Capacity building, programmatic development and communication in the field of environmental taxation and budgetary reform

Final Report

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AEM	Agri-environment measure
AQG	Air quality guidelines
ATS	Austrian Schilling
BAT	Best available technologies
BBLV	Bond Beter Leefmilieu Vlaanderen (Belgian NGO)
BEF	Belgian Franc
BOD	Biological oxygen demand
CAP	Common Agricultural Policy
CGE	Computable general equilibrium model
CO	Carbon monoxide
CO_2	Carbon dioxide
COMEOS	Belgian retail federation
CZK	Czech Koruna
DKK	Danish Krone
DRS	Deposit refund scheme
EBT	Earnings before taxes
ECS	Energy and Climate Strategy (Finland)
EEA	European Environment Agency
EFTA	European Free Trade Association
EIC	Environmental Investment Centre (Estonia)
EPR	Extended producer responsibility
ETC	Environmental tax commission
ETR	Environmental tax reform
EU	European Union
EUR	Euro
FIM	Finnish Markka
GBP	British Pound
GDP	Gross domestic product
GHG	Greenhouse gas(es)
GPP	Green public procurement
GTR	Green tax reform
HELCOM	Baltic Marine Environment Protection Commission
HUF	Hungarian Forint
ISK	Icelandic Krona
ITQ	Individual Transferable Quota
LAAIF	Lithuanian Environmental Investment Fund
LCF	Landfill Communities Fund (UK)
MBI	Market-based instrument
MBT	Mechanical biological treatment
MP	Member of parliament
MSW	Municipal solid waste
Mtoe	Million tonnes of oil equivalent
MWh	Megawatt hours
NEAFC	North East Atlantic Fisheries Commission
NGO	Non-governmental organisation
NH_2	Amidogen
NH_3	Ammonia
NO_2	Nitrogen dioxide
OECD	Organisation for Economic Co-operation and Development
PAH	Polycyclic aromatic hydrocarbons
PALPA	Suomen Palautuspakkaus Oy, the largest DRS operator in Finland
PAYT	Pay-as-you-throw
PCB	Polychlorinated biphenyl

PES	Payment for ecosystem services
PET	Polyethylene terephthalate
PLN	Polish Zloty
PM10/PM2.5	Particulate matter
PRO	Producer responsibility organisation
PVC	Polyvinyl chloride
RB-AEM	Result-based agri-environment measure
RBMP	River Basin Management Plans
RCEP	Royal Commission on Environmental Pollution (UK)
RDP	Rural Development Programme
RON	Romanian New Leu
RWA	Regional Water Authorities (Netherlands)
SDGs	Sustainable Development Goals
SEK	Swedish Krona
SKK	Slovak Koruna
SO_2 / SOx	Sulphur dioxide
TAC	Total Allowable Catch
TBT	Tributyltin
TFEU	Treaty on the Functioning of the European Union
TOC	Total organic carbon content
TRH	Hydric resources tax (Portugal)
UK	United Kingdom
USD	US Dollar
VAT	Value added tax
VOC	Volatile organic compounds
WEEE	Waste electrical and electronic equipment
WFD	Water Framework Directive
WHO	World Health Organization

EXECUTIVE SUMMARY

KEY MESSAGES

1 **Experience with the use of market-based instruments (MBIs), in particular environmental taxes and charges, has grown over the past two decades.** The EU Flagship Initiative for a Resource-Efficient Europe calls for environmental taxes to account for 10% of total tax and social contribution revenues by 2020 – a substantial increase from the EU average of 6.3% in 2015.

2 **Environmental taxes and charges to address pollution and resource use are already in place in several European countries, with plans underway in a number of countries to introduce new instruments or to amend existing systems.** There is a diversity of practice across the study areas: air pollution; waste management, products and materials (i.e. circular economy); water quality and marine litter; water stress & availability; land use & management and biodiversity.

Key design issues and insights from best practice

3 Prior to the introduction of an economic instrument, it is very important to define precise objectives and to carefully tailor the design of the instrument in line with this. **Clear objectives linked to specific environmental goals can increase the acceptability of economic instruments and contribute to their success.**

4 The **tax rate applied and adopting a phased, predictable approach to future change** has a strong impact on the effectiveness of an economic instrument and its ability to stimulate behaviour change.

5 The **scope of the tax base, where/on whom it is applied and how it is calculated** can influence the effectiveness of the instrument, its ability to achieve the desired behaviour change and its acceptability.

6 **Managing administration costs** can help convince affected economic operators that an instrument will not be unduly burdensome (as with the plastic bag levy in Ireland for which revenue collection and reporting is easily integrated in retailers Value Added Tax (VAT) collection systems).

7 **Other design features can also incentivise behaviour change,** for example:
- **Reimbursement of revenues to affected groups**, applying exemptions or reduced charges for certain activities;
- Making **environmentally harmful activities more expensive**;
- Increasing **awareness of the benefits** of certain activities;
- Including specific design features to **stimulate innovation and investment**.

8 Introducing economic instruments as **part of a wider package of measures** can provide a window of opportunity for their establishment and ensure coherence with other policies.

9 **Clear communication** by policy makers to affected stakeholders and civil society **is critical to the success of an economic instrument and can help increase acceptance.**

10 **How revenues from economic instruments are used has an important influence** on the impact and effectiveness of the instrument, its political and public acceptability, its potential to mitigate adverse impacts and overcome obstacles.

11 **Regular monitoring and evaluation** of the impact of instruments (including unintended impacts) **and subsequent revisions** are critical to ensure their continued effectiveness.

Role and importance of civil society engagement

12 **Civil society organisations have played a range of different roles in a wide range of economic instruments to address pollution and natural resource use –** they have had varying levels of engagement with and influence over the design, introduction and implementation of economic instruments in the EU-28.

13 In the **problem recognition and policy formulation stage**, civil society can play an important role in helping to make a **case for the introduction of economic instruments by identifying the need for (further) action**.

14 In the **decision-making phase**, civil society can **shape the design of economic instruments through engagement in stakeholder consultation processes and help increase their acceptance**.

15 Civil society can also **support the implementation of economic instruments**, for example by being involved in instrument management, helping to decide on changes to fees and distribution of revenues, and raising awareness on economic instruments. Experience at this part of the policy cycle has, however, been limited to date.

16 There are also a limited number of examples of civil society being involved at the **policy monitoring phase**, for example by monitoring and reporting on emissions or monitoring beach litter.

17 Finally, civil society organisations can usefully be engaged at the **policy evaluation stage** to gather evidence on the impacts of instruments which can support an evidence-based revision of the instrument to increase its effectiveness.

The way forward

18 **It is increasingly clear that correcting economic signals will be a core part of the solution to addressing multiple sustainability challenges** from resource scarcity, water scarcity and air pollution to biodiversity loss and marine litter among others.

19 Civil society organisations have undoubtedly been **effective on many occasions** at **making the case for environmental tax reform**, but have **often missed or not been afforded opportunities to engage at other stages of the policy cycle,** in particular with implementation.

20 There is much to learn from these experiences to date – and **an accelerated peer-to-peer, Member State to Member State, exchange could be a promising way forward, and valuable complement to (soft) harmonisation approaches already being adopted**.

21 **Policy- and decision-makers should arguably engage more with civil society** to use its expertise to promote change with wide-ranging citizen support. Governments are public servants, there for public interest, and civil society have their fingers on the public pulse and provide a voice to the public. There should therefore be a **natural cooperation to meet common objectives** – access to a clean environment and safeguarding resources for both this and future generations.

22 Collaborating to get signals in the economy to support these objectives is a question of good governance, and **there remains scope for further efforts in this area.** This offers the **potential for economic, budgetary, social and environmental benefits,** as well as **helping to implement policy commitments and incentivise a transition to a resource efficient, circular economy** that safeguards natural assets, supports the implementation of the sustainable development goals (SDGs) and heads towards a pollution free environment for European citizens.

E1 CAPACITY BUILDING & ENVIRONMENTAL TAX REFORM

Experience with the use of market-based instruments (MBIs), in particular environmental taxes, has grown over the past two decades. Such instruments are an important part of the policy mix to support the transition to an inclusive green economy and attracting increasing attention. Within the EU, calls for further action on environmental taxes and subsidy reform have appeared in several country-specific recommendations under the European Semester and in policy discussions on climate change, resource efficiency, marine litter and the circular economy. The EU Flagship Initiative for a Resource-Efficient Europe calls for environmental taxes to account for 10% of total tax and social contribution revenues by 2020 – a substantial increase from the average of 6.3% in 2015 in the EU-28.

Environmental taxes and charges are already in place in all EU Member States European countries, with plans underway in a number of countries to introduce new instruments or to amend existing systems. The main focus of efforts to date has been in the area of energy, transport and climate, with limited action in relation to issues of pollution and resource use. However, despite growing interest and some positive trends, MBIs are not widely used in the environmental area. In the EU, revenues from environmental taxes amounted to just 2.4% of EU-28 GDP, with significant diversity in national experiences ranging. Moreover, current environmental taxes have only led to relatively marginal changes in the tax system and incentives in the economy as a whole, partly due to how they have been designed and implemented to date. Thus, there remains scope for the wider application and more effective use of such instruments, particularly in the areas of pollution reduction and natural resource management, which could lead to further economic, social and environmental benefits.

To contribute to the broader use of MBIs within environmental policy, this study for the European Commission, carried out by the Institute for European Environmental Policy (IEEP) and partners, investigated the use of economic instruments to address pollution and resource use and the role of civil society stakeholders in their introduction, development and implementation. In particular, the study aimed to improve the knowledge base on existing economic instruments in the EU-28, stimulate exchanges of experience and best practice and build civil society capacity to participate in MBI policy processes at the national and EU levels.

Through detailed case studies on 40 specific economic instruments across the EU-28 (see Table E1) and a **series of regional workshops focused on five environmental themes**, the study has identified key design features for successful economic instruments. It also explored the roles that civil society has played in the development and implementation of such instruments, areas where more engagement is needed, and opportunities for future civil society participation in the policy process.

This summary presents the results of the study across five environmental themes: **Air pollution; Waste, Resources and the Circular Economy; Water quality and marine litter; Water stress and availability; Biodiversity and land-use and management**.

Table E1 Market based instruments in Europe & case studies selected for analysis

	Air pollution	Waste management & products	Materials	Water quality	Marine litter	Water stress & availability	Land use & management	Biodiversity
	NOx taxes/fees, SOx taxes/fees, PM taxes/fees and other air pollution taxes/fees	Incineration tax, Landfill tax, Pay-as-you-throw (PAYT) Scheme, Packaging tax, Plastic Bag fee, Product fee, Deposit Refund Scheme, Producer fee	Aggregates tax, Natural Resource tax	Fertilizer tax, Pesticide tax, Waste water charge/tax, Other pollution tax, Natural resource tax, Other	Packaging tax, Plastic bag fee, Product fee, Producer fee, Other waste tax, Other	Water abstraction tax/charge; water pricing including cost recovery	Land taxes, PES, timber/ forestry/ stumpage fees, pesticide and fertilizer taxes	Stumpage fee, pesticide tax, fertilizer tax, wildlife/hunting tax, PES, ITQs, offsets / habitat banking
Austria		Landfill tax						Vienna tree protection act
Belgium		Packaging charge and Environmental charge, Pay-as-you-throw			Packaging taxes			
Bulgaria						Water abstraction charge		
Croatia								Forest Public Benefit Fee
Cyprus						Water pricing		
Czech Republic	Air pollution fee (PM_{10}, SO_2, NOx)							
Denmark				Pesticide tax; Animal feed mineral phosphorus tax			Tax on animal feed mineral phosphorus	
Estonia			Natural resources charges					Hunting and fishing fees
Finland		Deposit refund scheme	Peatland tax reform		Deposit refund scheme & packaging tax			Peatland tax reform
France						Water abstraction charges		

	Air pollution	Waste management & products	Materials	Water quality	Marine litter	Water stress & availability	Land use & management	Biodiversity
	NOx taxes/fees, SOx taxes/fees, PM taxes/fees and other air pollution taxes/fees	Incineration tax, Landfill tax, Pay-as-you-throw (PAYT) Scheme, Packaging tax, Plastic Bag fee, Product fee, Deposit Refund Scheme, Producer fee	Aggregates tax, Natural Resource tax	Fertilizer tax, Pesticide tax, Waste water charge/tax, Other pollution tax, Natural resource tax, Other	Packaging tax, Plastic bag fee, Product fee, Producer fee, Other waste tax, Other	Water abstraction tax/charge; water pricing including cost recovery	Land taxes, PES, timber/ forestry/ stumpage fees, pesticide and fertilizer taxes	Stumpage fee, pesticide tax, fertilizer tax, wildlife/hunting tax, PES, ITQs, offsets / habitat banking
Germany							Biodiversity offsetting; Result-based agri-environment measure	
Greece		Landfill tax						
Hungary	Air pollution load charges (SO_2, NOx, non-toxic dust)							
Ireland		Plastic bag levy			Plastic bag levy			Fishing fees
Italy				Phytosanitary product tax			Phytosanitary product tax	
Latvia		Packaging tax			Packaging tax			
Lithuania		Environmental pollution tax			Environmental pollution tax			
Luxembourg		Pay-as-you-throw						
Malta						Water pricing		
Netherlands		Pay-as-you-throw			Rotterdam & Amsterdam port fee reductions	Taxes/fees of regional water authorities		
Poland				Wastewater fee				
Portugal						Water resources fee		Ecological fiscal transfers
Romania		Packaging charge (Producer Responsibility)			Packaging tax			
Slovak Republic	Air pollution fee (PM_{10}, SO_2, NOx)							

	Air pollution	Waste management & products	Materials	Water quality	Marine litter	Water stress & availability	Land use & management	Biodiversity
	NOx taxes/fees, SOx taxes/fees, PM taxes/fees and other air pollution taxes/fees	Incineration tax, Landfill tax, Pay-as-you-throw (PAYT) Scheme, Packaging tax, Plastic Bag fee, Product fee, Deposit Refund Scheme, Producer fee	Aggregates tax, Natural Resource tax	Fertilizer tax, Pesticide tax, Waste water charge/tax, Other pollution tax, Natural resource tax, Other	Packaging tax, Plastic bag fee, Product fee, Producer fee, Other waste tax, Other	Water abstraction tax/charge; water pricing including cost recovery	Land taxes, PES, timber/ forestry/ stumpage fees, pesticide and fertilizer taxes	Stumpage fee, pesticide tax, fertilizer tax, wildlife/hunting tax, PES, ITQs, offsets / habitat banking
Slovenia							Payments for private forest management	
Spain	Tax on fluorinated greenhouse gases						Mature forest payments in Girona province	
Sweden	NOx fee and SO_2 tax			Fertilizer tax			Fertilizer tax	Fertilizer tax
United Kingdom		Landfill tax	Aggregates Levy					
Others								Iceland: Fisheries ITQ and Resource tax

** The instruments for analysis were selected: on the grounds of environmental/thematic interest; to ensure coverage of a wide range of instrument types; and to ensure appropriate geographical coverage and balance (to give each country at least one in-depth case study). Please note that the table is not intended to be a full and comprehensive picture of all instruments in place around Europe, but rather to give an indication of the widespread use of such instruments. Insights on additional practice are welcome.*

E2 AIR POLLUTION

Air pollution remains a significant environmental concern and is the single most important health challenge in Europe. In addition to impacts on human health, air pollution also has impacts on the environment (e.g. excessive nutrients, destruction of ecosystems) and the economy. Despite existing legislation, air quality remains problematic in many cities and regions across the EU with regular exceedances of air quality standards and in EU target and limit values for specific pollutants, especially particulate matter, ozone and nitrogen oxides.

Different types of economic instruments can be used to address air pollution, for example taxes and charges on various air pollutant substances (e.g. NOx, SO_2, PM, NH_2, heavy metals, VOC, CO, NH_3, hydrocarbons, dust, cadmium, mercury, asbestos; and ozone depleting substances) and air pollution non-compliance fees. Cases examined in the study focused on the following air pollution related instruments:

- Air pollution fees in the Czech Republic and Slovakia;
- Air pollution load charges in Hungary;
- NOx fee and SO_2 tax in Sweden; and
- Tax on fluorinated greenhouse gases in Spain.

The design of these instruments varies significantly in terms of the rates applied, changes over time and complementary policies in place. The rates applied have had a strong impact on the effectiveness of the instruments and their ability to stimulate change in industry behaviour. Some instruments have been designed to incentivise further emission reductions by industry. For example, the 2012 revision of the Czech air pollution fee reduced the fee paid by businesses that achieve lower emission levels compared to best available technologies (BAT) emission concentrations. Revenues from the Swedish NOx fee are reimbursed to plants based on their energy efficiency, thus providing an economic incentive to regulated plants to achieve further emission reductions.

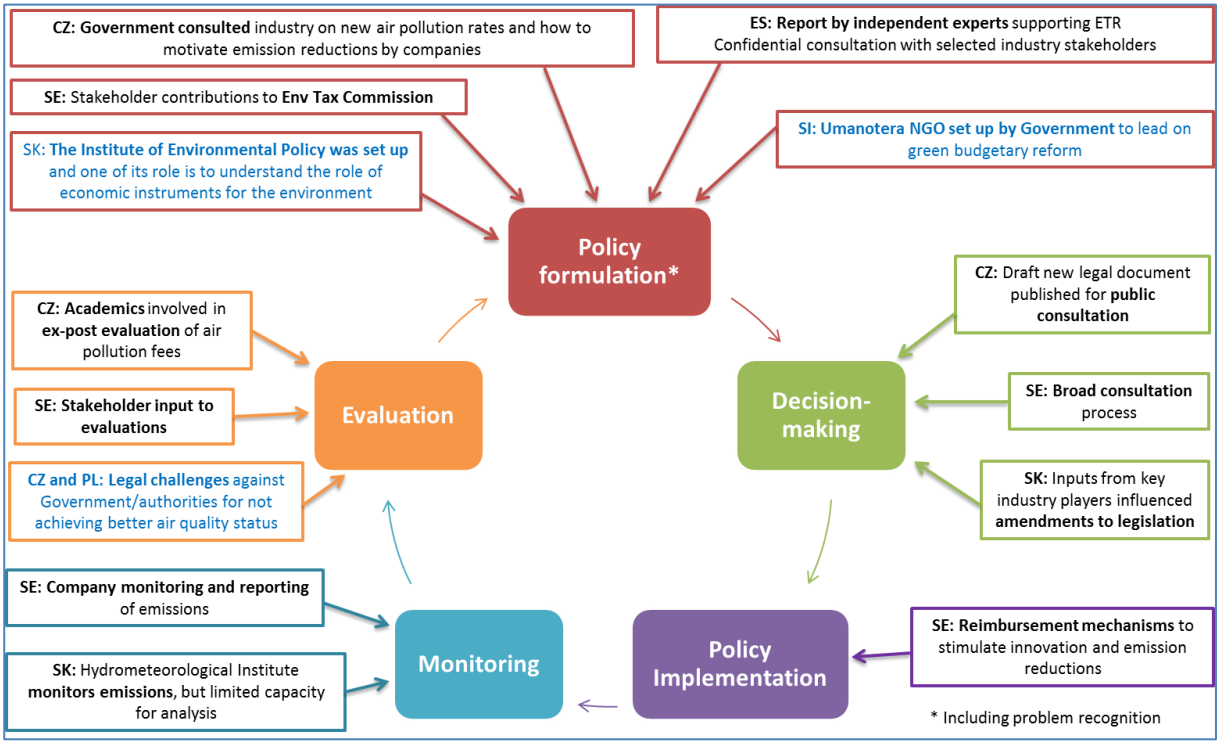
The scale of revenues raised by the instruments and their use varies significantly across the countries. In some cases, revenues are allocated to the general budget (e.g. Hungary, Spain), while in others revenues are used to support environmental projects and activities (e.g. Czech Republic, Poland, Slovakia) or reimbursed to regulated entities (e.g. Sweden which has helped reduce potential negative impacts of the tax on competitiveness and helped increase acceptance of the tax among industry).

