ⁷⁵	To be implemented	<u>Medium</u> : Can create incentives for abstractors in some locations to invest in water efficiency measures in order to trade surplus water and allows EA to buy back water rights.	<u>Medium</u> : Considerable regulatory and transaction costs, but offsetting economic benefits.	<u>Unproblematic</u> , provided that license hoarding and other anti-competitive abuses are prevented by appropriate accompanying regulation.
Household charges: zonal tariffs ⁷⁶	Partial in England and Wales	<u>Low</u> : May impact marginally on match between price signals and environmental cost of water and sewerage services in different zones.	<u>Low</u> : Perhaps some additional administrative or regulatory costs.	<u>Unproblematic (?)</u> : Zonal charging differentials have a distributional impact which may be considered undesirable. However, this impact is spread across a large customer base.
Household charges/non-household charges: expansion of metering and volumetric charging ⁷⁷	Partial in England and Wales and Scotland	<u>High</u> : Can have significant incentive effects.	<u>Medium</u> : Considerable meter installation costs, customer adaptation costs, and regulatory costs.	<u>Unproblematic (?)</u> : Impact on vulnerable groups needs to be mitigated.

⁷⁴ EA (2005), "Review of the Water Abstraction Charges Scheme", Second Consultation Document".

⁷⁵ EA (2003), "Trading Water Rights – A Consultation Document" and EA (2004), "Water Rights Trading Consultation Response Document".

⁷⁶ Ofwat (2005), "Tariff Structure and Charges", 2005-06 Report.

⁷⁷ Ofwat (2005), "Tariff Structure and Charges", 2005-06 Report.

Mechanism	Status	Effectiveness	Costs	Distributional Impact
Extension of seasonal variations in non-household charges to other companies and customers ⁷⁸	Partial in England and Wales	<u>Low</u> : Seasonal variations in water charges may lead to a better seasonal pattern of abstraction, though abstractors already face seasonal variation in abstraction charges.	<u>Low</u> : Customers are likely to prefer smooth charges over the year.	<u>Unproblematic</u> : Unlikely to have significant distributional impact.
Interruptible non-household charges ⁷⁹	Partial in England and Wales	<u>Low</u> : Could reduce demand/supply headroom requirements and thereby indirectly affect abstraction behaviour.	<u>Low</u> : Take-up is voluntary and likely to be beneficial to water companies and their customers.	<u>Unproblematic</u> : Unlikely to have significant distributional impact.
Non-household charges: reservation tariffs for stand-by supplies (based on reserved capacity) ⁸⁰	Partial in England and Wales	<u>Low</u> : Reservation charges encourage abstraction by industry from own sources and recycling by allowing access to more reliable public water supply if required. Environmental benefits depend on impact of borehole abstraction / on-site treatment and recycling facilitated by reservation charges relative to impact of public water company abstraction.	<u>Low</u> : Take-up is voluntary and likely to be beneficial to water companies and their customers.	<u>Unproblematic</u> : Unlikely to have significant distributional impact.
Enhanced capital allowances for water technologies ⁸¹	Currently used in England, Wales and Scotland	<u>Medium</u> : May encourage use of technologies that help to reduce abstraction, but the induced change in behaviour is unclear.	<u>Low</u> : Mostly a transfer from public to private sector.	<u>Unproblematic</u> : Benefits businesses, financed from general taxation.

Source: NERA.

Our assessment of the cost-effectiveness of these mechanisms suggests that:

- Volumetric abstraction charges within EA or SEPA cost-recovery constraints are likely to have limited effects. However, additional abstraction charges could be cost-effective, especially if they are targeted at stressed areas. Their implementation will create winners (the taxpayer and the environment) and losers (the abstractors and their customers bearing the additional charges). It may be worth exploring whether some of the revenue from additional abstraction charges could be used for “adaptation grants” to facilitate changes in abstraction methods, volumes, or locations to promote acceptability.

⁷⁸ Ofwat (2005), “Tariff Structure and Charges”, 2005-06 Report.

⁷⁹ Ofwat (2005), “Tariff Structure and Charges”, 2005-06 Report.

⁸⁰ Ofwat (2005), “Tariff Structure and Charges”, 2005-06 Report.

⁸¹ Defra (2005), “Defra Scheme Awarded for Encouraging Innovation in the Water Industry”.

- Abstraction rights trading could be useful in some locations, but transaction costs are high and likely to limit the number of trades taking place.
- Metering and volumetric charges for end-use can help to reduce water consumption. Policies to encourage or require meter expansion and volumetric charging, especially if targeted on acutely affected locations and times are likely to be environmentally beneficial and so promote Article 4 compliance. However, their distributional consequences need to be managed. “Vulnerable groups regulation” in England and Wales could be used and if necessary expanded for this purpose.
- A range of other policies aimed at final customers, such as interruptible non-household charges, provision of stand-by supplies against reservation tariffs and subsidies for investments in technologies to enhance efficient water use are likely to be cost-effective, even if their overall environmental impact is limited.

5.2. Economic Mechanisms to Address Point-source Pollution

The table below sets out our assessment of economic mechanisms to address point-source pollution.

Table 5.2
Mechanisms to Mitigate Pressure from Point-source Pollution

Mechanism	Status	Effectiveness	Costs	Distributional Impact
Current SEPA/EA charges on direct industrial discharges (within EA/SEPA cost-recovery constraint) ⁸²	Used in England, Wales and Scotland	<u>Medium</u> (relative to discontinuation benchmark): Cost-recovery constraint restricts monetary incentives.	<u>Low</u> : Charge itself is a transfer, to cover EA/SEPA monitoring and enforcement costs. Low financial and regulatory costs.	<u>Unproblematic</u> : Capped by EA/SEPA cost recovery constraint. But note Article 9 issues.
Charges on direct industrial discharges (to cover the cost of environmental damage) ⁸³	Proposal	<u>Medium</u> (relative to status quo): Incentives can be strengthened if charges are not capped by regulatory cost-recovery constraint.	<u>Medium</u> : Greater private financial and regulatory costs.	<u>Maybe problematic</u> : Higher costs for dischargers need to be justified.
Current charges for trade effluent discharges into sewer (treatment cost based) ⁸⁴	Used in England, Wales and Scotland	<u>Medium</u> (relative to discontinuation benchmark): Charges impose only treatment costs on polluters, not residual environmental damage costs. Provides limited incentives.	<u>Low</u> : Charge itself constitutes a transfer from the private sector to the EA. In addition, some adaptive costs and regulatory costs arise.	<u>Unproblematic</u> : Reflect treatment costs. But note Article 9 issues.
Charges for trade effluent discharge into sewer (treatment cost and environmental damage cost based) ⁸⁵	Proposal	<u>Medium</u> (relative to status quo): Charges impose treatment costs and residual environmental damage costs on polluters, thus creating additional incentives.	<u>Medium</u> : Greater private financial and regulatory costs.	<u>Maybe problematic</u> : Higher costs of discharges need to be justified.
Trade-effluent reservation charge: extension to other users and other companies ⁸⁶	Partially used in England and Wales	<u>Low</u> : More of a risk mitigating mechanism than a mechanism to reduce average sewage volumes going into treatment.	<u>Low</u> : Reservation charges impose costs on dischargers, but presumably lower their costs overall.	<u>Unproblematic</u> : Does not raise any distributional issues.

⁸² Defra (1997), "Economic Instruments of Water Pollution", SEPA (2005), "Consultation on the Water Environment Charging Scheme 2006".

⁸³ Defra (1997), "Economic Instruments for Water Pollution", Defra (1999), "Economic Instruments for Water Pollution Discharges".

⁸⁴ Defra (1997), "Economic Instruments for Water Pollution", Defra (1999), "Economic Instruments for Water Pollution Discharges".

⁸⁵ Defra (1997), "Economic Instruments for Water Pollution", Defra (1999), "Economic Instruments for Water Pollution Discharges".

⁸⁶ Ofwat (2006), "Tariff Structure and Charges".