Drivers supporting the adoption of these instruments range from fiscal considerations (e.g. in Spain, Czech Republic, Slovakia) to **changes in the political context** and **rising public awareness** of environmental issues (e.g. in Sweden).

The effectiveness of the instruments has varied significantly depending on a number of factors including the level of fees applied, the wider policy mix and the administrative burden. For example, the low level of air pollution fees in Slovakia, Poland and the Czech Republic (until 2012) provided little incentive for companies to decrease their emissions and other policies (e.g. legal emission limits and penalties), a decline in production in heavy industry and changes in production processes/technologies are considered more important factors in the improvement of air quality in these countries since the early 1990s. It is difficult to assess the effectiveness of some instruments due to a lack of data (e.g. Spain), limited capacity to analyse available data (e.g. Hungary) and challenges related to assessing the effectiveness of these instruments in isolation from the impacts of the wider air quality regulatory framework (e.g. air quality legislation and permits).

Civil society including government bodies, industry, NGOs, the public and academics played an important role in the policy process (see Figure E1), with engagement ranging from participation in informal discussions (e.g. Slovakia) to more collaborative processes (e.g. Sweden, Czech Republic). In some cases, formal stakeholder engagement has been limited or non-existent in the policy formulation phase (e.g. in Spain), while in others stakeholder inputs from a few prominent actors have played an important role in the policy process (e.g. in Hungary).

Figure E1 Examples of civil society engagement with instruments for air pollution



Key: Text in black are examples from the study cases; text in blue examples shared at the workshops

These experiences with economic instruments in the area of air pollution highlight a number of lessons including: the importance of certain design aspects such as the definition of tax-payers; how the participation of key stakeholders can facilitate the adoption of an instrument; the importance of regular monitoring and review which can support the adoption of more effective instruments; how instrument design can influence effectiveness, encourage further emission reductions and stimulate innovation; and the role of the wider policy mix.

E3 WASTE, RESOURCES AND THE CIRCULAR ECONOMY

Waste management has been an important issue for the EU and its Member States for many years, due to its potentially significant environmental impacts including greenhouse gas emissions from landfills, land, water and air pollution, and littering. In recent years, attention has moved from simply managing waste towards opportunities to create a circular economy and improve resource efficiency. In 2012, total waste generation in the EU was over 2.5 billion tonnes, representing almost 37% of material consumption. Policies dealing with specific product streams at the end of their useful life, and sustainable raw material use, are therefore crucial for resource efficiency and a circular economy.

Economic instruments in this area include waste taxes, packaging taxes, plastic bag and other product fees, deposit refund schemes, pay-as-you-throw (PAYT) schemes, raw material and aggregates taxes, and natural resource taxes and charges. Instruments relating to waste management and products are much more common than those targeting the extraction of natural materials. Cases examined in the study focused on the following instruments:

- Austrian landfill tax (and ban), UK and Greek landfill taxes;
- Benelux pay-as-you-throw (PAYT) schemes;
- Belgian, Latvian and Romanian packaging taxes/charges;
- Finnish beverage container deposit refund scheme (DRS) and packaging tax;
- Irish plastic bag levy;
- Lithuanian environmental pollution tax;
- UK aggregates levy;
- Estonian mineral resource extraction charge; and
- Finnish tax on the use of peat for energy.

The scale of revenues raised by the instruments and their use varies across the Member States. In several cases (e.g. Belgian and Latvian packaging taxes, UK aggregates levy revenues accrue to the general budget. In others they are allocated to national environmental funds or bodies (e.g. UK landfill tax, Romania, Ireland, Estonia), used to support waste management activities (e.g. Benelux, Lithuania), or for very specific purposes such as site remediation (Austria). Payers range from landfill site operators, producers and businesses to householders and consumers.

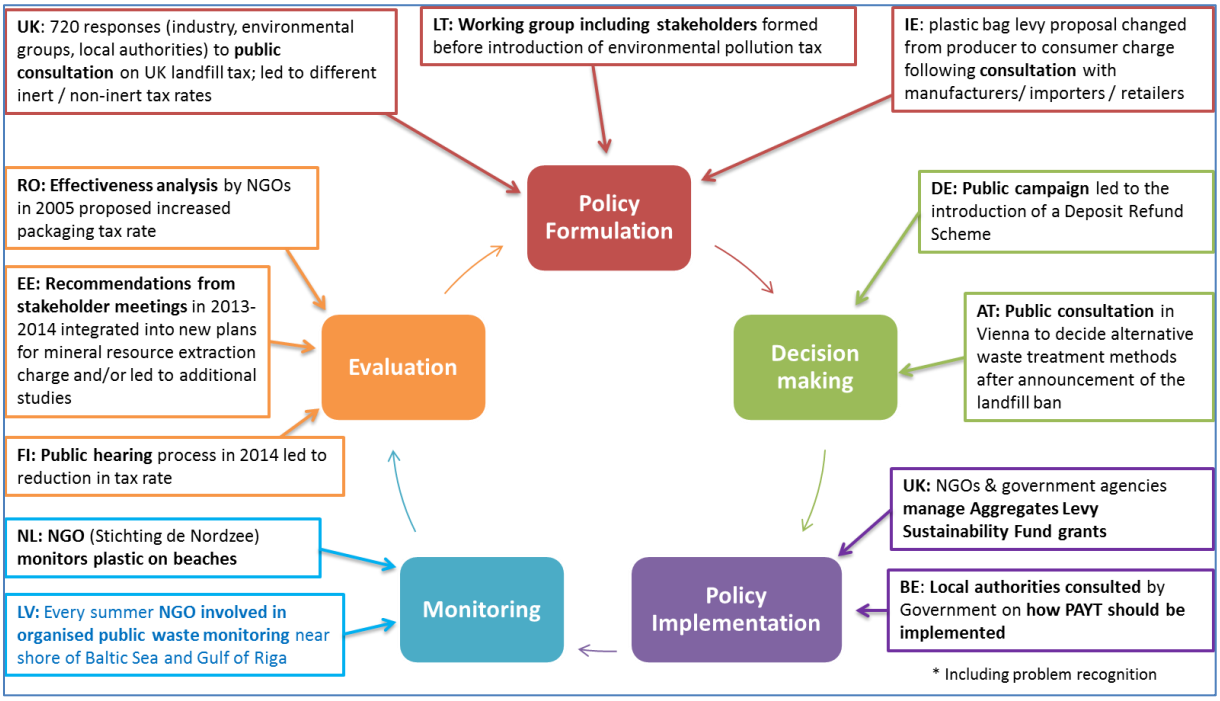
Drivers supporting the adoption of these instruments include the need to achieve specific environmental objectives (e.g. in UK, Austria, Benelux, Finland, Ireland, Lithuania, Estonia) and to **apply aspects of EU legislation** (e.g. in Greece, Luxembourg, Romania, Latvia and Lithuania). In other cases, instruments were introduced based on expert recommendations or policy evaluations (e.g. UK, Finland, Ireland, Lithuania), or thanks to the efforts of a political or stakeholder 'champion' (e.g. Ireland, UK aggregates levy, Belgium, Finland). In some cases, instruments formed part of a wider package of measures (e.g. Austria, Estonia, Benelux).

The effectiveness of the instruments has varied considerably depending on several factors, including the level of rates/fees applied (and advance warning of changes), **the wider policy mix, successful engagement and communication with stakeholders, and efficient administration to reduce implementation costs**. In some cases, implementation has been hampered by stakeholder opposition (e.g. Belgium, Estonia, Greece) or by lack of cooperation between government departments (e.g. Estonia). Amongst the instruments leading to the greatest environmental benefits are the UK and Austrian landfill taxes (reduced landfilling and site remediation respectively), Benelux pay-as-you-throw schemes (reduced household waste generation), the Finnish deposit return scheme (with 90% collection rates for both one-way cans and PET bottles),

and the Irish plastic bag levy (a sharp decline in plastic bag use). In other cases the environmental impacts are mixed (e.g. Lithuania, Latvia), harder to separate from the impacts of other instruments in the policy mix (e.g. Belgium, Romania), or seem to be negligible (e.g. Estonian mineral resource extraction charge, Finnish peat energy tax). The instruments present a mixed picture of economic impacts on businesses, from broadly positive (e.g. Ireland, Lithuania) to rather more negative (e.g. Romania, Estonia).

Civil society including governmental bodies and political parties, waste operators/waste management companies and producer responsibility organisations (PROs), industry and producers, consumers/the public and (environmental) NGOs have had varying levels of involvement with and influence over the design, introduction and implementation of the instruments (see Figure E2). Engagement ranges from wide-ranging public consultation (e.g. UK, Austria) and consultation with concerned stakeholders (e.g. PAYT in Belgium, Ireland, Finland) prior to an instrument's introduction, to stakeholder inclusion in working groups and boards (e.g. Lithuania, Latvia), and involvement in the evaluation and review of instruments (e.g. Estonia, Romania) and allocation of revenues (UK aggregates levy). In other cases civil society engagement has been more limited (e.g. Belgian Environmental Charge.

Figure E2 Examples of civil society engagement with instruments for waste management, products and materials



Key: Text in black are examples from the study cases; text in blue examples shared at the workshops

The experiences with economic instruments on waste management, products and materials highlight a number of lessons, including: the benefits of a specific and explicit link to environmental goals; the potential benefits of earmarking revenues for environmental purposes; the importance of design aspects such as predictable rate increases and ensuring fairness to those who pay; ensuring the presence of supporting infrastructures (e.g. for waste management) for implementation; the need for sound implementation and monitoring and the possibility to review instruments to improve their effectiveness; coherence between relevant instruments and policies allowing increased effectiveness; tailoring instruments to a country's social and economic context; and the benefits of stakeholder engagement in design and implementation.

E4 WATER QUALITY AND MARINE LITTER

Although water quality status in the EU is gradually improving, 90% of river basin districts, 50% of surface water bodies and 33% of groundwater bodies are estimated to be affected by diffuse pollution, primarily from the agriculture sector[1]. Implementation of the Urban Waste Water Treatment Directive (91/271/EEC) has been 'challenging', with sewer overflows remaining a key pollution source in urban areas. In the marine environment, pressures arise from anthropogenic loads of phosphorus, nitrogen, organic matter and hazardous substances, as well as marine litter, in particular the significant amount of waste plastic that reaches the marine environment. There is increasing scientific evidence of impacts on the environment, ecosystems and human health, meaning that further action is required.

Economic instruments applicable in the area of water quality include wastewater charges, pesticides taxes and fertilizer taxes. Cases examined in the study focused on the following instruments:

- Danish pesticide tax;
- Danish animal feed mineral phosphorus tax;
- Swedish fertilizer tax.
- Italian phytosanitary product tax;
- Polish wastewater fee;
- Dutch port fee reductions (in Rotterdam and Amsterdam);
- Belgian, Latvian and Romanian packaging taxes/charges;
- Finnish beverage container deposit refund scheme (DRS) and packaging tax;
- Irish plastic bag levy; and
- Lithuanian environmental pollution tax.

The scale of revenues raised by the instruments varies significantly across the Member States. In some cases, **revenues are earmarked for different purposes**, for example being **recycled back to the agricultural sector** through reduction of land value taxes (Denmark), **used to develop organic farming** (Italy), or **used for investment in environmental protection** (Poland). Ideally tax/charge rates should reflect pollution damage costs (external costs), whilst earmarking of revenues for a full or partial reduction in other tax burdens for relevant target groups may leverage political effectiveness. Payers are typically farmers, product users, manufacturers and businesses/industry.

Several of the instruments had a stated environmental objective behind their introduction, aiming to address pollution by specific substances (Denmark, Sweden, Italy, Poland, Ireland). In Denmark and Italy, the taxes also aimed to **address human health risks**. Some instruments were introduced based on the recommendations of experts or policy evaluation processes involving stakeholders (e.g. Sweden, Denmark). Some formed part of a wider package of measures (e.g. Denmark, Netherlands). The need to apply specific legislation has also been a driver for the introduction of instruments (e.g. in Denmark, Poland).

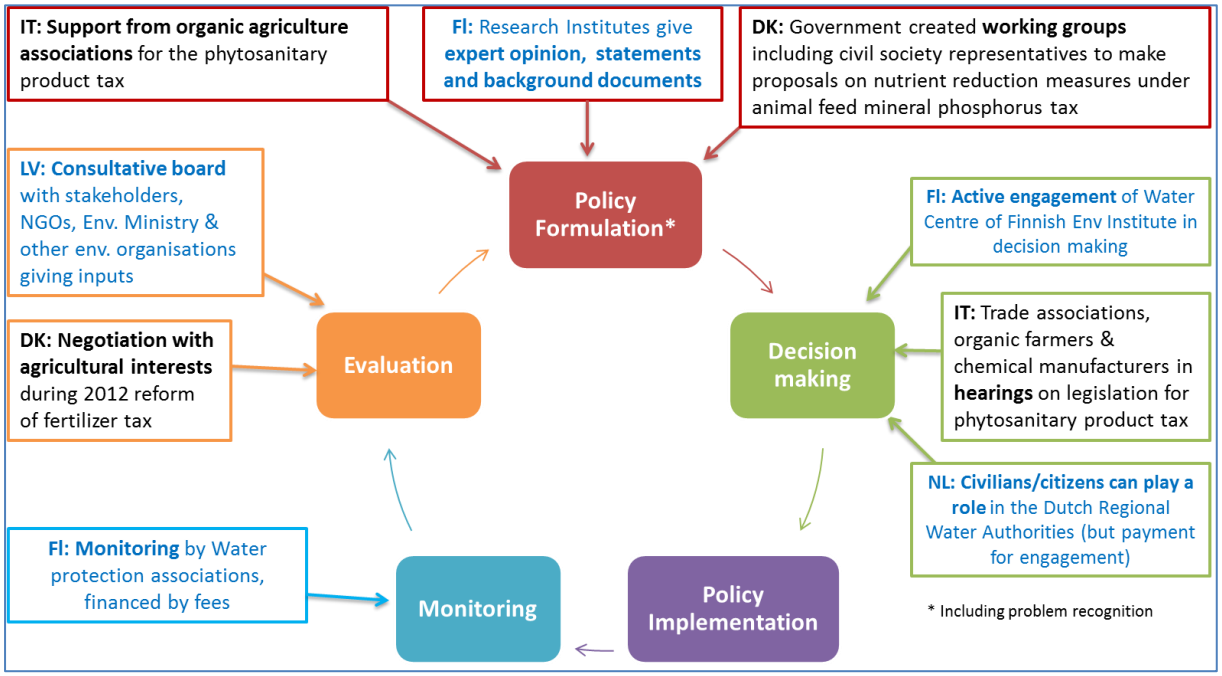
The environmental effectiveness of the instruments has been varied. The Swedish fertilizer tax is estimated to have led to a reduction in previously common excessive 'precautionary' applications of fertilizers, and reductions in phosphorus and cadmium

[1] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL: The Water Framework Directive and the Floods Directive: Actions towards the 'good status' of EU water and to reduce flood risks, COM(2015) 120 final, Brussels, 9.3.2015

content. The environmental impact of the Danish animal feed mineral phosphorus tax has weakened over time by the tax rate not being adjusted with inflation, but the Danish pesticide tax has undergone several stages of reform to improve its environmental effectiveness. It is harder to disentangle the specific environmental impacts the Italian tax from other factors, or those of the Polish wastewater fee from general improvements in wastewater treatment and water protection due to significant infrastructure investments. The economic impacts of some instruments (e.g. Italy) are assumed to be very limited, whilst others (e.g. Sweden) may have led to some modest competitive disadvantage in the absence of similar instruments in other Member States. Where identified, the social impacts of instruments have ranged from variable (e.g. Danish pesticide tax), to broadly positive, contributing to increased organic agricultural production in Italy and positive redistributional effects in Poland.