Mechanism	Status	Effectiveness	Costs	Distributional Impact
Pollution prevention and control charges ⁸⁷	Used in England, Wales and Scotland	<u>Low</u> : Some incentives to reduce pollution, locate in less polluted areas or to take measures to reduce risks of pollution. Incentives are severely restricted by overriding cost recovery requirements, meaning charges are low relative to production costs.	<u>Low</u> : Charges constitute a transfer from the private to the public sector. Significant adaptive costs, some regulatory costs.	<u>Unproblematic</u> : Limited by cost recovery constraint.
Tradable direct industrial discharge permits ⁸⁸	Proposal	<u>Low</u> : Some financial incentive to reduce own discharge and gain financially from sale of the “spare” permits. Impact constrained by level of liquidity and size of the market, which would need to be local.	<u>Medium</u> : Regulatory costs and private transaction costs can be significant. However, to compensate, trading of discharge permits can reduce the overall costs of discharge controls by minimising abatement costs.	<u>Unproblematic</u> : No adverse distributional impacts if effectively regulated.
Trading permits for discharges into the sewer ⁸⁹	Proposal	<u>Low</u> : Tradable permits would create financial incentives to reduce amount of trade effluent going into the sewer. EA could also buy some permits back to control trade effluent. Restrictions on trading that will need to be put in place to take account of local circumstances are likely to severely limit the size of the tradable market.	<u>Medium</u> : Regulatory costs and private transaction costs can be significant. However, trading of discharge permits can reduce the overall costs of discharge controls by minimising abatement costs.	<u>Unproblematic</u> : No adverse distributional impacts if effectively regulated.
Chemicals: incentive-based emission charges ⁹⁰	Proposal	<u>Low/medium</u> : Many chemicals emissions are already regulated by means of other economic and command and control mechanisms. Price signal may need to be substantial before any real impact on behaviour is observed.	<u>Low to high</u> : Additional charges to companies, additional abatement efforts, additional regulatory costs.	<u>Maybe problematic</u> : Additional charges which impact on particular industries need to be carefully justified.

⁸⁷ EA (2006), “Environmental Protection and Water Abstraction Charges 2006/07”.

⁸⁸ Defra (1997), “Economic Instruments for Water Pollution”.

⁸⁹ This is a modification of the preceding proposal.

⁹⁰ RPA (2002), “Scope for the Use of Economic Instruments for Selected Persistent Pollutants”, RPA (2002), “Risk Reduction Strategy and Analysis of Advantages and Drawbacks for Octabromodiphenylether”, RPA (2003), “Interim

Mechanism	Status	Effectiveness	Costs	Distributional Impact
Chemicals: tradable permits ⁹¹	Proposal	<u>Low</u> : Magnitude of the effect will be subject to liquidity in the market, size of tradable market, and restrictions on trading that may need to be imposed to ensure that local and regional environmental objectives are met.	<u>Medium</u> : High regulatory costs. High transaction costs but gains from trade for companies engaging in trade.	<u>Unproblematic</u> : No adverse distributional effects if appropriate regulation is put into place.
Highway water drainage: charges to highway authorities or highway users ⁹²	Proposal	<u>Low</u> : Charges to highway users may generate incentives to reduce pollution of highway drainage water by limiting highway use. Charges born by highway authorities may incentivise highway drainage systems that allow water to drain away from the public sewer. Extent of the incentives depends on the charging arrangement chosen.	<u>Medium</u> : Additional financial costs for highway users or highway authorities. Additional regulatory costs.	<u>Maybe problematic</u> : Affects highway users or highway authorities adversely.
Surface water drainage charges (households and non-households): expansion of site-area based approach and/or rebates ⁹³	Partial in England and Wales, proposal in Scotland	<u>Medium</u> : Site-area based charges offer greatest incentives compared to the other current and considered schemes. Uncertainty about its environmental impact.	<u>Low</u> : Limited additional regulatory costs. Private adaptive costs arise if charges create effective incentives to reduce volume of water draining into the public sewer.	<u>Unproblematic</u> : May have distributional effects, but these can easily be justified with reference to service demands made.

Risk Reduction Strategy and Analysis of Advantages and Disadvantages for Bisphenol A”, RPA and BRE Environment (2004), “Perfluorooctane Sulphonate: Risk Reduction Strategy and Analysis of Advantages and Drawbacks”.

⁹¹ RPA (2002), “Scope for the Use of Economic Instruments for Selected Persistent Pollutants”, RPA (2002), “Risk Reduction Strategy and Analysis of Advantages and Drawbacks for Octabromodiphenylether”, RPA (2003), “Interim Risk Reduction Strategy and Analysis of Advantages and Disadvantages for Bisphenol A”, RPA and BRE Environment (2004), “Perfluorooctane Sulphonate: Risk Reduction Strategy and Analysis of Advantages and Drawbacks”.

⁹² Ofwat (2006), “Tariff Structure and Charges: 2005/06 Report”.

⁹³ Ofwat (2003), “Surface Water Drainage – Charging Policy”, RD 35/03, Ofwat (2006), “Tariff Structure and Charges: 2005/06 Report”.

Mechanism	Status	Effectiveness	Costs	Distributional Impact
Household charges: zonal charges ⁹⁴	Partial in England and Wales	<u>Low</u> : May marginally improve the alignment between charges and environmental costs of water services received across zones.	<u>Low</u> : Some additional administrative and regulatory costs.	<u>Unproblematic (?)</u> : Zonal charging differentials have a distributional impact which may be considered undesirable. However, this impact is spread across a large customer base in each zone.
Household and non-household charges: expansion metering and volumetric charging ⁹⁵	Partial in England and Wales, limited in Scotland	<u>Low</u> : Significant impact on volume of wastewater going to the sewerage system, but may lead to more concentrated flows, so impact on the environment less clear.	<u>Medium</u> : Considerable meter installation costs, adaptive costs and regulatory costs.	<u>Unproblematic (?)</u> , provided that vulnerable groups are effectively protected.
Extension of seasonal variations in non-household charges to other companies and customers ⁹⁶	Partial in England and Wales	<u>Low</u> : May have a marginal effect on the seasonal pattern of sewage volumes	<u>Low</u> : May increase administrative and regulatory costs slightly.	<u>Unproblematic</u> : Unlikely to have significant distributional impact.
Chemicals: product taxes and charges ⁹⁷	Proposal	<u>Low/medium</u> : For some products charges may need to be set very high before any impact on behaviour is observed, particular where significant sunk costs are incurred by the industry and no easy substitute is available.	<u>Medium</u> : Imposes additional charges and abatement costs on industries. Also some regulatory costs.	<u>Maybe problematic</u> : Affects particular industries and needs to be carefully justified.

⁹⁴ Ofwat (2006), "Tariff Structure and Charges: 2005/06 Report".

⁹⁵ Ofwat (2006), "Tariff Structure and Charges: 2005/06 Report".

⁹⁶ Ofwat (2006), "Tariff Structure and Charges: 2005/06 Report".

⁹⁷ RPA (2002), "Scope for the Use of Economic Instruments for Selected Persistent Pollutants", RPA (2002), "Risk Reduction Strategy and Analysis of Advantages and Drawbacks for Octabromodiphenylether", RPA (2003), "Interim Risk Reduction Strategy and Analysis of Advantages and Disadvantages for Bisphenol A", RPA and BRE Environment (2004), "Perfluorooctane Sulphonate: Risk Reduction Strategy and Analysis of Advantages and Drawbacks".

Mechanism	Status	Effectiveness	Costs	Distributional Impact
Tax on household detergents ⁹⁸	Proposal	<u>Low/medium</u> : May have an impact on consumption patterns in the UK, depending on level of the tax and elasticities of demand. Detergent phosphate reduction is only one way to reduce phosphate sewage load.	<u>Medium</u> : (Transfer) costs of tax and costs of substituting products in response to the tax and some regulatory costs.	<u>Maybe problematic</u> : Affects particular industries and needs to be carefully justified.

Source: NERA.