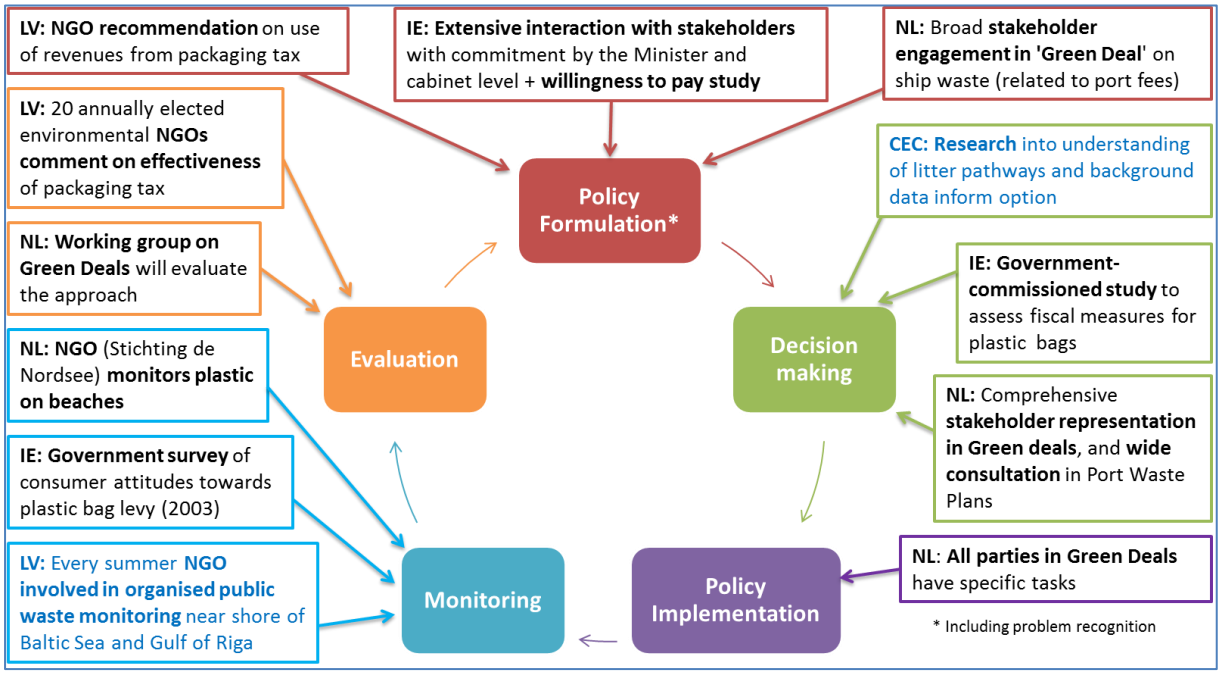
Civil society including governmental bodies and political parties, the agriculture sector, trade associations, chemicals manufacturers, scientific experts and (environmental) NGOs have played various roles in the policy process, with varying levels influence over the design, introduction and implementation of instruments related to water quality (see Figure E3 and Figure E4). Engagement has ranged from civil society helping to raise the profile of the issue being addressed (e.g. Ireland), through formal consultation with stakeholders prior to the introduction of an instrument (e.g. Danish phosphorus tax, Poland) and lobbying by interested parties (e.g. Italy, Poland), through to the evaluation of an instrument's effectiveness (e.g. Latvia). Occasionally, civil society has had a role at each stage of the policy cycle, from policy development to implementation, monitoring and evaluation (e.g. Netherlands).

Figure E3 Examples of civil society engagement with water quality-related instruments



Key: Text in black are examples from the study cases; text in blue examples shared at the workshops

Figure E4 Examples of civil society engagement with instruments related to marine litter



Key: Text in black are examples from the study cases; text in blue examples shared at the workshops

A number of lessons can be drawn from the case studies related to water quality and marine litter, including: the importance of strong design to avoid loopholes that allow non-payment of a tax or fee; the need to ensure all relevant products are within the scope of a tax; the importance of sound implementation, enforcement and monitoring of instruments to ensure their success; the benefits of engaging stakeholders in the design and implementation of instruments; and the positive impacts of the appropriate use of revenues, including earmarking for environment-related purposes.

E5 WATER STRESS & AVAILABILITY

Problems of water stress and lack of fresh water availability are prevalent across some parts of Europe and are expected to be further exacerbated in the coming years as a result of climate change. Despite the adoption of several pieces of legislation and progress in some areas, almost half of Europe's water bodies missed the Water Framework Directive (WFD) target to reach good ecological status in 2015 and other provisions of the Directive, such as on water pricing, are not yet fully implemented.

Economic instruments applicable in the area of water stress and availability include: taxes and charges on water abstraction, water pricing policies, water trading systems and payments for ecosystem services (PES). A number of these instruments are in place in EU Member States with significant variations in coverage and the nature of the instrument applied. Although in many countries there is cost recovery of water services (in that prices cover operating costs), the environmental costs of water supply are rarely integrated in water pricing systems, with due exceptions such as Denmark. Cases examined in the study focused on the following water stress related instruments:

- Abstraction charge in Bulgaria;
- Water pricing in Cyprus;
- Water abstraction charges in France;
- Water pricing in Malta;
- Taxes and fees of regional water authorities in the Netherlands; and
- Water Resources Fee in Portugal.

In terms of the **design of these instruments, the rates applied vary by user** (e.g. domestic, industry, agriculture), **source** (e.g. groundwater or surface water) and in some cases **by location** such as in France, the Netherlands and Cyprus to take into account relative water scarcity and pressure of abstraction on available water resources. Exemptions are sometimes applied for different users and the burden of the water charges varies between different types of water use, for example in France, the Netherlands and Portugal, households pay much more for water use than agriculture and industry. Some instruments include incentives to encourage behaviour change such as charging lower base values for residual water use in Portugal.

The scale of revenues raised by the instruments and their use varies. In some countries, **revenues go to the general government budget** (e.g. Cyprus), in others revenues are **allocated to water management related activities**, including **environmental protection** (e.g. Bulgaria), or to **finance activities of water agencies** (e.g. France, the Netherlands).

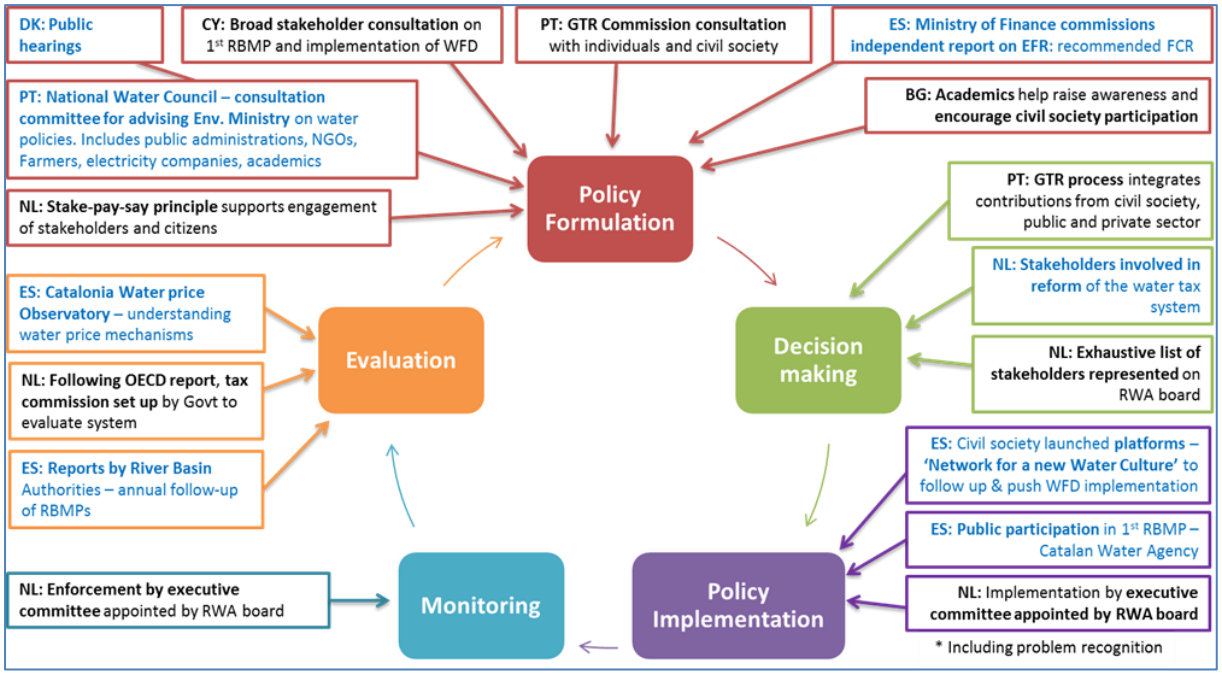
The effectiveness of the instruments has also varied significantly between countries. The low level of charges have had a limited incentive effect in some countries (e.g. in Portugal and France) and other policies/factors have influenced overall abstraction rates (e.g. high water pollution charges and variable charges in France, illegal boreholes in Malta, subsidies for energy produced by small and medium hydropower plants in Bulgaria). Some instruments have had notable impacts such as the application and substantial increase of the Dutch water pollution levy which has contributed to a decline in emissions discharged to open water, an increase in rates of pollutants removed by waste water treatment and stimulated innovation in the sector.

The need to implement specific pieces of legislation, in particular the EU WFD, has played an important role in the introduction and reform of instruments in this area in Portugal, Bulgaria and France. Another key driver for action in this area

are **concerns relating to water scarcity**, as has been the case in Malta. Windows of opportunity for further action include meeting EU legislative requirements (e.g. on water pricing reform under the WFD in Cyprus, application of (higher) charges/taxes for agriculture-related water use in the context of future reforms of the Common Agricultural Policy) and evaluations by external actors (e.g. an OECD report initiated a process to evaluate the Dutch levy system). Barriers to effective action on water pricing include political barriers (e.g. in Cyprus), a lack of transparency, and vested interests from certain sectors such as the agriculture sector (e.g. in France, the Netherlands).

Civil society including governmental bodies, water agencies, consumer associations and citizens, businesses, farmers' associations, environmental NGOs and academics have participated to varying degrees and at different stages in the policy cycle (see Figure E5). In countries such as France and the Netherlands where the main responsibility for water charges lies at the regional or sub-national level, stakeholders are engaged in policy processes either directly or indirectly, in others stakeholders have been engaged in policy evaluation processes (e.g. Portugal, Cyprus) while in some countries the policy process has been criticized for a lack of transparency and inclusiveness (e.g. Bulgaria).

Figure E5 Examples of civil society engagement with instruments for water stress and availability



Key: Text in black are examples from the study cases; text in blue examples shared at the workshops

These experiences with economic instruments in the area of water stress and availability highlight a number of interesting lessons including: the use of revenues from water abstraction charges in supporting environmental protection and management; important design considerations for cost recovery levies including the specifics of the levy base; underlying principles such as 'water pays for water', reflecting various components of the fee in different economic sectors; incentives to encourage behaviour change such as charging lower base values for residual water use and charges proportional to the amount of water abstracted so that the marginal cost of water use is never zero. Furthermore, transparent, accurate information on the impacts of water pricing can help overcome political barriers to further action.

E6 BIODIVERSITY AND LAND-USE & MANAGEMENT

Loss of biodiversity has reached an unprecedented pace in the EU, with the assessment of the Habitats Directive for 2007–2012 showing that only 23% of assessed animal and plant species and 16% of the assessed habitat types were in a favourable conservation status in that period, with 60% of species and 77% of habitats in unfavourable conditions. Whilst the EU Biodiversity Strategy to 2020 aims to halt the loss of biodiversity and ecosystem services and to restore ecosystems where feasible, the mid-term review shows that whilst progress has been made, biodiversity loss and ecosystem degradation are continuing. With almost half of EU land covered by farmland and over 42% by forests and woodland, proper management of these land uses can play a key role in the conservation and maintenance of biodiversity, as well as carbon storage, water regulation, protection against natural disasters, reduction of soil erosion, and provision of recreational activities.

Economic instruments can be used to improve the sustainability of agricultural and forest land to complement the legislation in place on pollution limits and required management practices. Examples include fertilizer and pesticide taxes, fishing and hunting fees, public and/or private financing for the conservation and sustainable use of forests, and payments for ecosystem services. The following cases were examined:

- Austrian tree protection act (Vienna);
- Croatian Forest Public Benefit Fee;
- Forestry-related payments in Slovenia and Spain (Girona province);
- Danish pesticide tax;
- Danish animal feed mineral phosphorus tax;
- Italian phytosanitary product tax;
- Swedish fertilizer tax;
- Irish fishing fees and Estonian hunting/fishing fees;
- Icelandic fisheries instruments;
- German result-based agri-environment measure (Baden Württemberg)
- German biodiversity offsetting;
- Portuguese ecological fiscal transfers; and
- Finnish tax on the use of peat for energy.

The scale of revenues and their use varies across the analysed instruments. In several cases, the revenues are **earmarked for environmental projects and activities** (e.g. Italy, Croatia, Estonia, Ireland, Iceland, Austria, Germany). In **other cases there is no earmarking**, for example in the case of Portuguese ecological fiscal transfers (EFTs), where municipalities can decide how to use revenues. Earmarking is not relevant for several other instruments, which instead aim to remunerate environmentally beneficial activities, for example through payments for ecosystem services (e.g. Germany, Spain, Slovenia).

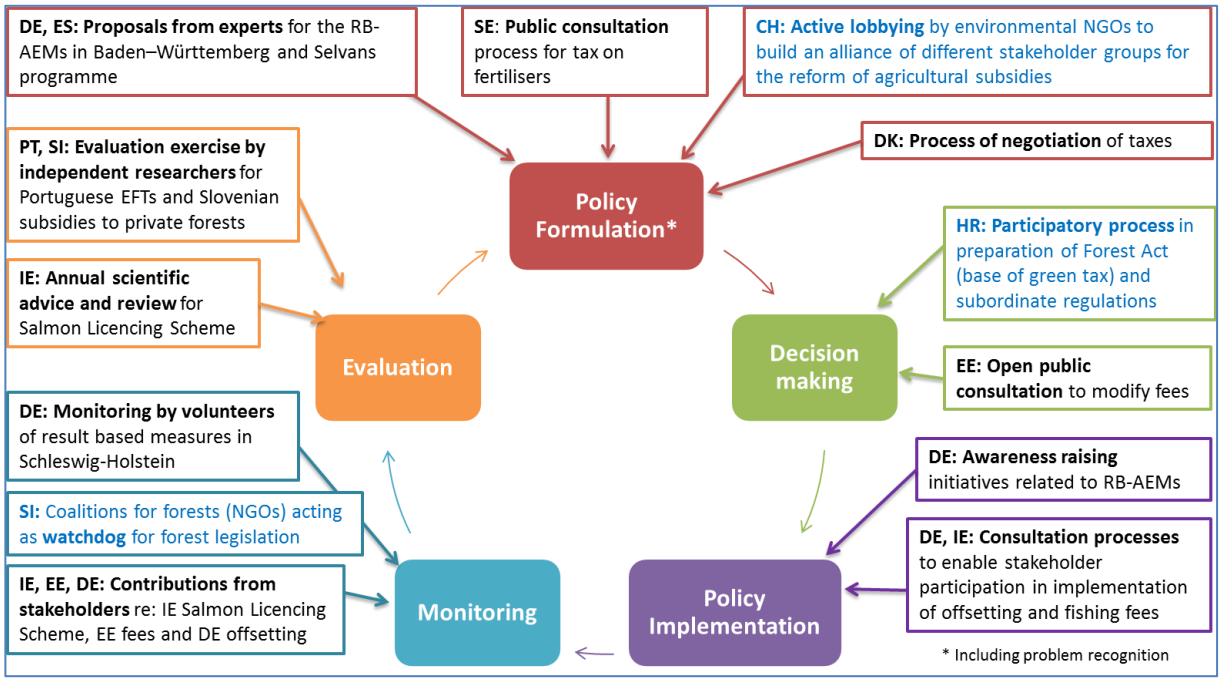
Many of the instruments were introduced as part of a wider package of measures which offered a window of opportunity for their establishment (e.g. Denmark, Slovenia, Portugal, Germany, Ireland, Croatia, Estonia, Iceland, Italy). In several cases, experts have identified the need for (improved) instruments (e.g. Ireland, Denmark, Italy, Spain, Slovenia, Portugal). The increased use of RB-AEMs is partly in response to the desire for more cost-efficient and effective CAP-related instruments. Meanwhile, one important barrier to the introduction of subsidy-based instruments is the lack of financial resources.

The environmental effectiveness of some of the taxes has been limited so far, sometimes due to inadequate design (e.g. Finland) and the low level of taxes (e.g. Danish

phosphorus tax). **Other instruments have had more significant impacts**, such as reduced salmon fishing (Ireland), recovering fish stocks (Iceland), improved forest management (Croatia) and reduced sales of certain phytosanitary products (Italy). Whilst the impact of subsidies to farmers or forest owners tends to be difficult to assess, the results of the cases in this study appear variable, with the land area being covered by some instruments declining (e.g. Slovenia, Germany), but with increased or maintained levels of coverage in others (e.g. Spain, Vienna). For several of the instruments studied, the environmental impacts have not yet been formally estimated (e.g. German offsetting, Estonia, Portugal). Some positive economic impacts have been observed, including job creation (German offsetting), more economically profitable fisheries (Iceland) and contributions to municipal budgets (Portugal), although some job losses have also occurred (Iceland). Social benefits of the instruments include increased opportunities for research, recreational and tourism activities related to forests (Spain, Slovenia, Croatia) and demining of land allowing land to be constructively used again (Croatia).

Civil society bodies that have engaged with biodiversity and land-use related instruments include farmers' organisations, hunters and fishermen, fertilizer producers, landowners, coastal communities, (environmental) NGOs and scientific experts and academia (see Figure E6). Types of engagement have included formal public consultation processes (Denmark, Sweden, Ireland, Iceland, German offsetting) and lobbying by/negotiation with impacted groups (Denmark, Estonia, Ireland, Sweden, Slovenia). In other cases there has been somewhat limited participation by citizens' groups (Portugal) or a lack of consultation processes (Croatia). Key experts played an important role in promoting and designing several of the instruments (e.g. German RB-AEM, Denmark, Spain, Slovenia, Portugal, Ireland, Italy). In some cases, civil society plays an important implementation role (e.g. Spain, Germany).

Figure E6 Examples of civil society engagement with biodiversity and land use & management instruments



Key: Text in black are examples from the study cases; text in blue examples shared at the workshops

Several lessons can be drawn from the case studies related to biodiversity and land use, including: the potential for well-designed instruments to encourage behaviour change that leads to environmental benefits; the contribution that revenue earmarking can make to an instrument's success; the benefits of engaging key stakeholders in

instrument design; the potential for compensatory measures to offset impacts on certain groups and gather support for an instrument; the importance of communicating an instrument's objectives; the need for proper monitoring and enforcement of an instrument; and the contribution that scientific research can make towards ensuring the effectiveness and credibility of an instrument.

E7 KEY DESIGN ISSUES AND INSIGHTS FROM BEST PRACTICE

Based on country experiences with the use of economic instruments to address pollution and natural resource use, some key lessons learned from the design and implementation of these instruments and best practices include the following:

Prior to the introduction of an economic instrument, it is very important to define precise objectives and to carefully tailor the design of the instrument in line with this. **Clear objectives linked to specific environmental goals can increase the acceptability of economic instruments and contribute to their success.** For example, the Belgian Environmental Charge and Irish plastic bag levy were both accompanied by successful communication campaigns which made the environmental link clear.

The **tax rate applied and adopting a phased, predictable approach to future change** has a strong impact on the effectiveness of an economic instrument and its ability to stimulate behaviour change. Successful approaches include adopting a low initial tax rate with predictable increases (as with the UK landfill tax) or a high initial rate to give a strong behaviour signal (as with the Swedish NOx fee which was made possible by a connected reimbursement mechanism which helped increase its acceptability).

The **scope of the tax base, where/on whom it is applied and how it is calculated** can influence the effectiveness of the instrument, its ability to achieve the desired behaviour change and its acceptability. For example, including health and environmental impact considerations in the calculation of the Danish pesticide tax is expected to enhance its effectiveness. By increasing the price of recreational and commercial salmon fishing licenses, the licencing scheme for salmon fishing in Ireland ensured a fair distribution of the conservation burden between stakeholders which helped increase support.

Managing administration costs can help convince affected economic operators that an instrument will not be unduly burdensome (as with the plastic bag levy in Ireland for which revenue collection and reporting is easily integrated in retailers Value Added Tax (VAT) collection systems).

Other design features can also incentivise behaviour change, for example:

- A **reimbursement of revenues** to affected groups (as with the Swedish NOx fee and SO_2 taxes whose revenues are reimbursed to more energy-efficient and lower-emission plants respectively), **applying exemptions or reduced charges** for certain activities (e.g. reduced air pollution fees applied to businesses in the Czech Republic with emissions below BAT concentrations and lower base values for residual water use in Portugal).
- Some instruments influence behaviour by **making environmentally harmful activities more expensive** (e.g. an increase in the Lithuanian environmental pollution tax on batteries encouraged wider adoption of producer responsibility measures to avoid paying the tax and under the Benelux PAYT schemes, households tend to generate less waste after the introduction of fees).
- Some instruments **influence behaviour by increasing awareness of the benefits of certain activities** (e.g. the result-based agri-environment measure in Baden-Württemberg, Germany increased farmer's knowledge of the impact of their farming practices on grassland biodiversity and on the importance of conserving grassland biodiversity as well as helping to raise public awareness on the importance of species-rich grassland and the role of farmers in its conservation).
- Specific **design features can also stimulate innovation and investment**. For example, the water pollution levy in the Netherlands stimulated investment in

innovation in water and waste water treatment plants as companies sought to reduce their levy payments by cutting emissions. Similarly, the Swedish NOx fee stimulated innovations within regulated plants through the refund system and a requirement to install monitoring equipment.

Introducing economic instruments as **part of a wider package of measures** can provide a window of opportunity for their establishment and ensure coherence with other policies (e.g. the Danish pesticide tax and revised Estonian mineral resource extraction charge formed part of wider green tax reform efforts). The policy mix/package can also influence the effectiveness of economic instruments, complementing the incentive role played by taxes. For example, the Austrian landfill tax was part of a successful package of measures which included a ban on the landfilling of waste with a total organic carbon content of over 5% and an incineration tax. In Finland, synergies between the packaging tax and deposit refund system has been important in encouraging high rates of use of the deposit system.

Clear communication is critical to the success of an economic instrument and can help increase acceptance. Some examples of good approaches to communication among the cases include transparent communication on the Estonian hunting and fishing fees which enabled the public to understand why sustainable use of natural resources is important; the successful publicity campaign to launch the plastic bag levy in Ireland and the communication campaign and industry voluntary agreement which preceded the introduction of an environmental charge on single-use plastic bags, plastic film, aluminium foil and disposable plastic cutlery in Belgium.

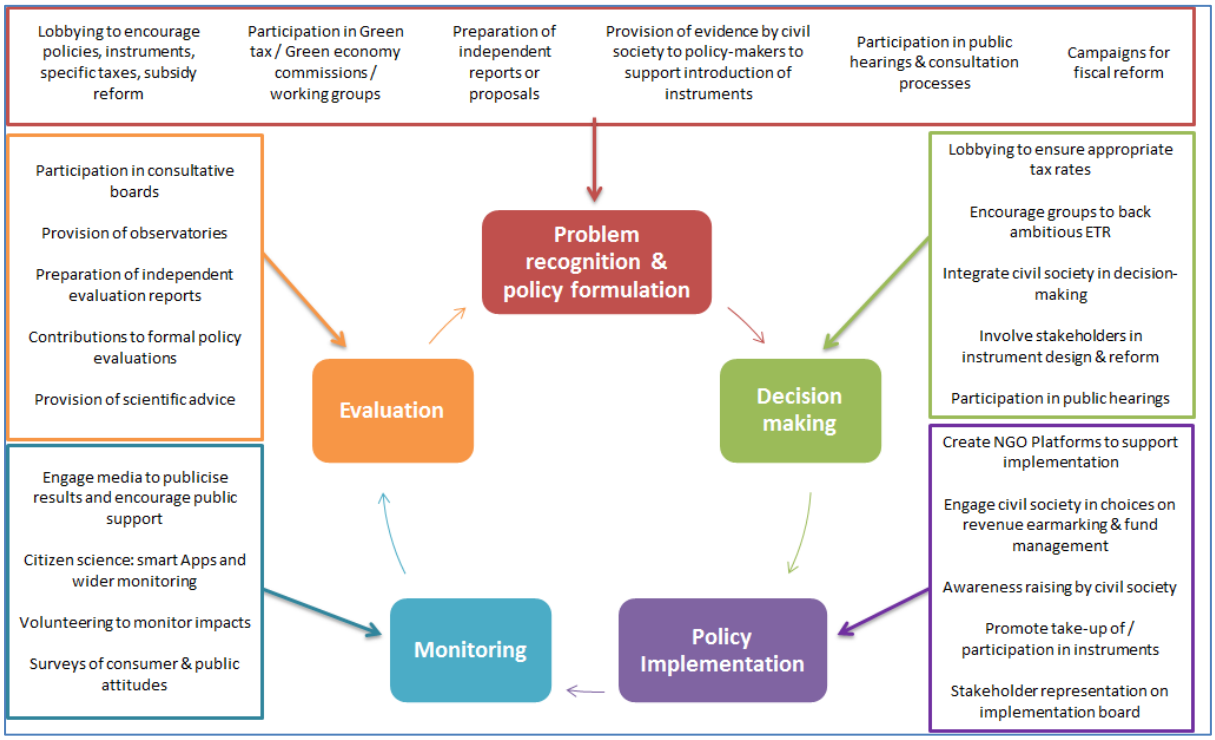
How revenues from economic instruments are used has an important influence on the impact and effectiveness of the instrument, its political and public acceptability, its potential to mitigate adverse impacts and overcome obstacles. Revenues can be used to reduce opposition to the introduction an instrument and increase acceptability for example by helping those affected, especially early adopters, innovators and vulnerable groups (e.g. revenues from the UK landfill tax are used to offset a reduction in employers' social security contributions, revenues from the Danish pesticide tax are recycled back to the agricultural sector and revenues from the Swedish NOx fee are repaid to power plants based on emissions). The earmarking of revenues for environmental purposes can increase acceptance of the instrument and enhance its effectiveness, as illustrated by the Romanian packaging charge (revenues are paid into an Environmental Fund), Polish wastewater fee (revenues are allocated to National (and Regional) Funds of Environmental Protection & Water Management) and Bulgarian abstraction charges (which co-finances investments in the water sector).

Finally, **regular monitoring and evaluation** of the impact of instruments (including unintended impacts) and subsequent revisions are critical to ensure their continued effectiveness. A number of countries have revised economic instruments based on the results of evaluation processes and/or in recognition of the ineffectiveness of the current instrument design, helping to improve the effectiveness of the instruments and its acceptability (e.g. air pollution fees in the Czech Republic were revised in 2012 to introduce higher fees and annual increases, after recognition that they were ineffective).

E8 ROLE AND IMPORTANCE OF CIVIL SOCIETY ENGAGEMENT

The case studies and workshops highlighted the key role a range of civil society organisations play in relation to economic instruments to address pollution and natural resource use. Depending on the type of instrument and the environmental theme addressed, this may include: NGOs; industry and business (e.g. waste management, water agencies, producers and manufacturers, trade associations, agricultural bodies, hunters and fishers); political parties; academics, individual and scientific experts; consumers; landowners; and the public. These groups have had varying levels of engagement with and influence over the design, introduction and implementation of economic instruments in the EU-28 (see Figure E7).

Figure E7 Examples of civil society engagement throughout the policy cycle



Source: Case studies and Workshops

In the **problem recognition and policy formulation stage**, civil society can play an important role in helping to make a **case for the introduction of economic instruments by identifying the need for (further) action**. Indeed, experience to date suggests that civil society engagement has largely focused on this stage in the policy cycle through formal consultations, informal discussions and lobbying. For example, the Hungarian NGO Clean Air Action Group kick-started discussions on an air pollution charge that was later adopted. Public and NGO pressure led to the introduction of the Austrian landfill tax, whilst academics, scientists and NGOs provided inspiration for ecological fiscal transfers in Portugal and biodiversity offsetting schemes in Germany.

In the **decision-making phase**, civil society can **shape the design of economic instruments through engagement in stakeholder consultation processes and help increase their acceptance**. For example, the salmon fishing licence in Ireland was designed following meetings with 46 different agencies, organisations and individual stakeholders, leading to a perceived fair distribution of burdens amongst recreational and

commercial fishers. Formal consultations on Swedish air pollution taxes, the Irish plastic bag levy and the Slovenian Forest Act helped ensure each instrument's acceptability among affected actors and enhance its effectiveness.

The case studies demonstrate that civil society can also **support the implementation of economic instruments**, although experience has been limited to date. In some cases, civil society organisations are involved in the management of instruments (e.g. the Finnish DRS and the Selvans programme in Spain), consulted on changes in fees (e.g. salmon fishing licence in Ireland and Estonian fishing rates) and involved in decisions on the distribution of revenues from instruments (e.g. UK aggregates levy). Civil society can also play an important role in raising awareness on economic instruments (e.g. civil society initiatives motivate farmers and spread awareness on the importance of species-rich grassland in Baden Württemberg).

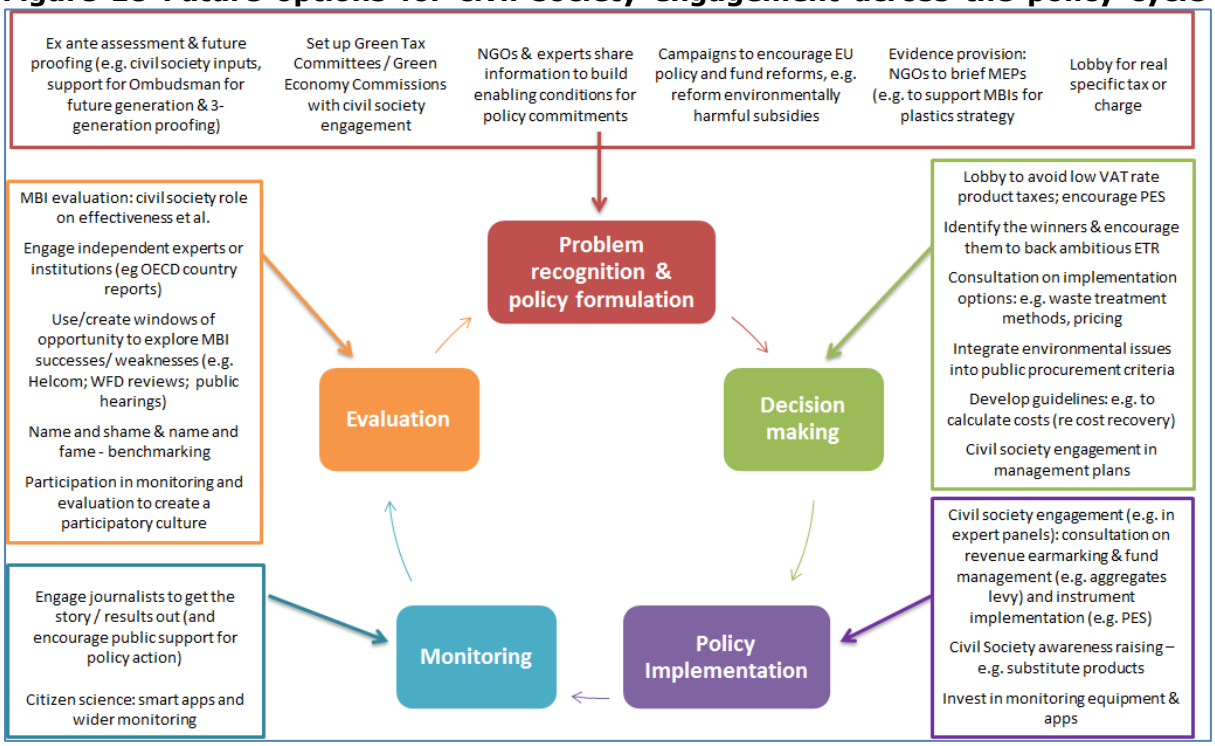
There are also a limited number of examples of civil society being involved at the **policy monitoring phase** such as the involvement of industry and other organisations in monitoring and reporting on air pollutant emissions (e.g. in Sweden and Slovakia), monitoring by volunteers (e.g. result-based measures in Germany, voluntary beach clean-ups related to marine litter in Ireland) and NGOs (e.g. in monitoring plastic on beaches in the Netherlands).

Finally, civil society organisations can usefully be engaged at the **policy evaluation stage** to gather evidence on the impacts of instruments which can support an evidence-based revision of the instrument as necessary. For example, stakeholder inputs supported the evaluation and revision of the UK landfill tax, a consultation board of environmental NGOs was responsible for assessing the effectiveness of the Latvian packaging tax, academics were closely engaged in the evaluation and revision of Czech air pollution fees and independent researchers were involved in the evaluation of Portuguese EFTs and Slovenian subsidies to private forests.

Opportunities for further civil society engagement

The cases examined indicate that to date, a core contribution of civil society organisations, notably NGOs, has been to focus mainly on the policy formulation stage in particular to show that there is an environmental (or social) problem so that it receives policy attention and makes its way on to the policy agenda**.** While this is still expected to be a fruitful area of focus in the future, with further contributions to the evidence base and engagement in consultation processes, institutions and lobbying campaigns, workshop participants felt that civil society organisations could also play a more significant role in other steps of the policy cycle (see Figure E8).

Figure E8 Future options for civil society engagement across the policy cycle



Source: Case studies and Workshops

Potential areas for further civil society engagement include a more active role in the **decision-making phase** depending on the issue under discussion and the type of civil society organisation involved (i.e. taking part in the design of instrument management, supporting and disseminating guidance); **policy implementation phase** (i.e. participate in expert groups, contribute to consultations on earmarking of revenues, awareness raising, encouraging good practice); **monitoring** (i.e. in situ monitoring of the impacts of instruments, making use of new technologies such as smartphone apps, contribute to the evidence base through citizen science); and **evaluation** (e.g. encourage independent analysis, publish own reports using benchmarking, 'name and fame' or 'name and shame' approaches).

E9 THE WAY FORWARD

It is increasingly clear that correcting economic signals will be a core part of the solution to addressing multiple sustainability challenges from resource scarcity, water scarcity and air pollution to biodiversity loss and marine litter among others. MBIs, including environmental taxes and budgetary reforms will play a key role in this regard by helping to shift the behaviour of businesses and citizens towards a more sustainable path. They also generate public revenues which can be used to support various strategic priorities, including environmental objectives. MBIs can therefore help to achieve the goals and targets of legislation, and can also prove beneficial in promoting progress on wider environmental, social and economic objectives even where there is currently no legislation in place.

This study has highlighted a range of experiences with MBIs in different environmental areas among the 28 EU Member States. These experiences provide insights on best practices in the **design of such instruments** and the **role of civil society stakeholders in the policy-making processes**. Civil society organisations have undoubtedly been effective on many occasions at **making the case for environmental tax reform**, but have often missed opportunities to help at other stages of the policy cycle, in particular with implementation.

There is much to learn from these experiences to date – and **an accelerated peer-to-peer, Member State to Member State, exchange of best practices could be a promising way forward.** This, together with potential new coalitions of like-minded countries to take forward new pilot actions on environmental fiscal reform, could be valuable complements to (soft) harmonisation approaches already being adopted. National policy- and decision-makers in the EU Member States should arguably engage more with civil society to use its expertise to promote change with wide-ranging citizen support. Governments are public servants, there for public interest, and civil society have their fingers on the public pulse and provide a voice to the public. There should therefore be a **natural cooperation to meet common objectives** – access to a clean environment and safeguarding resources for both this and future generations. Collaborating to get signals in the economy to support these objectives is a question of good governance, and **there remains scope for further efforts in this area with potential economic, budgetary, social and environmental benefits.**

There is a need to better understand current windows of opportunity to take this agenda forward, what other opportunities could be created and how civil society can input into them. Opportunities include the motivation provided by international actions such as the Paris Agreement, biodiversity agreements and the UN Sustainable Development Goals, as well as ongoing discussions on future EU policies, including those related to circular and green economy, agriculture policy, and environmental fiscal reform more generally. Furthermore, there is a **need for more active engagement of civil society throughout the policy cycle to support the transition towards appropriate resource, product and pollution pricing needed for a transition to a green and circular economy in the EU**.

It is intended that the results of this study will feed into two work streams of the European Commission. Firstly, they will be used to make suggestions on **incorporating environmental tax reforms in country-specific recommendations through the Greening the European Semester process**. Secondly, they will feed into the **two-yearly Environmental Implementation Review**, to help Member States implement EU environmental policy. In addition, the case studies and wider study findings should make a valuable contribution to **supporting Member State national, regional and local governments** on the one hand, **and civil society organisations** on the other, **in promoting market-based instruments for environmental improvements and fiscal reform.**

FINAL REPORT – MAIN REPORT

1. INTRODUCTION

Context for the study

Economic instruments, in particular environmental taxes, are increasingly used in the field of environmental policy and are considered an important part of the policy mix to support the transition to an inclusive green economy. When carefully designed, such instruments can help shift consumer and business behaviour towards more sustainable activities, helping to reduce pollution and environmental degradation, improve health, encourage resource efficiency and address global challenges such as climate change. Environmental taxes can also generate public revenues which can be used for different purposes, for example to support broader fiscal reform, contribute to priority investments or help deliver the Sustainable Development Goals and the Paris Climate Agreement.

Experience with the use of environmental taxes has grown over the past two decades and has attracted increasing attention in recent years. This renewed interest has been driven by various considerations from the need for fiscal consolidation in some countries; to concerns over impacts on the environment, human health, biodiversity, energy, resource and food security; appreciation of the limitations of more traditional 'command and control' approaches; recognition of the cost-effectiveness of economic instruments; or to support wider policy objectives, such as boosting employment or stimulating growth.