We conclude that:

- Many current point source pollution charging schemes, such as charges on direct discharges, have not been designed to create strong environmental incentives. An overriding regulatory cost recovery constraint caps these charges at a level where monetary incentives are limited.
- Various point source pollution charges, such as the direct discharge charge, could be refined to better reflect and internalise environmental damage costs. However:
 - Price elasticities of demand for these services are not well understood, particularly where volumes may be reduced without reducing pollutant loads;
 - Even with an administrative framework already in place supporting current mechanisms, additional monitoring costs associated with modifications of these mechanisms can be significant;
 - Changes in charging arrangements create winners and losers and need to be carefully justified.
- Environmental issues tend to be very location specific. Any tradable permit schemes will need to be restricted to make sure that local circumstances are taken into account. This is likely to limit the size and liquidity of the tradable market and hence the scope of incentives.

5.3. Economic Mechanisms to Address Diffuse Pollution (not from Agriculture)

A key source of diffuse pollution is agriculture and a number of mechanisms and policy proposals to combat diffuse pollution generated by this sector exist. However, this area is outside the scope of this project.

We found only one proposed economic mechanism to address diffuse pollution, a chemicals product charge or tax, which we already screened in Section 5.2, in the context of point-

⁹⁸ Köhler (2000), “Detergent Phosphates and Detergent Eco-taxes: A Policy Assessment”.

source pollution. Historically, the use of tax differentials favouring unleaded petrol over traditional high octane fuel with lead anti-knock additives very effectively reduced sales of leaded petrol, until leaded petrol was completely banned after 2000.⁹⁹

We also note that UK legislation provides for environmental liability and the remediation of environmental damage caused by certain kinds of diffuse pollution. This includes:¹⁰⁰

- The Water Resources Act 1991 and the Scotland Control of Pollution Act 1974, as amended by the Environment Act 1995, provides for liability for damage in the form of “pollution of controlled waters”, e.g. rivers, canals, lakes and ground waters. Liability applies strictly and regardless of who causes the damage and requires relevant polluters to restore waters to previous condition if “reasonably practicable to do so” and includes ecological restoration and restocking of rivers.
- Environment Protection Act 1990 Part II as amended by Waste Licensing Regulations bears on liability for the pollution of water, land and air, risks to soil, plants and animals and danger to human health. Liability applies strictly and requires licensed polluters to avert or deal with serious pollution or serious harm and illegal polluters to remove waste and deal with the consequences of the deposit.
- The Environmental Protection Act 1990 Part IIA (inserted by the Environment Act 1995) provides for liability for damage (including historic) in the form of substances in, on or under land creating unacceptable risk to human health or the environment. Liability applies strictly to anyone who “causes or knowingly permits” presence of substances giving rise to the (contaminated) condition of the land and requires remediation to “suitable for use” standard, i.e. a reduction of risk to acceptable levels and remediation of effects of any significant harm or water pollution, subject to reasonableness and other detailed rules.

5.4. Economic Mechanisms to Address Morphological Pressure

The table below sets out our screening results for economic mechanisms that deal with morphological pressures by applying incentives:

⁹⁹ Campbell, N., D’Arcy, B., Frost, A., Novotny, V., Sansom, A., (2004), “Diffuse Pollution: An Introduction to the Problems and Solutions“, IWA Publishing.

¹⁰⁰ See Defra (2006), “Environmental Liability”, webpage information. We list all environmental liability regimes in the UK which are relevant to WFD objectives in Appendix D. Here, we mention those which are most obviously relevant to diffuse pollution as opposed to point-source pollution.