Several commitments relating to environmental taxes have been adopted at the national, sub-national, regional and international level. At the EU level, calls for further action on environmental taxes and subsidy reform have appeared in several country-specific recommendations under the European Semester and in policy discussions on climate change, resource efficiency, marine litter and the circular economy. The Flagship Initiative for a Resource-Efficient Europe under the Europe 2020 Strategy sets a target for environmental taxation to account for 10% of total revenues from taxes and social contributions by 2020. Environmental taxes, charges and levies are already in place in several European countries across different areas. The main focus of efforts to date has been in the area of energy and transport, with limited action in relation to issues of pollution and resource use. Plans and initiatives are also underway in several countries to introduce new environmental taxes or to amend existing systems.

Despite these positive trends, such instruments are not widely used. In the EU, revenues from environmental taxes amounted to just 2.4% of EU-28 GDP, with significant diversity in national experiences ranging from around 4% of environmental tax revenues to GDP in Croatia and Denmark to below 2% in Slovakia, Lithuania, Luxembourg, Spain, Ireland and Germany. The proportion of environmental taxes in total revenues from taxes and social contributions also varies significantly across Member States, from around 10% in Croatia, Slovenia, Greece and Bulgaria to less than 5% in Belgium, France and Luxembourg[2].

Moreover, environmental taxes currently in place have only led to relatively marginal changes in the tax system and incentives in the economy as a whole, partly due to how such taxes have been designed and implemented to date which has influenced their effectiveness and overall impact. Thus, there remains scope for the wider application and more effective use of such instruments which can lead to further economic, social and environmental benefits. For example, a 2016 study for the European Commission

[2] Eurostat, Environmental tax statistics, http://ec.europa.eu/eurostat/statistics-explained/index.php/Environmental_tax_statistics [accessed 21/6/2017]

estimated that shifting taxes from labour to pollution in the EU-28 Member States could generate around EUR 100 billion in 2018, rising to EUR 208 billion in 2030[3].

Objectives and tasks of the study[4]

Environmental taxation efforts to date have mainly focused in the areas of energy, transport and climate. To complement this existing experience, this study investigated the use of economic instruments to address pollution and natural resource use, in order to contribute to a broader development and application of market-based instruments (MBIs), and in particular environmental taxes, in the field of environmental policy. The objectives of the study were to improve the knowledge base, to stimulate exchanges of experience and best practice amongst civil society stakeholders, and to help organisations to become better prepared to participate in policy-making processes at both the national and EU levels. The study took a broad definition of civil society, including NGOs, business, academia and citizens, to ensure balanced representation of stakeholder inputs throughout the project and to capture a range of useful examples of engagement to be taken into account in the analysis.

During the first task of the study, an inventory was compiled of MBIs to address pollution and resource use that are currently in place in the 28 EU Member States. The inventory drew on existing databases and the knowledge of the study team, and gathered information on, for example: environmental relevance, governance level, year of introduction, rationale for the instrument, rates and revenues raised, who pays and collects, and exemptions. The inventory focussed on eight environmental areas, chosen due to their relevance for stakeholders. These environmental areas, and the types of instruments reviewed, are summarised in Table 1 below. In addition to the inventory, a questionnaire was sent to civil society representatives across the EU to gather information on their engagement with the development and implementation of MBIs. This information helped to identify: areas where civil society has already been involved in the development and implementation of instruments, areas where more engagement is needed, and opportunities for future civil society engagement.

[3] Eunomia, Aarhus University, IEEP, ENT (2016) 'Study on Assessing the Environmental Fiscal Reform Potential for the EU 28', Final Report to DG Environment of the European Commission, http://www.eunomia.co.uk/reports-tools/study-on-assessing-the-environmental-fiscal-reform-potential-for-the-eu28/

[4] The project was led by the Institute for European Environmental Policy (IEEP), with joint contractors Danish Centre for Environment and Energy (DCE) of Aarhus University and ENT Environment and Management. The other consortium partners were: Eunomia Research & Consulting Ltd, Green Budget Europe, the Institute for Environmental Studies at VU University (IVM), Cambridge Econometrics, Denkstatt GmbH, Netherlands Environmental Assessment Agency (PBL), Galovic Consulting, Stockholm Environment Institute Tallinn Centre (SEI Tallinn) and Ekokonsultacijos JSC. The consortium also included three independent experts: Janis Brizga, Prof. Theodoros Zachariadis (Cyprus University of Technology) and Katja Kavcic Sonnenschein.

Table 1 Market based instruments in Europe (and case studies selected for analysis*)

	Air pollution	Waste management & products	Materials	Water quality	Marine litter	Water stress & availability	Land use & management	Biodiversity
	NOx taxes/fees, SOx taxes/fees, PM taxes/fees and other air pollution taxes/fees	*Incineration tax, Landfill tax, Pay-as-you-throw (PAYT) Scheme, Packaging tax, Plastic Bag fee, Product fee, Deposit Refund Scheme, Producer fee*	*Aggregates tax, Natural Resource tax*	*Fertilizer tax, Pesticide tax, Waste water charge/tax, Other pollution tax, Natural resource tax, Other*	*Packaging tax, Plastic bag fee, Product fee, Producer fee, Other waste tax, Other*	*Water abstraction tax/charge; water pricing including cost recovery*	*Land taxes, PES, timber/ forestry/ stumpage fees, pesticide and fertilizer taxes*	*Stumpage fee, pesticide tax, fertilizer tax, wildlife/hunting tax, PES, ITQs, offsets / habitat banking*
Austria		Landfill tax						Vienna tree protection act
Belgium		Packaging charge and Environmental charge, Pay-as-you-throw			Packaging taxes			
Bulgaria						Water abstraction charge		
Croatia								Forest Public Benefit Fee
Cyprus						Water pricing		
Czech Republic	Air pollution fee (PM_{10}, SO_2, NOx)							
Denmark				Pesticide tax; Animal feed mineral phosphorus tax			Tax on animal feed mineral phosphorus	
Estonia			Natural resources charges					Hunting and fishing fees
Finland		Deposit refund scheme	Peatland tax reform		Deposit refund scheme & packaging tax			Peatland tax reform
France						Water abstraction charges		
Germany							Biodiversity offsetting; Result-based agri-environment measure	
Greece		Landfill tax						

Hungary	Air pollution load charges (SO_2, NOx, non-toxic dust)							
Ireland		Plastic bag levy			Plastic bag levy			Fishing fees
Italy				Phytosanitary product tax			Phytosanitary product tax	
Latvia		Packaging tax			Packaging tax			
Lithuania		Environmental pollution tax			Environmental pollution tax			
Luxembourg		Pay-as-you-throw						
Malta						Water pricing		
Netherlands		Pay-as-you-throw			Rotterdam & Amsterdam port fee reductions	Taxes and fees of regional water authorities		
Poland				Wastewater fee				
Portugal						Water resources fee		Ecological fiscal transfers
Romania		Packaging charge (Producer Responsibility)			Packaging tax			
Slovak Republic	Air pollution fee (PM_{10}, SO_2, NOx)							
Slovenia							Payments for private forest management	
Spain	Tax on fluorinated greenhouse gases						Mature forest payments in Girona province	
Sweden	NOx tax and SO_2 tax			Fertilizer tax			Fertilizer tax	Fertilizer tax
United Kingdom		Landfill tax	Aggregates Levy					
Others: Iceland								Iceland: Fisheries ITQ and Resource tax

* The instruments for analysis were selected: on the grounds of environmental/thematic interest; to ensure coverage of a wide range of instrument types; and to ensure appropriate geographical coverage and balance (to give each country at least one in-depth case study). Please note that the table is not intended to be a full and comprehensive picture of all instruments in place around Europe, but rather to give an indication of the widespread use of such instruments.

The second task analysed the use of a number of MBIs to address pollution and resource consumption. In total, 40 specific economic instruments, each relevant to one or more of the eight environmental areas, were selected for this more detailed analysis. Under this task, the following aspects were investigated: instrument design, reductions and exemptions granted, revenue raised and any earmarking that takes place, links to other policies/instruments, political processes behind the instrument's introduction, the role of civil society in the development/implementation of the instrument, how the instrument is perceived by stakeholders, environmental effectiveness and insights, distributional and competitiveness impacts, and elements of best practice. Table A1 in Annex 1 of this report contains a brief overview of the key features of all 40 case studies conducted within the study. The case studies are arranged by Member State, and the relevant environmental areas are indicated for ease of reference when reading each thematic chapter of this report.

Under the third task, five one-day workshops were organised throughout the EU during March and April 2017. Each workshop was organised in different location, with both a focus on a particular environmental theme and a geographical focus on a specific group of EU Member States. Around 30 stakeholders, including representatives of civil society organisations, government and academia, participated in each workshop. The themes, locations and geographical focus of the workshops are outlined in Table 2 below.

Table 2 Regional workshops organised within the study

Workshop theme	Location and date	Geographical focus
Circular economy Waste management & products; materials	**Amsterdam, Netherlands** 10 March 2017	Belgium, Estonia, Ireland, Luxembourg, Netherlands, UK
Water stress & availability	**Barcelona, Spain** 27 March 2017	Bulgaria, Cyprus, France, Greece, Malta, Portugal, Spain
Water quality Water quality/pollution; marine litter	**Copenhagen, Denmark** 3 April 2017	Denmark, Finland, Latvia, Lithuania, Sweden
Biodiversity & land use Biodiversity; land use & management	**Berlin, Germany** 25 April 2017	Austria, Croatia, Germany, Italy, Slovenia
Air pollution	**Budapest, Hungary** 25 April 2017	Czech Republic, Hungary, Poland, Romania, Slovakia

The workshops presented findings of the MBI analysis undertaken within the study, through the use of presentations by experts. Each workshop also included several interactive sessions to facilitate the exchange of experiences and best practices amongst stakeholders, helping to build capacity. The workshops also enabled the project team to gather additional information and views of stakeholders on how the study findings can be used to enable greater engagement of civil society with policy making in the future.

The final task was to ensure the consolidation and dissemination of the study results to contribute to building capacity amongst civil society to support the further development and use of environmental taxes and budgetary reform in the area of environmental policy. This report represents the first part of the task. The second part is the final conference that was held in Brussels in October 2017. This report and the conference aim to present lessons learned from the successful use of MBIs to date, and to identify the way forward for the further development of environmental taxation and budgetary reform in the EU.

2. AIR POLLUTION

The issues and challenges

Air pollution remains a significant environmental concern and is the single most important health challenge in Europe. Across the EU, an estimated 400,000 people die prematurely every year due to poor air quality[5]. In addition to impacts on human health, air pollution also has impacts on the environment (e.g. excessive nutrients, destruction of ecosystems) and the economy. For example, according to a recent study by the World Bank, the estimated cost of welfare losses from air pollution in Europe and Central Asia in 2013 was USD 1.2 trillion, which is equivalent to 5.1% of regional GDP[6]. Economic costs resulting from health impact of air pollution are estimated to be between EUR 330-940 billion in the EU alone[7]. These welfare losses are largely caused by exposure to ambient air pollution from fine particulate matter.

Air quality policies need to address a range of pollutants from various mobile and stationary sources. Some of the main air pollutants of concern across EU Member States are presented in Table 3 below. There are also a number of other pollutants relevant to human and ecosystem health such as carbon monoxide, toxic metals, volatile organic compounds or benzo[a]pyrene (the latter is especially relevant in Eastern Europe).

Air quality is a concern from a Europe-wide perspective, as many pollutants are transboundary in nature. From a local point of view, cities are often hotspots for poor air quality and associated health risks. EU policies target emission of pollutants mainly at source level. EU legislation targeting stationary sources include the Directive on Industrial Emissions and the Directive on Medium Combustion Plants. Other legislation targets mobile emissions for example from passenger or commercial vehicles. Furthermore, the National Emissions Ceilings Directive introduced limits for four pollutants responsible for acidification, eutrophication and ground-level ozone pollution (sulphur dioxide, nitrogen oxides, volatile organic compounds and ammonia).

Despite existing legislation, air quality remains problematic in many cities and regions across the EU. There are regular exceedances of air quality standards as laid down in the Air Quality Guidelines (AQG) of the World Health Organisation and in EU target and limit values for specific pollutants, especially particulate matter, ozone and nitrogen oxides, while sulphur dioxide is now less of a concern than in the past.

[5] EEA (2015) Air Quality in Europe – 2015 Report, EEA Report No 5/2015, European Environment Agency, http://www.eea.europa.eu/publications/air-quality-in-europe-2015

[6] World Bank and Institute for Health Metrics and Evaluation (2016). The Cost of Air Pollution: Strengthening the Economic Case for Action. Washington, DC: World Bank. License: Creative Commons Attribution CC BY 3.0 IGO, https://openknowledge.worldbank.org/bitstream/handle/10986/25013/108141.pdf?sequence=4&isAllowed=y

[7] European Commission (2013) COMMISSION STAFF WORKING DOCUMENT SWD (2013)531. IMPACT ASSESSMENT, http://ec.europa.eu/environment/archives/air/pdf/Impact_assessment_en.pdf

Table 3 Air pollutants of concern across the EU

Pollutant(s)	Main sources	Exceedance of standards in 2013
Particulate matter ($PM_{2.5}$, PM_{10})	Household/commercial heating, industrial processes, road transport	17% of EU-28 urban population exposed to PM_{10} above the EU daily limit value
Nitrogen oxides (NO_x)	Road transport, industrial activities, electricity and heat production	9% of EU-28 urban population exposed to NO_2 above the EU annual limit value
Ozone (O_3)	Not emitted directly, built up through other pollutants such as NO_x, volatile organic compounds	15% of EU-28 urban population exposed to O_3 above EU target value and 98% above WHO air quality guidelines (AQG) value
Sulphur dioxide (SO_2)	Electricity and heat production, industrial activities	Trend of decreasing exposure over past decades. Exposure of urban population to concentrations above the EU daily limit value under 0.5%

Source: EEA, 2015

Tools used and design choices: similarities and differences

A number of different types of economic instruments can be used to address air pollution, for example taxes and charges on different types of air pollutant substances (e.g. NOx, SO_2, PM, NH_2, heavy metals, VOC, CO, NH_3, hydrocarbons, dust, cadmium, mercury, asbestos; and ozone depleting substances) and air pollution non-compliance fees. While this study has primarily focused on stationary emissions, various transport-related economic instruments such as vehicle registration and circulation taxes, transport fuel taxes and traffic congestion charges can also be used to address air pollution. The economic instruments addressed in this study may, however, also allow some conclusions to be drawn that could also be applied in the context of mobile sources of air pollution, although the specifics of the design of instruments could of course vary.

The air pollution instruments selected for case studies were:

- Czech air pollution fee;
- Hungarian air pollution load charges;
- Slovak air pollution fees;
- Spanish tax on fluorinated greenhouse gases; and
- Swedish NOx fee and SO_2 tax.

A summary of the key details of the specific instruments assessed for this chapter is provided in Table A1 in Annex 1, which provides information on the rates, revenues and impacts of the analysed instruments.

The **design of these instruments varies significantly**. Although four of the instruments cover emissions of SO_2 and NOx, the rates applied vary substantially from the high tax rates applied in Sweden to the much lower rates applied in Hungary and Slovakia. The Czech fees were increased in 2012 and rates are progressively increased each year. In some cases, the taxes have been introduced alongside other policies such as regulation (e.g. in Sweden), emission limits and penalties (e.g. Czech Republic) and wider policy packages (e.g. package on environmental load charges in Hungary). The rates applied have had a strong impact on the effectiveness of the instruments and their ability to stimulate change in industry behaviour as discussed further below. Other pollutants covered by the studied instruments are PM_{10}, small sources, non-toxic dust and fluorinated gases (F-gases).

Some of the instruments have been in place for several decades, such as the original air pollution charges in the Czech Republic and Slovakia which were introduced in the 1960s and subsequently reformed over the years, while others have been adopted more recently such as the measures in Hungary and Spain. The instruments have been adopted for various reasons, for example **to raise revenues for government expenditure** in the Czech Republic, Slovakia and Hungary for environmental and other purposes, to **reduce income taxes and address environmental concerns** in Sweden, and to **support budget consolidation and meet climate change commitments** in Spain.

Some instruments have been designed **to incentivise further emission reductions by industry**. For example, the 2012 revision of the Czech air pollution fee reduces the fee paid by businesses that achieve lower emission levels compared to best available technologies (BAT) emission concentrations. Revenues from the Swedish NOx fee are fully reimbursed (minus administrative costs) to the group of taxed plants based on their energy efficiency. The economic incentive motivates the regulated plants to achieve minimal NO_x emissions instead of aiming to be just below the limit values – the limit values give a ceiling for emissions while the tax gives additional economic incentives for further reductions.

Further insights from the analysis of the selected cases are summarised below, Table A1 in Annex 1 provides case-by-case information on rates, revenues and impacts of the analysed instruments.

Raising and using revenues

The scale of revenues raised by the instruments and their use varies significantly across the countries. In Hungary and Spain, revenues from the instruments are **allocated to the general budget**. A large proportion of revenues from the Czech, Polish and Slovakian air pollution fees are paid into the State Environmental Fund and **used to support environmental projects and activities**. For example, in the Czech Republic from 2017, 65% of revenues will be allocated to the State Environmental Fund, 25% of revenues will be allocated to the region where the source of pollution is located (and only used to finance measures for environmental protection) and 10% of revenues will be allocated to the state budget (and only be used to finance Ministry-organised activities related to air pollution).

Revenues from the Swedish SO_2 tax and NOx fee are channelled through an innovative reimbursement mechanism that **returns the revenues to the regulated entities**. In the case of the SO_2 tax, if SO_2 emissions are reduced through cleaning or binding to the ash, a part of the tax proportionate with the saved amount of SO_2 emissions is reimbursed. For the NOx fee, the reimbursement mechanism is based on how energy efficient the plants are, thus firms emitting low volumes of NO_x per unit of energy produced are net beneficiaries of the scheme while only those firms with large NO_x emissions per energy unit are net tax payers. This system of reimbursement reduces potential negative impacts

of the tax on competitiveness and helped increase acceptance of the tax among industry. In general, the tax has stimulated innovation through the refund system (which motivates regulated plants to achieve minimal NO_x emissions instead of aiming to be just below the limit values) and a requirement to install monitoring equipment.

Effectiveness and efficiency insights

The effectiveness of the instruments has also varied significantly between the countries. The low level of the Slovakian, Polish and Czech air pollution fees (until 2012) provided **little incentive for companies to decrease their emissions** and are not considered important factors in the improvement of air quality in these countries since the early 1990s. Rather, other policies such as legal emission limits and penalties, together with a decline in production in heavy industry after 1990 and changes in production processes/technologies are considered important factors motivating emission reductions from large and medium pollution sources. The impact of revised fees applied since 2013 in the Czech Republic is not yet available. The wider **policy mix** can influence the effectiveness of the economic instruments. For example in Sweden, regulations on SO_2 and NOx set limit values and ceilings while the taxes on SO_2 and NOx provide further economic incentives for reductions.

The level of **administrative burden** can also influence the effectiveness of the instruments. In Sweden there is only a very low level of administrative burden since revenues from the NOx fee are fully reimbursed to the industry sector. In the Czech Republic, the 2012 reform significantly reduced the number of regulated pollutants (from over 10 to 4) and the administrative burden of authorities dealing with the fees has decreased.

In contrast to the limited effectiveness of the air pollution charges in Slovakia and the Czech Republic, in Sweden there has been a **dramatic decline in SO_2 and NOx emissions** from 1990 to 2014. Analysis indicates that the SO_2 tax and sulphur regulation have contributed to a lowering of the sulphur content in oils, while NO_x emissions per unit of useful energy produced by regulated plants have declined by 50% since the introduction of the tax in 1992. These declines began before the taxes and regulations were adopted in anticipation of their introduction. Other factors contributing to the decline in SO_2 and NOx emissions in Sweden include CO_2 and energy taxes and the introduction of natural gas in Southern Sweden.

In some countries, it is difficult to assess the effectiveness of the instruments due to a lack of data or limited capacity to analyse available data. For example in Hungary there are currently no publically available evaluations of the effectiveness of the air pollution load charge while in Slovakia, although data on emissions are collected and made publicly available, according to some stakeholders there are not enough resources for a thorough analysis and interpretation of this data. Given the recent adoption of the tax on F-gases in Spain and reduced rates applied in the transitory phase, it is difficult to isolate the impact of the tax on emissions however it is assumed that the tax may have contributed to consolidating existing declining trends in F-gas emissions, however further analysis is required.

Information on **wider impacts of the instruments** is limited with the exception of the case of Sweden. Analysis indicates that the sulphur tax and regulation have led to more cleaning of emissions from coal and peat (and thereby reimbursements to the companies) and induced technological progress. The NOx fee has also stimulated innovation through the refund system and through a requirement to install monitoring equipment - when the fee was introduced in 1992, 7% of the plants subject to the tax had NO_x abatement technologies installed; this increased to 62% the year after and to 72% in 1995. The

sulphur tax and NO_x fee are considered to have only a minor effect on the competitiveness of affected industries due to the reimbursement system. There are some distributional effects of the NO_x fee between different industries as some industries have higher abatement costs, higher emissions and therefore pay a higher net fee than other industries that might have a net benefit from the tax and reimbursement mechanism.

While in some countries more data is available on the impacts of the specific instruments, in general it is very challenging to assess the effectiveness of these instruments in isolation, as the impacts of the wider air quality regulatory framework (e.g. air quality legislation and permits) cannot be fully separated from these.

Box 1 Modelling: Air pollution tax[8]

The study modelled a theoretical air pollution tax based on existing air pollution fees in Sweden:

- General tax rate of around EUR 1 per kg applied to SO_2 and NOx emissions from fuel combustion (coal, oil and gas), mainly from power generation, road transport and some industries;
- Tax introduced from 2017 onwards in all EU Member States;
- Rate assumed to increase with inflation to 2030; and
- Additional scenario included to show macroeconomic impacts if all revenues from the tax are used ('recycled') to reduce labour costs to industries through lowering employers' social security contributions.

Key results

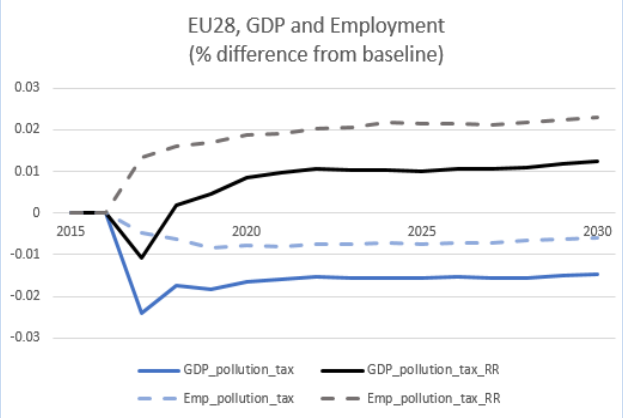
The results are presented as differences from the model baseline, which is consistent with the future trends published by the European Commission[9]:

- Same effects as a tax on fuel consumption, since emissions are associated with fuel combustion;
- In the power sector, higher costs from the pollution tax lead to marginally higher electricity prices (0.5% or around 0.1 cent per kWh on average);
- Households and industries also face slightly higher costs when using other fuels;
- Without revenue recycling, negative GDP impacts, mostly due to reduced consumer spending and export loss. However, trade balance helped by reduction in fossil fuel imports from outside the EU;
- With revenue recycling, double dividend: positive GDP and employment whilst providing a small reduction in emissions. Small emissions reduction partly explained by low tax rate compared with overall fossil fuel costs;
- Utilities, cars and fuel extraction sectors experience biggest loss in output; labour-intensive services sectors experience most gains when revenues are recycled;

[8] Additional information on the modelling exercise, including underlying assumptions and additional explanation of the results, can be found in an Annex at the end of this report.

[9] *EU Reference Scenario 2016: Energy, transport and GHG emissions Trends to 2050*, European Commission and *The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060)*, European Commission.

- Measure expected to raise around EUR 4.6bn in 2017 and EUR 7.5bn in 2030 (2016 prices).



EU28 sectoral output in 2030, % difference from baseline	
Electricity	-0.18
Gas, steam & air con	-0.09
Manufactured fuels	-0.03
Sale of cars	-0.02
Oil and Gas	-0.02
Textiles & leather	0.02
Arts & entertainment	0.03
Hotels & catering	0.03
Food, drink & tobacco	0.03
Other retail	0.04

Source(s): E3ME, Cambridge Econometrics

EU28 Summary of results in 2030, % difference from baseline		
	With revenue recycling	Tax only
GDP	0.01	-0.01
Consumer spending	0.02	-0.03
Imports (extra-EU)	0.00	-0.02
Exports (extra-EU)	0.00	-0.01
Investment	0.00	-0.01
Consumer price index	0.00	0.04
Employment	0.02	-0.01
SO_2 emissions	-0.18	-0.18
NOx emissions	-0.14	-0.15
GHG emissions	-0.16	-0.17
Revenues from pollution tax (m EUR 2016)	7,500	7,500
Source(s): E3ME, Cambridge Econometrics		

Drivers for action, political process and windows of opportunity

Various drivers have supported the adoption of the instruments. For example, the Czech and Slovakian air pollution fees were considered a good instrument to **raise additional revenues to be spent on environmental projects** and activities. Fiscal considerations also played a part in Spain where EU and domestic pressure to introduce an environmental tax reform for budget consolidation purposes together with high costs of GHG emission reductions supported the introduction of the tax on F-gases.

Changes in the political context and **rising public awareness of environmental issues** can also provide an important window of opportunity for action. For example, in Sweden, a political will to reduce income taxes, growing public awareness of environmental problems and changing dynamics in the political system led to the adoption of a package of environmental tax reform (ETR) as part of a wider tax reform in 1990/91. Although there was some industry opposition to initial proposals for taxes on chlorine and sulphur, there was high acceptance of the need for a sulphur taxes to address acidification problems. By contrast, the NO_x fee met with little resistance from regulated entities due to its reimbursement mechanism. In Hungary, the air pollution load charge was also introduced as part of a wider package of environmental load charges (which included load charges on water pollution and soil pollution) and aimed to protect the environment,

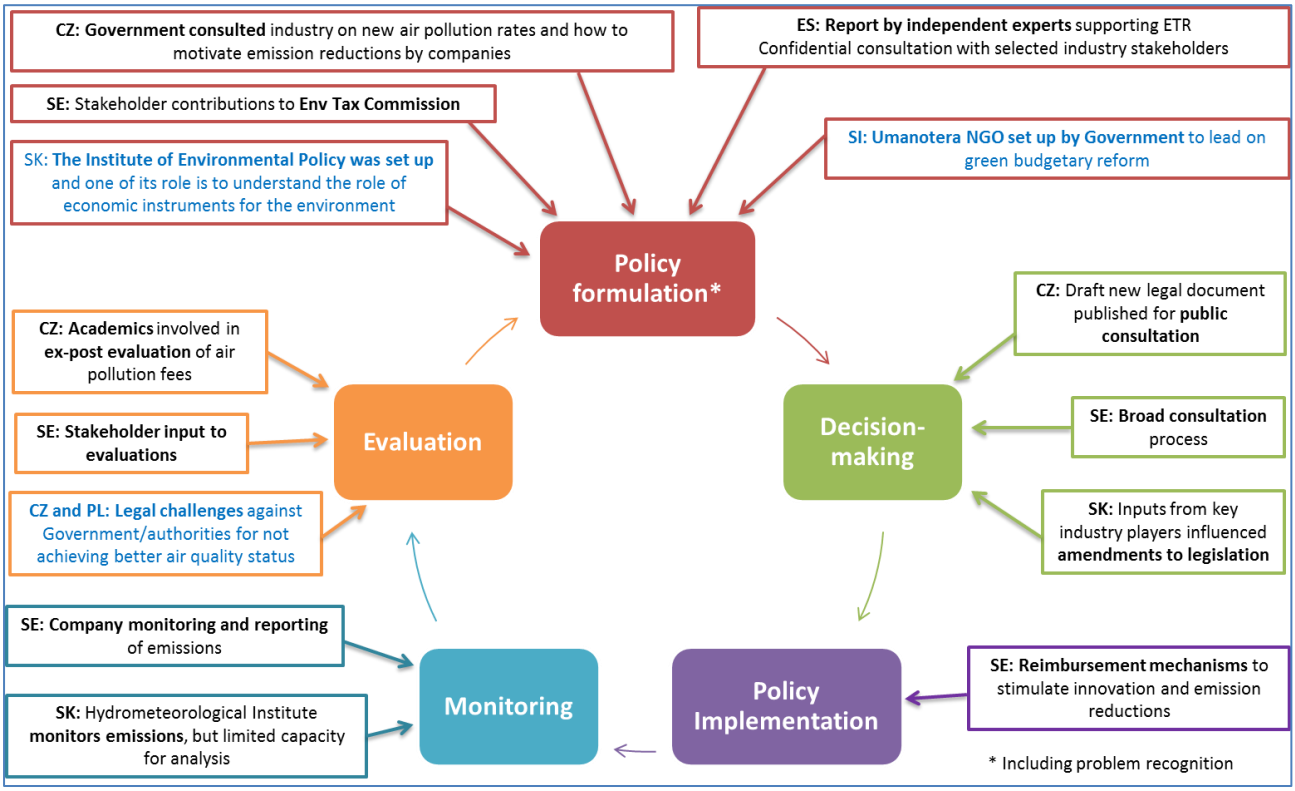
reduce pressures, incentivise environmental-friendly behaviour and raise revenues for environmental protection.

Stakeholder and civil society engagement

Stakeholders who have engaged with instruments related to air pollution include government bodies, industry, NGOs, the public and academics.

Figure 1 below summarises some of the key examples of civil society engagement with instruments for air pollution. These examples are drawn from both the case studies undertaken by the project team (in black text), and the experiences shared by stakeholders who attended the project workshop in Budapest (in blue text). Note that no detail on the latter examples is included in the discussion below the figure, since additional detail was not discussed during the workshop.

Figure 1 Examples of civil society engagement with instruments for air pollution



In the cases analysed, stakeholders have been engaged in the design and implementation of the instruments to varying degrees and at different stages in the policy cycle. In some cases, **formal stakeholder engagement** has been limited or non-existent in the policy formulation phase. For example in Spain, the process to design the tax on F-gases was considered top-down and largely led by the Spanish Office of Climate Change at the Ministry of Agriculture, Food and Environment with some consultations and negotiations held with industry towards the end of the process. Although external stakeholders were not formally engaged in the process to develop or implement the Slovakian air pollution fees, according to some stakeholders, **informal discussions** with industry may have influenced certain revisions to the legislation such as a 2001 exception introduced in favour

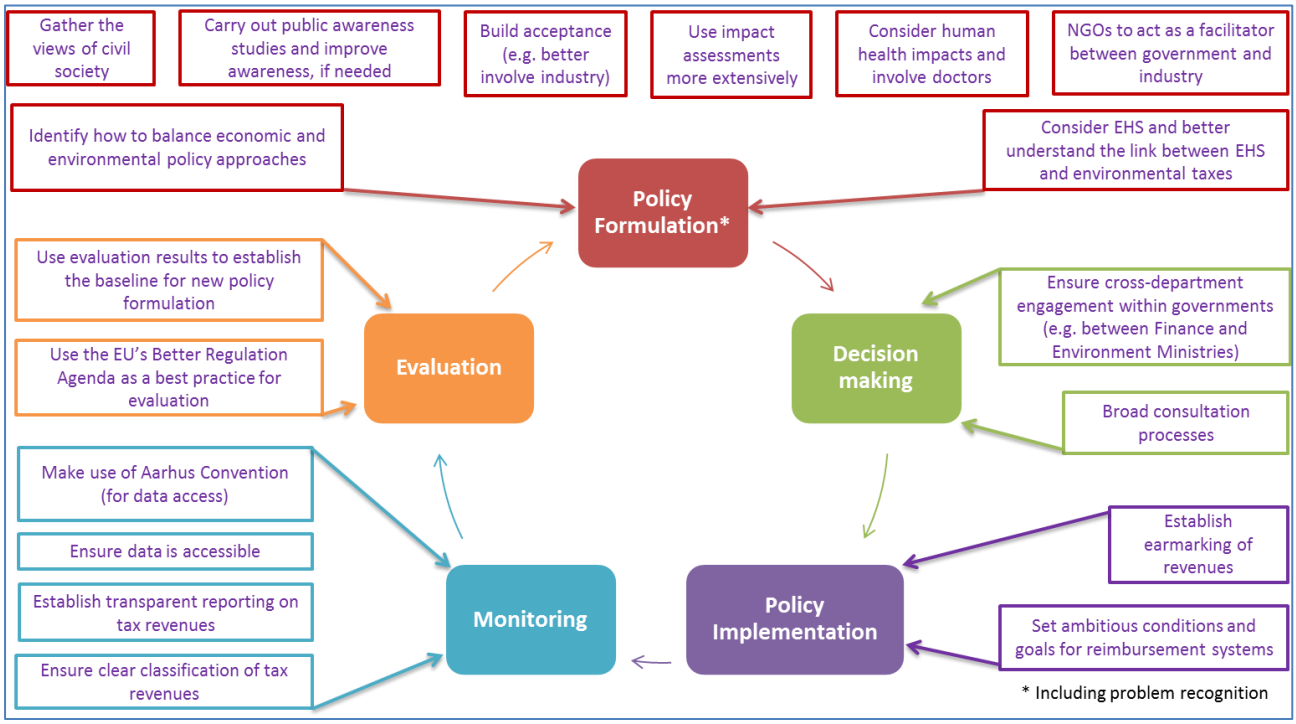
of coal mining companies and the abolition of special obligations for Category B polluters in 2006.

In some cases, **stakeholder inputs from a few prominent actors** have played an important role in the policy process. For example in Hungary, the NGO - Clean Air Action Group played an important role in initiating discussions on the charge with the then Ministry of Environment, actively participating in forums discussing the charge and providing background information to support the Ministry.

There are also examples of more **collaborative processes** engaging a range of stakeholders. For example in Sweden, the process of policy formulation and development was consultative from the beginning with the establishment of the Environmental Tax Commission (ETC) in 1987 involving a broad representation of interests in analysing the possible introduction of environmental taxes. Subsequent proposals for the NO_x fee and sulphur tax (and other taxes) went through a broad public consultation phase. Stakeholders were closely engaged in the evaluation and revision of Czech air pollution fees over a four year period, beginning with several projects by academics to evaluate the existing fee, discussions with industry on new rates and how to motivate emission reductions, and release of the draft proposal for public consultation.

During the workshop in Budapest, participants were also asked to identify where civil society could usefully be engaged to support environmental tax objectives in the future, and what types of tools and processes could help with this engagement. Figure 2 below presents some of the examples provided by participants for each part of the policy cycle. These are not discussed in detail in this section, but a summary discussion on potential future engagement opportunities is provided in section 8 of this report.

Figure 2 Potential future opportunities for civil society engagement with instruments for air pollution



Best practice and replicability

Some key lessons learned from the implementation of the instruments analysed and potential insights for other countries are set out below:

- Certain aspects are crucial for the **design of a tax** and have to be carefully taken into account, notably the definition of tax payers, which determines the tax base, exemptions granted, eligibility for reimbursement etc. This requires a solid understanding of economic agents involved in the value chain for the use of air pollutants.

- In Spain, although the process to introduce a tax on F-gases was largely top down and driven by national authorities, the active participation of industry in the **negotiations process** seems to have facilitated the final stages of legal development of the tax.

- Recognition of the ineffectiveness of the Czech air pollution fees launched a **process of consultation** on how to revise the instrument, engaging different stakeholders, and led to eventual adoption of a revised instrument with higher fees and a schedule of annual increases.

- The **design of the instrument can incentivise further emission reductions**. For example, businesses with emissions below BAT levels pay a reduced air pollution fee in the Czech Republic with higher reductions applied for increasing emission reductions achieved. In Sweden, the reimbursement mechanism provides an economic incentive, which motivates regulated plants to achieve minimal NOx emissions instead of aiming to be just below the limit values – the limit values, give a ceiling and the tax give further economic incentives for reductions.

- Instrument design can also play an important role in its **effectiveness**. For example in Sweden, two factors contributing to the success of the NOx fee is the mandatory continuous monitoring of emissions from the regulated plants, and a high tax level (made possible by the connected reimbursement mechanism).

- Effectively designed taxes can have important **impacts on innovation**. The Swedish NOx fee for instance clearly stimulated innovations within the regulated plants.

- The **wider policy mix** can influence the effectiveness of economic instruments, complementing the incentive role played by taxes such as in Sweden.

- In order to develop effective instruments to tackle stationary air pollutions there is a clear need to **continuously monitor emissions** and **evaluate the effectiveness** of the taxes and fees.

3. WASTE, RESOURCES AND THE CIRCULAR ECONOMY

The issues and challenges

The issue of waste management has been, and continues to be, on the agenda for the EU and individual Member States for many years. In recent years, attention has turned towards opportunities for creating a circular economy and improving resource efficiency, rather than on managing waste. Product related policies, in particular those dealing with specific product streams when they reach the end of their useful life, are strongly linked to this. Ensuring the sustainable use of raw materials is also crucial for resource efficiency and can make a significant contribution to a circular economy. Furthermore, waste, if not used and disposed of carefully, can lead to significant environmental impacts, including greenhouse gas emissions from landfills and processing of raw materials, land, water and air pollution, and littering.