Table 5.3
Mechanisms to Address Morphological Pressures

Mechanism	Status	Effectiveness	Costs	Distributional Impact
Charges on impoundments and engineering and building works (EA/SEPA cost recovery and environmental impact based) ¹⁰¹	Used in England and Wales and (as of April 2006) in Scotland	<u>Low</u> : Incentives are constrained by the overriding cost recovery requirement.	<u>Low</u> : Already in place, part of abstraction charging and licensing arrangements.	<u>Unproblematic</u> : Charges are capped by overarching regulatory cost recovery constraint.
Flood risk mitigation: subsidies to farmers who accept additional flooding ¹⁰²	Used in England, Wales and Scotland	<u>Low</u> : Creates incentives for farmers to help to mitigate flood risk at minimum environmental cost.	<u>Medium</u> : To be effective, subsidies need to be set at a level greater or equal to the opportunity costs of these remediation actions to the farmer.	<u>Unproblematic</u> : Rewards farmers for services to the environment/the community.
Land drainage consent charge (modified so as to provide incentive effect) ¹⁰³	Used in England, Wales and Scotland/ modification suggestion	<u>Low</u> : Does not currently create significant incentives. A modification might encourage measures to reduce the impact of land drainage.	<u>Low</u> : Charges constitute a transfer from private to public sector. Some additional monitoring and administrative costs may arise if used as an incentive mechanism.	<u>Unproblematic</u> : Any distributional consequences can be justified.
Aggregate dredging charge (royalties collected by Crown Estate) ¹⁰⁴	Used in England, Wales and Scotland	<u>Low</u> : Regulation is the primary constraint on dredging activities. Royalties payable reduce the private returns to dredging.	<u>Medium</u> : Royalties impose a cost on dredging companies. Also regulatory costs.	<u>Unproblematic</u> : Royalties reflect land ownership rights.

Source: NERA.

We conclude that the candidate mechanisms we screen have limited potential to create effective incentives to mitigate morphological pressures. All of these mechanisms are

¹⁰¹ SEPA (2005), "Consultation on the Water Environment Charging Scheme 2006", EA (2006), "Environmental Protection and Water Abstraction Charges for 2006/07".

¹⁰² Defra (2004), "Making Space for Water: Developing a New Government Strategy for Flood and Coastal Erosion Risk Management in England".

¹⁰³ Defra (2004), "Making Space for Water: Developing a New Government Strategy for Flood and Coastal Erosion Risk Management in England".

¹⁰⁴ MCEU (2006) "regulating Aggregate Dredging", Marine Network of Friends of the Earth (2006), "Marine Aggregate Dredging".

already used, though the land drainage consent charge may be modified so as to generate some incentives to adopt measures to reduce the impact of land drainage.

We also note that the Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way (CROW) Act 2000 provides for environmental liability and the restoration of protected sites to their former condition following damage to special interests for which they have been identified by owners or occupiers convicted of damaging the sites via specified operations and third parties convicted of reckless or intentional damage.

5.5. Economic Mechanisms to Deal with Alien Species

We found only one minor proposed economic mechanism to prevent the introduction of alien species into the aquatic environment in the UK, viz. incentives for vessel operators or owners to use effective anti-fouling products. This mechanism would have a minor effect, come at a low cost and have a very limited distributional impact.

5.6. Summary

Our assessment of candidate economic mechanisms – most of which address pressures from abstraction or point-source pollution — suggests some scope both for improving current (abstraction, discharge, and public water supply) charging and current (abstraction, direct and indirect discharge, chemical emissions) trading schemes.

Abstraction and discharge *charging regimes* in England and Wales and in Scotland have been designed with regulatory cost-recovery objectives in mind and therefore cannot be expected to generate socially optimal incentives to reduce pressures on the aquatic environment and so promote compliance with Article 4. Scope exists therefore for refining abstraction and discharge charging regimes to better reflect and internalise environmental costs, though this will impose additional costs on some and perhaps all abstractors/dischargers. Surface water drainage charges have evolved differently across England and Wales and Scotland. An expansion of site-area based surface water drainage charges may improve incentives to allow surface water to drain away from the public sewer. Public water supply charges policies – in particular expansion of metering and volumetric charging – have potential for mitigating environmental pressure from abstraction and point-source pollution.

Trading of abstraction and (direct, indirect, chemical) discharge permits can create additional incentives to reduce pressure on the environment while at the same time minimising the costs of abstraction reduction / pollution abatement across agents, but will be cost-effective only in few locations.

6. Synthesis and Recommendations

In this report, we screened water pricing policies, cost recovery mechanisms and economic instruments which may be included in programmes of measures to achieve compliance with the Water Framework Directive (WFD) in England and Wales and Scotland. Our preliminary assessment had two parts:

- Compliance of candidate mechanisms with cost-recovery and incentive-pricing objectives set out in Article 9 of the WFD;
- Cost-effectiveness in furthering Article 4 objectives, that is in mitigating environmental pressures arising from abstraction, point-source pollution, diffuse pollution, morphological impacts and alien species.