The EU has a range of legislation related to these issues, including the Waste Framework Directive (2008/98/EC), Landfill Directive (1999/31/EC) and Directives related to specific waste streams, such as the Packaging and Packaging Waste Directive (94/62/EC), End-of-Life Vehicles Directive (2000/53/EC), WEEE Directive (2012/19/EU) and Batteries Directive (2006/66/EC). The objectives of the 7th Environment Action Programme include reducing waste generation, maximising recycling and reuse, limiting incineration and phasing out landfilling where alternatives exist.

In the EU in 2015, total material consumption was over 6.7 billion tonnes[10] (13 tonnes per person[11]). In 2012, total waste generation in the EU was over 2.5 billion tonnes[12], representing almost 37% of material consumption. Around 213 million tonnes of waste was generated by households[13]. Although waste management has improved significantly in recent decades, in 2012 only around 36% of total waste was recycled, with the rest landfilled or burned[14]. Some 600 million tonnes of this could be recycled or reused[15], including valuable metal, wood, glass, paper and plastics.

Tools used and design choices: similarities and differences

Economic instruments applicable in the areas of waste management, products and materials include waste taxes (i.e. for landfill and incineration), packaging taxes, plastic bag and other product fees, deposit refund schemes, pay-as-you-throw (PAYT) schemes, raw materials and aggregates taxes, and natural resource taxes and charges. Instruments

[10] Eurostat (2016) Domestic material consumption by material - 1 000 t, Code: tsdpc230

[11] Eurostat (2016) Domestic material consumption - tonnes per capita, Code: t2020_rl110

[12] Eurostat (2016) Generation of waste by economic activity, Code: ten00106

[13] Eurostat (2016) Waste generated by households by year and waste category, Code: ten00110

[14] Eurostat (2016) Treatment of waste by waste category, hazardousness and waste operations, Code: env_wastrt

[15] European Commission (2016) Waste, http://ec.europa.eu/environment/waste/index.htm

relating to waste management and products are much more common than those targeting the extraction of natural materials.

The instruments related to waste, resources and circular economy selected for case studies were:

- Austrian landfill tax (and ban);
- Belgian packaging taxes;
- Benelux pay-as-you-throw (PAYT) schemes;
- Estonian mineral resource extraction charge;
- Finnish beverage container deposit refund scheme (DRS) and packaging tax;
- Finnish tax on the use of peat for energy;
- Greek landfill tax;
- Irish plastic bag levy;
- Latvian packaging tax;
- Lithuanian environmental pollution tax;
- Romanian packaging charge
- UK landfill tax; and
- UK aggregates levy.

A summary of the key details of the specific instruments assessed for this chapter is provided in Table A1 in Annex 1, which provides information on the rates, revenues and impacts of the analysed instruments.

Insights from the analysis of the selected cases are summarised in the sections below.

Raising and using revenues

The scale of revenues raised by the instruments studied is summarised in Table A1 in Annex 1. A couple of the instruments summarised in this chapter **earmark revenues** for a very specific purpose. Revenues from the Austrian landfill tax are used exclusively to finance the containment and treatment of contaminated sites. Greek landfill tax revenues (if and when the tax is implemented) would be used for waste recovery and disposal projects, administered through the National Green Fund.

Revenues from several other instruments are not formally earmarked, but are **(at least partially) used for environmental purposes, often through environmental funds**. Around 10% of UK landfill tax revenues went to the Landfill Communities Fund (LCF) from 1995-2015. The LCF supports approved community and environmental organisations, and landfill operators who contribute to it can claim credit on their landfill tax liability (4.2% in 2016-17 - the proportion used to be higher). Furthermore, the landfill tax enabled a tax shift by reducing higher rate employers' National Insurance (i.e. social security) contributions by 0.2 percentage points. Romanian packaging charge revenues are paid into the Environmental Fund, which finances environmental and climate change related projects (including waste management projects).

Revenues from the Irish plastic bag levy go to the Environmental Fund, which is used to finance environmental organisations and projects (e.g. related to waste prevention and recovery, greener products and local community initiatives). Revenues from Benelux PAYT schemes are used to help fund municipal waste management services. Revenues from the Latvian packaging tax were earmarked for environmental protection activities until 2006.

Since January 2016, revenues from the Lithuanian environmental pollution tax are used to fulfil the objectives of the Waste management program, and fines for non-payment are

used to fund, *inter alia,* collection, sorting, recovery, environmental investments and cleaner technologies. Although revenues received by the state from the Estonian mineral resource extraction charge are not specifically earmarked, the Environmental Investment Centre (EIC), which provides funding for environment-related projects, is the main beneficiary.

In other cases, **revenues are not earmarked** for a specific purpose and instead accrue to the general national budget. This is the case for Belgian and Latvian packaging taxes (the latter since 2006), the Finnish peat energy tax and the UK aggregates levy (although from 2002-11, around GBP 35 million (EUR 57 million) per year was allocated to the Aggregate Levy Sustainability Fund, which aimed to reduce/mitigate the local environmental impacts of primary aggregate extraction). From the cases examined, no clear picture emerges on whether earmarking results in more successful instruments in environmental terms, although it can be anticipated that if revenues are directed toward measures to help achieve the objective of the instrument, an instrument may be more successful. In addition, instruments where revenues are directed towards environmental funds or projects can provide useful financing for such activities.

There are a variety of **payers and collectors of the revenues** of the instruments studied. **Operators of landfill sites** are the payers in the case of the UK landfill tax and Austrian landfill tax (as well as those carrying out structural work, e.g. road surfacing). **Packaging producers** are the fee payers in the case of the Finnish DRS, the Belgian and Latvian packaging taxes and Romanian packaging charge; producers of taxable products pay the Lithuanian environmental pollution tax, and the UK aggregates levy is paid by businesses that sell or use aggregates. **Extracting companies** pay the Estonian mineral resource extraction charge. **Householders/the public/consumers** pay the charges under Benelux PAYT schemes, deposits under the Finnish deposit refund scheme, the Irish plastic bag levy and the Finnish peat energy tax. **National administrations** collect the UK landfill tax and UK aggregates levy (HM Revenue & Customs), Austrian landfill tax (federal financial authorities, *Bundesfinanzbehörden*), Belgian, Romanian (Environmental Fund Administration) and Latvian packaging taxes/charges, the Irish plastic bag levy (Collector General/revenue commissioners) and the Lithuanian environmental pollution tax (the State Tax Office). Benelux PAYT schemes are administered at the **municipal level**. **Private operators** administer the Finnish DRS.

Effectiveness and efficiency insights

Some of the instruments summarised in this chapter have had **demonstrable beneficial environmental impacts**. For example, the UK landfill tax has led to a significant reduction in the quantity of waste landfilled, which has fallen from 50 million tonnes (2001-02) to around 12 million tonnes (2015-16). The Austrian landfill tax, aside from its impact on landfill rates (see below), has financed 212 site remediation projects between 1993 and 2013. Benelux PAYT schemes have certainly led to a reduction in overall (household) waste generation (see paragraph below on behaviour change). The Finnish DRS has achieved very high container return (i.e. recycling) rates. The PALPA scheme for one-way cans achieved a 59% return rate in its first year (1996), rising to 79% in its second year and more than 90% by 2009; whilst the scheme for PET bottles achieved return rates of 71% in its first year (2008), rising to over 90% two years later. Officials from the Ministry of the Environment have suggested that the tax on plastic bags within the Latvian packaging tax led to a 'rapid fall' in the number of plastic shopping bags used after its introduction in 2008. Following the introduction of the Irish plastic bag levy, the proportion of litter comprising plastic bags fell from an estimated 5% in 2001 to 0.13% in 2015.

Some of the instruments are likely to have had **some environmental impacts**, but it is less clear how much of the impact is attributable specifically to the instrument and how

much to other measures. For example, since the introduction of the Austrian landfill tax, landfilling of MSW has fallen from over 60% to less than 10%; however, some of this reduction is certainly due to the ban on landfilling of waste with a total organic carbon (TOC) content of 5% or greater (introduced in 2004 and fully implemented in 2009), which has complemented the effect of the tax. The tax has also likely contributed to improvements in landfill technology and reduced environmental impacts (due to the higher tax rates for lower-technology sites and for waste that has not been biologically pre-treated). The Lithuanian environmental pollution tax has had mixed results. Tyre recovery/recycling targets are generally met, but agricultural and industrial tyres do not undergo proper treatment (since treatment costs are higher than the tax rate); the target for accumulators was fully met by producers/importers (P/I) as of 2006; and the target for batteries was not met from 2004-2011, only in 2012 when the tax rate was significantly increased.

It is **hard to assess the environmental impacts** of some other instruments. The Belgian Packaging Charge had several different goals (re-use, recycling, tackling litter, reducing CO_2 emissions) making it difficult to assess against any single objective, and whilst Belgian plastic and metal packaging waste recycling rates are higher than the EU average, it is not clear how much of this is attributable to the charge, and how much to other aspects such as extended producer responsibility. Whilst disposable plastic bag use in Belgium fell following the introduction of the Belgian Environmental Charge, with revenues decreasing by 60% (estimated 36 million fewer bags) from 2008-09, members of COMEOS (the Belgian retail federation) saw a reduction in carrier bag usage of 86% (765 million bags) from 2003-10, outside the scope of the Environmental Charge, and the change in distribution of single-use bags at smaller stores has been much less dramatic. The packaging waste recovery rate in Romania increased from 25% to 57% between 2005 and 2012. However, since the rate of the Romanian packaging charge has not changed since 2009, it is hard to know how much of the increased recycling since then (from 47% to 57%) can be attributed to the tax. The impact is also likely to be limited due to the relatively low tax rate. Whilst the intensity of use of primary aggregates in the UK construction sector fell by around 40% between 2010 and 2014, it is hard to attribute this specifically to the UK aggregates levy since a reduction was already observed prior to its introduction (partly, perhaps, as a result of the 1997 introduction of the UK landfill tax which disincentivised landfilling of C&D waste and helped to create a market for secondary materials). The combined effect of the two instruments appears to be of interest. Other instruments seem to have had **no significant environmental impact**. The Estonian mineral resource extraction charge has not reduced the quantity of mineral resources extracted (extraction rates have remained relatively stable since around 2005), and the Finnish peat energy tax is too low to be effective in addressing the environmental impacts associated with peat use.

Some instruments have led **to changes in behaviour** by specifically targeted groups. One example is the Benelux PAYT schemes, where households tend to generate less waste after the introduction of fees. Waste generation in Oostzaan (the Netherlands) dropped by 30% (from 384.7 to 270.7 kg per household) in the year following the scheme's introduction (1993-94), and communes in Luxembourg with charges based on the amount of waste generated produced 25% less waste than those without such charges in 2012 (175.6 kg per person per year compared with 233.8 kg). Comparative results across the system types in the Netherlands and Belgium suggest that weight based schemes have the greatest impact in terms of waste prevention, whilst recycling rates are highest for sack-based schemes (partly due to the greater amount of waste available for recycling). Officials from the Ministry of the Environment have suggested the Latvian packaging tax has led producers to look into minimising packaging and using environmentally friendly packaging materials, to reduce their tax liability. The huge increase in the Lithuanian environmental pollution tax applied to batteries in 2012 appears to have led to more producers choosing to adopt producer responsibility measures rather than paying the tax (only 20% paid the tax in 2015 compared with 95% in 2004). In other cases, it is unclear

how much behavioural change can be attributed to an instrument. For example, fewer disposable bags were distributed by retailers participating in the Belgian Environmental Charge, but retailers outside the scope of the charge also saw significant reductions, suggesting that bag use may have reduced without the instrument. Regarding the Latvian packaging tax, higher consumer prices and/or additional taxes on items have not led to an observable change in consumption (in Latvia, packaging consumption actually increased from 105 kg per capita per year to 114 kg between 2004 and 2013).

The instruments summarised in this chapter show a mixed picture in terms of observable **economic impacts**. Retailers have claimed that the Irish plastic bag levy has had a neutral or modestly positive economic impact, since any costs related to implementation and record-keeping are generally lower than the savings from not having to buy and store so many bags. Additional funding for the recycling industry and increased private capital investments in recycling and/or recovery technologies have been partly attributed to the Lithuanian environmental pollution tax. Some concerns have been raised that the difference between the Austrian landfill tax rates for new/state of the art and for lower-technology landfills may have been too small to offset the additional cost of new/state of the art landfills, making it hard for them to compete with older, lower-standard sites. Information has not been found on the specific economic impacts of other instruments summarised in this chapter. Breweries in Finland need to be above a minimum size for joining a deposit refund scheme to make sense financially; larger companies have the additional option of setting up their own scheme. The initial structure of the Finnish packaging tax may have disadvantaged smaller breweries since they were using cans that were subject to higher tax (because they were not in a DRS, whereas the refillable glass bottles used by larger breweries were included in a DRS). The Romanian packaging charge has imposed additional costs on businesses, most notably when they had to pay huge amounts to the Environmental Fund due to misreporting by PROs. The extractive industry has borne the main impacts of the Estonian mineral resource extraction charge, and peat producers have stated that increasing extraction charges (together with pollution charges and increased fuel excise) have negatively affected their competitiveness. Based on current municipal waste generation rates, if the Greek landfill tax is implemented and passed through to final consumers, it would amount to an additional cost of EUR 50-150 per household per year.

Concerns have been raised over the **social impacts** of some the instruments summarised in this chapter. Some have argued that (the Benelux) PAYT schemes are regressive and have a disproportionate impact on lower-income or larger households/families, since fees are structured the same for all households regardless of income. However, one scheme in Leuven (Belgium) provided 20 free sacks per year to low income households to address this concern. Since the Belgian packaging taxes are only applied to products where there is a viable alternative, this provides a route to avoid paying the tax, and there seems to be little firm evidence of regressive effects from the charges.

The Irish plastic bag levy has had a very limited impact on jobs, as around 80% of bags are imported rather than produced domestically. Since the introduction of the levy, one of the four plastic manufacturing firms in Ireland has gone out of business with the loss of 26 jobs, but it is not clear whether this would have happened even in the absence of the levy.

The importance of peat harvesting for the local economy and employment in western, eastern and central Finland (over 200 companies and hundreds of entrepreneurs are currently involved in peat production) is one of the reasons that a low rate has been maintained for the Finnish peat energy tax.

In a limited number of cases, **positive social impacts** may have resulted. For example, the disbursal of revenues from the Romanian packaging charge (through the Environmental Fund) is thought to have been well shared between regions of the country,

taking into account their economic and social needs and therefore having at least a small redistributional impact. Evidence has not been found on the social impacts of other instruments summarised in this chapter.

Box 2 Modelling: Landfill tax and Aggregates tax[16]

Landfill tax

The study modelled a theoretical landfill tax:

- Tax rate of EUR 80/tonne applied to all types of waste, including: mixed ordinary waste, animal & vegetal waste, and chemical waste;
- Tax introduced in 2017 in all EU Member States;
- Rate assumed to increase in line with inflation to 2030
- One scenario assumes revenues recycled back into the economy (15% invested in waste management, 85% used to reduce employers' social security contributions); and
- Alternative scenario assumes revenues not used to reduce other tax rates or increase government spending.

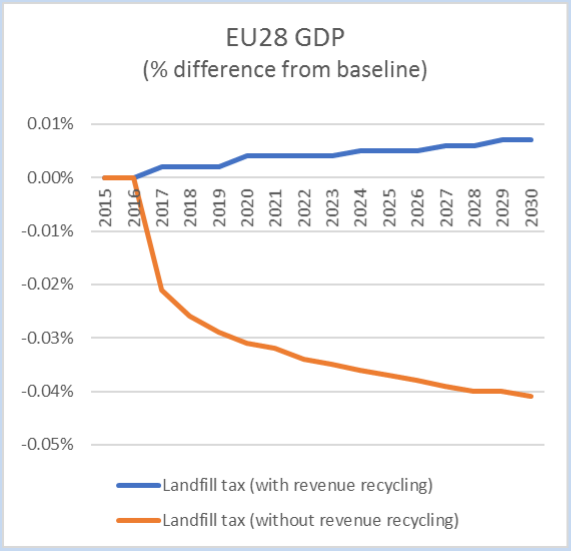
The baseline scenario for comparison is consistent with the future trends published by the European Commission[17] and assumes that existing taxes are continued.

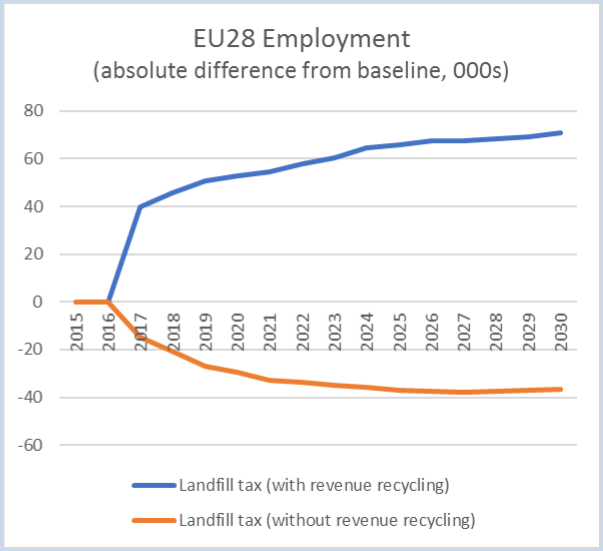
Key results

- 35% reduction in waste landfilled (around 50-70 million tonne reduction per annum at the EU28 level), due to increased recycling and other recovery (accounting for 25% of the reduction), increased waste incineration (also 25%) and reduced waste generation (50%);
- Small negative impact on GDP and employment if revenues not used to reduce other taxes: EU28 level GDP around 0.04% lower by 2030 and employment slightly reduced. This negative economic effect is driven by higher prices for businesses and consumers, leading to a worsening of the balance of trade and reduction in real incomes and consumption;
- Small positive GDP and employment benefits if revenues used to increase waste sector investment and reduce employers' social security payments, due to boost to investment in waste services and a reduced cost of employing additional workers.

[16] Additional information on the modelling exercise, including underlying assumptions and additional explanation of the results, can be found in an Annex at the end of this report.

[17] *EU Reference Scenario 2016: Energy, transport and GHG emissions Trends to 2050*, European Commission and *The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060*, European Commission).