We summarise our initial screening results below and discuss scope for further research.

6.1. Compliance of Candidate Economic Mechanisms with Article 9

We screened charging policies and cost-recovery mechanisms against the Article 9 requirements that they provide for, i.e.

- *Adequate incentives for users to exploit water resources efficiently and thereby contribute to Article 4 objectives (Article 9.1., 2nd sentence, 1st indent);*
- *An adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of costs of water services, based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle (Article 9.1., 2nd sentence, 2nd indent).*

In line with preliminary guidance from Defra on the interpretation of these requirements, we used broad and cautious screening values (“questionable” being the most critical value in the range) in our assessment. Consistent with earlier research commissioned by WAG and Defra (2004),¹⁰⁵ we found that most, if not all, mechanisms were broadly aligned with or not immediately relevant to Article 9 obligations. We note however that:

- The current abstraction charging arrangements were designed to recover the EA’s regulatory costs and may not fully recover environmental and resource costs or incentivise reductions of abstraction within licensed amounts. While questions may therefore be raised about their alignment with Article 9, this does not mean that the current charging arrangements are necessarily inconsistent with Article 9 requirements,
- The current charges for industrial discharges into the sewer (“Mogden charges”) do not reflect the residual pollution of the watercourse for which discharges are responsible. They are also currently based on average (rather than marginal) abatement costs and only cover a limited number of measurable inputs to the sewer. This may create some distortions in relative incentives for discharging to sewer or directly into the environment.

¹⁰⁵ Defra (2004), “Current Levels of Cost Recovery and Incentive Pricing”.

Questions may therefore be raised about the alignment about these charges with Article 9, but they are not in our view inconsistent with Article 9 requirements.

- The site-area based surface water drainage charges advocated by regulators can help to ensure adequate contributions by different user groups and generate incentives to reduce water drained into the public sewer. Again, it is doubtful that a move to site-area based surface water drainage charges is actually required by Article 9. We understand that at present, UK law prevents charging highway users or highway authorities for highway drainage services; however, such arrangements would be aligned with Article 9 requirements.
- Expansion of metering and volumetric charging is an objective already pursued by government and regulators in England and Wales and in Scotland. Metering and volumetric charging would be well-aligned with incentive pricing objectives set out in Article 9. Metering and volumetric charging can also contribute to user-group specific recovery of the cost of water services, including their environmental and resource costs.

We note that these results may need to be revised in future research following the finalisation of Defra’s interpretation of Article 9.

6.2. Cost-effectiveness with Regard to Article 4 Environmental Objectives

Research undertaken by the EA and SEPA highlights that many water bodies of all types and in all regions are at risk of failing to meet good ecological status by 2015 unless measures are taken to address the pressures causing the environmental damage. This study sought to screen readily available economic mechanisms that might “drive” these measures.

Our starting point was a compilation of a list of economic mechanisms used or considered in England and Wales or Scotland to address each of the five pressures identified in the WFD, i.e. abstraction, point-source pollution, diffuse pollution, physical change and alien species. Our long list shows that

- A range of mechanisms have been developed to address environmental pressures created by abstraction and point-source pollution. Many economic mechanisms are used already in these areas while others have been investigated in some detail. We set out the results of our assessment of these mechanisms below.
- In respect of diffuse pollution, some attention has been focused on agricultural sources, but Defra have excluded this family of mechanisms from the scope of analysis for this study. We found only one proposed economic mechanism to address diffuse non-agricultural pollution, a chemicals product charge or tax. Historically, the use of tax differentials favouring unleaded petrol over traditional high octane fuel with lead anti-knock additives also very effectively reduced sales of leaded petrol, until leaded petrol was completely banned after 2000.¹⁰⁶ We note that we did not screen environmental liability mechanisms.

¹⁰⁶ Campbell, N., D’Arcy, B., Frost, A., Novotny, V., Sansom, A., (2004), “Diffuse Pollution: An Introduction to the Problems and Solutions“, IWA Publishing.

- We found few mechanisms to address morphological pressures. This is perhaps not surprising. Morphological pressure can be caused by a range of human activities, such as agriculture, forestry, production and distribution of electricity, collection, purification and distribution of water, flood defences, inland water transport, fishing (including fish hatcheries, fish farms and commercial fishing), recreational, cultural and sporting activities, and urban development. The environmental effect of one of these activities depends on its interaction with other physical impacts. It also depends on the characteristics of the water body in question. A classical economic mechanism, such as a charge, which would allow a full internalisation of the adverse physical impact on the aquatic environment, would need to be very local and case-specific and so will be difficult to design. However, we await future research and policy developments in this area with interest.
- We found only one minor proposed economic mechanism to prevent the introduction of alien species, i.e. incentives for vessel operators or owners for using effective anti-fouling products. There might be scope for further mechanisms to encourage the use of certain preventative measures by private agents.

Our initial assessment of mechanisms proposed or implemented in the UK suggests that:

- Abstraction and discharge charging regimes in England and Wales and in Scotland have been designed with regulatory cost-recovery objectives in mind. There may therefore be scope for refining these mechanisms to better reflect and internalise environmental costs. Adjustments of the current arrangements are likely to be most cost-effective when they are targeted at particular locations.
- Trading of abstraction and (direct, indirect, chemical) discharge permits has limited potential to create additional incentives to reduce pressure on the environment given limited gains from trade for potential traders, high transaction costs and requirements to meet minimum environmental standards in any case.
- Different surface water drainage charging schemes currently coexist in England and Wales and in Scotland are metered. An expansion of site-area based surface water drainage charges may improve incentives to allow surface water to drain away from the public sewer. At present, UK law prevents charging highway users or highway authorities for highway drainage; however, such arrangements might have beneficial (but low) incentive effects.
- Metering and volumetric charging is far from complete in the UK. Only about 28% of households in England and Wales and very few households in Scotland. While the majority of non-household users in England and Wales are on a measured tariff, in Scotland completion of non-household metering and elimination of over-recovery of costs for water and sewerage services from the non-household sector are seen as objectives to be achieved within the next four years. We believe that metering and volumetric charging has considerable potential to address pressures from abstraction and point source pollution and to reinforce the effectiveness of incentives created by the abstraction and discharge charging schemes.

6.3. Scope for Further Research

Our study highlighted scope for further research on mechanisms which may help to achieve compliance with environmental or other WFD objectives. In particular, we note that:

- The aim of our study was to screen economic mechanisms which have been implemented already or been sufficiently worked up to qualify as policy proposals. By 2015, additional policies may be proposed and developed which could contribute to WFD objectives. Such policies will require further research.
- More specifically, we noted that few economic mechanisms have so far been considered in the UK to deal with non-agricultural pressures on the aquatic environment arising from diffuse pollution, morphological impacts and alien species. While we suspect that this suggests these problems are often better addressed by command-and-control instruments, further research on the potential for developing economic mechanisms in these areas would be of interest.¹⁰⁷
- Economic mechanisms to address diffuse pollution from agriculture were outside the scope of this study. Mechanisms and measures to reduce diffuse water pollution from agriculture are appraised under the Catchment Sensitive Farming programme. This research may also draw attention to mechanisms used to combat agricultural diffuse pollution which might be modified so as to address other sources of diffuse pollution.
- In the course of screening economic mechanisms drawn from our list of candidate mechanisms, we reviewed available research on their costs and effectiveness. This suggested that further research on price elasticities of polluting and abstraction behaviour would be helpful in order to better gauge its responsiveness to changes in charging arrangements. Similarly, further research on or, indeed, experience with trading schemes and the extent to which low differences in marginal costs and hence, low gains from trade for potential traders, high transactions costs and regulatory requirements restrict their application and impact might be of interest. Case studies of the few most promising localities would probably be informative. Finally, we are not aware of research on the impact of alternative surface water drainage charging regimes, which would be useful background if further regulatory intervention in this area were to be considered.

¹⁰⁷ Nick Hanley, a Peer Reviewer for this report, noted that complex ambient-based pollution charging mechanisms have received considerable attention in the academic literature. See e.g. Segerson, K., (1988), "Uncertainty and Incentives for Nonpoint Pollution Control", *Journal of Environmental Economics and Management* No 15, p. 87-98.

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