Source(s): E3ME, Cambridge Econometrics

EU28 Summary of results in 2030, % difference from baseline		
	With revenue recycling	Tax only
GDP	0.01	-0.04
Consumer spending	0.00	-0.07
Imports (extra-EU)	0.01	-0.03
Exports (extra-EU)	0.00	-0.01
Investment	0.05	-0.02
Consumer price index	-0.01	0.02
Employment	0.03	-0.02
Revenues from landfill tax (m EUR 2016)	8,836	8,836
Source(s): E3ME, Cambridge Econometrics		

Aggregates tax

The study also modelled a theoretical aggregates tax based on an existing aggregate levy in the UK:

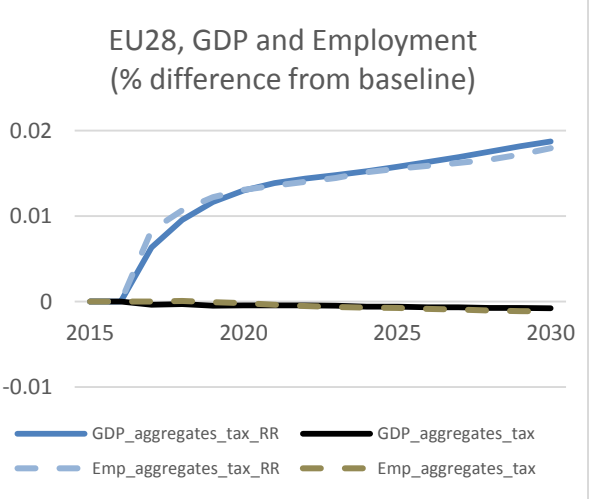
- Tax of EUR 3/tonne applied to construction minerals;
- Tax introduced from 2017 onwards in all EU Member States;
- Rate assumed to increase with inflation to 2030;
- Additional scenario included to show macroeconomic impacts if revenues from the tax are used ('recycled') to reduce employers' social security contributions at Member State level.

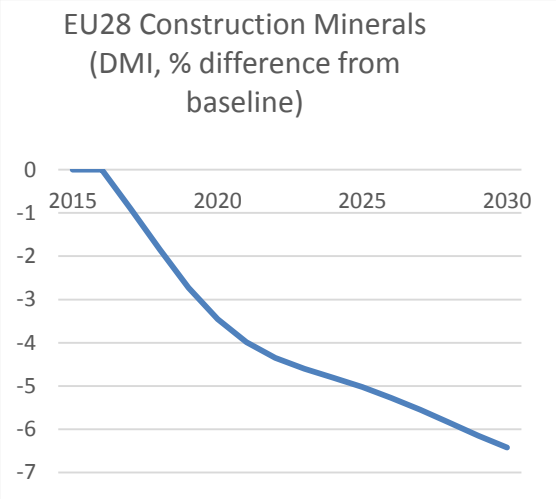
Key results

The results are presented as differences from the baseline, which is consistent with the future trends published by the European Commission[18]:

[18] *EU Reference Scenario 2016: Energy, transport and GHG emissions Trends to 2050*, European Commission and *The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060*, European Commission).

- Without revenue recycling, GDP decreases by a very small amount, with negative impacts due to higher aggregates prices paid by construction sector leading to reduced demand. Negative impacts limited since aggregates account for relatively small share of construction costs;
- With revenue recycling, double dividend: positive GDP and employment results, and Domestic Material Input of construction minerals expected to fall by almost 7% by 2030. Also zero net impact on government balances due to revenue use to reduce employers'' social contributions;
- Aggregates producers and extraction sector most negatively impacted, and construction output falls slightly in response to higher prices;
- Many other sectors (e.g. retail, food, hotels) make small gains due to increased consumer expenditure;
- Measure expected to raise around EUR 2bn in 2017 and EUR 4.7bn in 2030.





Source(s): E3ME, Cambridge Econometrics

EU28 Summary of results in 2030, % difference from baseline		
	With revenue recycling	Tax only
GDP	0.019	-0.001
Consumer spending	0.031	-0.003
Imports (extra-EU)	0.004	-0.009
Exports (extra-EU)	0.004	-0.001
Investment	-0.001	-0.006
Consumer price index	-0.020	0.004
Employment	0.018	-0.001
Construction minerals raw material	-6.423	-6.425
Revenues from aggregates tax (m EUR 2010)	4,779	4,778
Source(s): E3ME, Cambridge Econometrics		

Drivers for action, political process and windows of opportunity

Several of the instruments summarised in this chapter had explicit **environmental objectives** behind their introduction, as summarised below:

- UK landfill tax: to reflect environmental impacts (e.g. leachate and landfill gas emissions and local disamenity) in the cost of landfill, recover value from waste, and dispose of less waste in landfill sites;
- Austrian landfill tax: to provide funding to clean up historical contaminated sites;

- Benelux PAYT schemes: to combat the growing waste management issue in densely populated areas (Flanders, Belgium), and in response to public opposition to landfilling/incineration as methods of waste disposal;
- Finnish DRS: to incentivise the return of packaging for reuse and recycling; and Finnish packaging tax: to further incentivise beverage producers/importers to participate in a DRS;
- Belgian Environmental Charge: to disincentivise the use of targeted products, including single-use plastic bags;
- Irish plastic bag levy: to reduce the consumption of bags and their litter-related effects on the landscape;
- Lithuanian environmental pollution tax: to reduce the volume of waste products and encourage producers to organise collection and proper management of their waste and to encourage production of more environmentally friendly products;
- Estonian mineral resource extraction charge: when introduced, the aim was to protect the environment by internalising negative externalities (in 2016 it was clarified that the instrument also aims to raise revenue from resource use); and
- UK aggregates levy: to reduce the negative environmental impacts of aggregate extraction and incentivise recycling of aggregates.

Some instruments were introduced based on the **recommendations or outcomes of experts or policy evaluation processes**. The introduction of the UK landfill tax was preceded by an attempt by the Royal Commission on Environmental Pollution (RCEP) to measure the externalities associated with landfilling and incineration, and several pieces of research were carried out by both industry and Government on the environmental costs of quarrying prior to the introduction of the UK aggregates levy. Independent experts were consulted and assessments carried out to obtain objective input on the financial cost of Finnish DRS for PET and glass, prior to their introduction. The introduction of the Irish plastic bag levy followed a government-commissioned study to identify fiscal measures to minimise the environmental impact of plastic bags. A Working Group on Pollution Tax Law was created by the Ministry of Environment prior to the introduction of the Lithuanian environmental pollution tax, including representatives from ministries, municipalities, environmental engineers and the waste management sector. In Finland, the annual review of energy taxes and consultations related to the development and updating of the national Energy and Climate Strategy (ECS) have in principle provided opportunities for stakeholders to submit their views on the Finnish peat energy tax.

In a couple of cases, the instruments summarised in this chapter were introduced as **part of a wider package of measures**. Such an approach can help to ensure coherence between relevant instruments and also with the broader policy context, which can contribute to the success of an instrument. The Austrian landfill tax was the first element in a related package of measures, which later went on to include a ban on the landfilling of waste with a TOC of over 5% and an incineration tax; this package has been very successful in environmental terms. Environmental charges had an important role in wider ecological tax reform discussions in Estonia during 2004-2005, and the 2006 increase in the Estonian mineral resource extraction charge was part of wider changes to taxation that included a reduction in income tax and increased taxes on the use of environmental resources. PAYT schemes in the Benelux countries all link in to extended producer responsibility schemes (Fost Plus in Belgium, Nedvang in the Netherlands and Valorlux in Luxembourg), which provide infrastructures that help householders to easily increase their recycling. Although the UK landfill tax was introduced as a standalone instrument, there were links to the landfill allowances scheme for biodegradable municipal waste (no longer in place because the high tax rate has rendered it no longer relevant) and the UK aggregates levy, which was introduced later.

The **need to apply various pieces of legislation** can act as a driver and window of opportunity to introduce an instrument. Implementation of the EU Waste Framework

Directive (2008/98/EC) is seen as the main driver for the legal adoption (as yet unfinalised) of the Greek landfill tax. Much of the legislation governing PAYT schemes in Luxembourg has been enacted in response to EU legislation (e.g. Landfill Directive, 94/62/EC and Waste Framework Directive, 2008/98/EC). The main driver for the Romanian packaging charge and Latvian packaging taxes was the need to comply with the EU Packaging and Packaging Waste Directive (94/62/EC). Such changes are occasionally detrimental in environmental terms; for example the transposition of the EU Batteries Directive (2006/66/EC) into national law actually led to a reduction in the recycling targets for batteries and accumulators in Lithuania.

Some of the instruments were introduced following **consultation with interested stakeholders** which influenced their design. Government consulted industry prior to the introduction of the UK landfill tax. Retailers and the beverage industry were heavily involved in discussions around the design of the various Finnish DRS and the packaging tax. The Ministry of Environment, the largest companies and PROs discussed changes to the structure and rates of the Romanian packaging charge. Consultation with stakeholders also helped to shape the Irish plastic bag levy.

Other success factors can also be observed in the instruments summarised in this chapter. For example, there was little opposition to the UK landfill tax, due largely to the original intention for it to be **revenue-neutral** by offsetting a reduction in employers' National Insurance (i.e. social security) contributions.

Keeping administration costs low can help to convince affected economic operators that an instrument will not be unduly burdensome; this was the case for the Irish plastic bag levy, which uses the Value Added Tax (VAT) collection and reporting systems for its administration, thereby avoiding the imposition of another administrative system on retailers. Other instruments have (at their time of introduction, and in some cases still) applied a **low tax or fee rate** which has helped to reduce opposition; this was the case for the UK landfill tax (which has since increased substantially) and the Austrian landfill tax. In Wallonia (Belgium), several municipalities introduced PAYT schemes as a means to **reduce their costs** by ensuring they did not have to pay a levy applied to municipalities exceeding a specific quota of residual waste per inhabitant.

Earmarking of revenues for a specific (or general) environmental purpose can also help to gain acceptance for the instrument amongst stakeholders and the general public. Examples include the Austrian landfill tax, Romanian packaging charge and Irish plastic bag levy.

Advance warning of (changes in) instrument design can contribute to an instrument's success. The duty escalator of the UK landfill tax provides a reliable roadmap for changes in the tax rate, and a long lead-in time/deadline extensions was provided to allow federal states to prepare for the implementation of the differentiated rates for different technology standard landfills and for the ban related to the Austrian landfill tax. **Introducing an instrument in a coordinated way** can help to smooth its introduction, as was the case with the simultaneous introduction of PAYT schemes in several local authority areas of Flanders (Belgium).

Adequate communication/awareness-raising about a new instrument can also help it to gain acceptance. Examples include the SuperDrecksKescht programme in Luxembourg which provides information and advice on waste sorting in relation to PAYT schemes, a tool accompanying the introduction of a sack-based PAYT scheme in The Hague (the Netherlands) to show households how they could pay less by improving their recycling, and the publicity campaign to launch the Irish plastic bag levy, which highlighted the environmental reason (visible accumulation of litter) for the levy.

Some instruments summarised in this chapter benefitted from a **political or stakeholder 'champion'** to either make the case for the instrument or implement it. Irish Minister of Environment Noel Dempsey pushed for the Irish plastic bag levy to be a downstream consumer charge rather than an upstream levy on producers/importers, and was instrumental in pursuing the introduction of the levy. The green agenda of the New Labour Government in the late 1990s was a key driver for the introduction of the UK aggregates levy, and the Belgian Packaging Charge was introduced mainly due to pressure by green political parties (in exchange for their support for an overall legislative programme). The beverage/brewery industry in Finland was instrumental in setting up the Finnish DRS by creating PALPA (the largest DRS operator in Finland) and the one-way can deposit refund system (albeit to avoid the higher rate of packaging tax), whilst retailers also supported a switch from refillable glass bottles to metal cans as they were easier to handle and required less storage space. The Belgian Environmental Charge was introduced following a communications campaign and industry voluntary agreement.

Changes in the political environment in a country can of course provide an opportunity to alter environmental taxation, depending on the priorities of successive governing parties. For example, the Green Party's role in the Finnish Government in 2011-2014 is considered to have played a crucial role in increasing the Finnish peat energy tax. Meanwhile, the new Estonian Government as of late 2016 seems to be more open to adjustments in fiscal policy, including resource taxation.

One **barrier** for the introduction and successful implementation of taxes and fees is the **opposition of stakeholders** targeted by the instruments. For example, industry made several legal challenges to the Belgian Packaging Charge in the mid-2000s whilst some unions also opposed the Charge. Some retailers were concerned that the Irish plastic bag levy would result in poorer hygiene standards. In 2012, a decision to increase environmental charges including the Estonian mineral resource extraction charge was challenged by industry and overturned by the Supreme Court in 2013. The aggregates industry argued that a UK aggregates levy was not the most appropriate tool, proposing a voluntary agreement instead.

Perceived (significant) negative economic impacts can also provide a barrier to the introduction of an instrument; this appears to be the main reason for the failure so far to actually implement the Greek landfill tax, due to fears it would worsen the already poor financial situation of local authorities and/or citizens. In the case of the Finnish peat energy tax, considerations related to national energy security, regional employment and profitability of the forest sector are key barriers to reform, and led to a proposed tax rate increase being revoked in 2016. This case is also an example of a barrier created by the **interplay with other sectoral policies**; the link between the peat tax and the national subsidies paid for energy from wood biomass is one of the key reasons for maintaining a low peat tax rate. Finally, the limited success of the Estonian mineral resource extraction charge has also been attributed to a **lack of collaboration in government**: different responsible ministries did not work adequately together and also missed opportunities to learn from international examples of previously established charges.

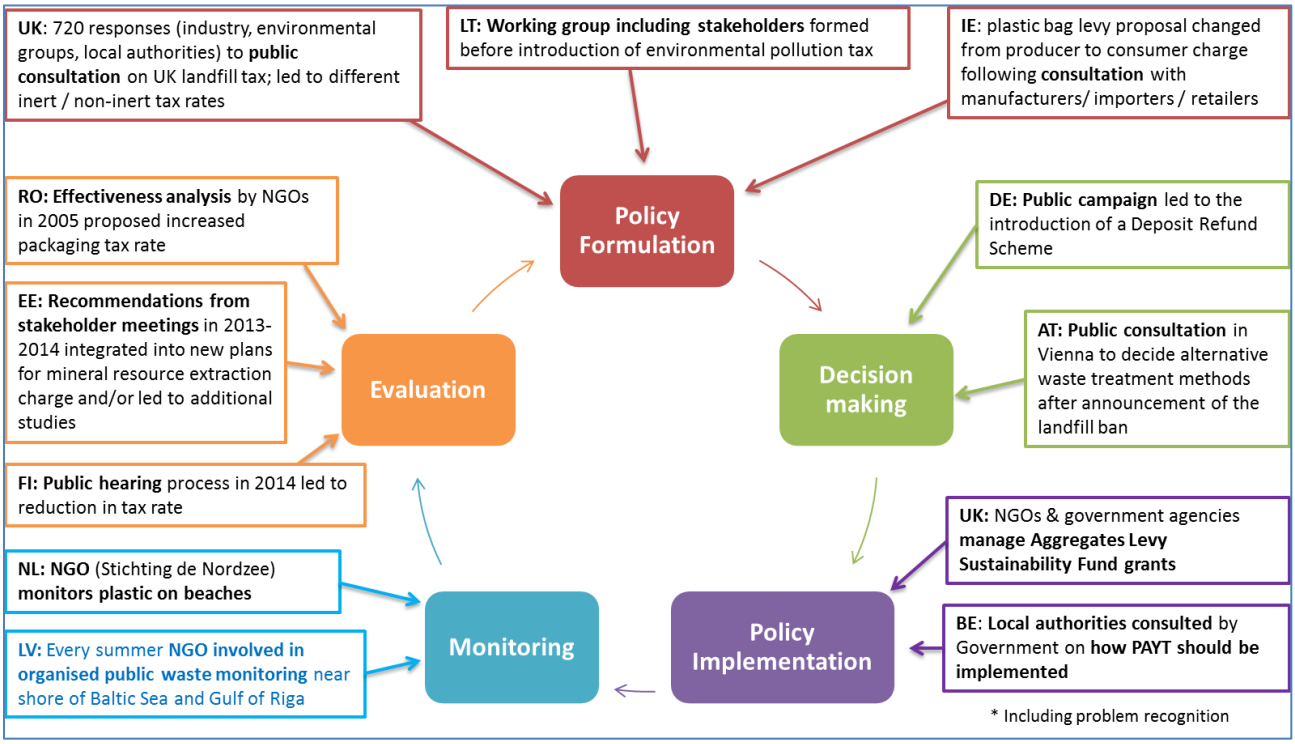
Limited or negative (anticipated) environmental impacts can act as a brake on the introduction of an instrument. For example, fear of an increase in the illegal disposal of waste, or travel to dispose of waste in a nearby area not subject to a PAYT scheme, are sometimes cited in opposition to the introduction of such schemes. Achievable targets, such as those set prior to the introduction of the Finnish DRS for PET bottles, can help to allay fears that an instrument is 'doomed to fail' by being initially too ambitious.

Stakeholder and civil society engagement

Key stakeholders with regards to the instruments summarised in this chapter include governmental bodies and political parties, waste operators/waste management companies and producer responsibility organisations (PROs), industry and producers, consumers/the public and (environmental) NGOs. These groups have had varying levels of involvement with and influence over the design, introduction and implementation of the different instruments.

Figure 3 below summarises some of the key examples of civil society engagement with instruments related to waste management, product and materials. These examples are drawn from both the case studies undertaken by the project team (in black text), and the experiences shared by stakeholders who attended the project workshop in Amsterdam (in blue text). Note that no detail on the latter examples is included in the discussion below the figure, since additional detail was not discussed during the workshop.

Figure 3 Examples of civil society engagement with instruments related to waste management, products and materials



Prior to the introduction of some of the instruments, **discussions/negotiations with concerned stakeholders** were held, and in some cases helped to influence the design of instruments. Several instruments were subject to relatively **formal consultation processes**. A public consultation prior to the introduction of the UK landfill tax elicited 720 responses (from industry, environmentalists and local authorities) and led to the different rates for inert and non-inert wastes, and a change from a proposed *ad valorem* tax to one based on the weight of waste deposited. A survey of waste management companies also led to the decision to increase the tax rate in 1998-99 and introduce a duty escalator (as companies pointed out the low level of the tax was reducing its effectiveness).

Lengthy negotiations were held between the Government, waste operators, federal state governments and municipalities prior to the introduction of the Austrian landfill tax, and a

long public consultation was held in Vienna to decide what alternative waste treatment methods to invest in after the announcement of the landfill ban. Although the latter process was successful, it led to a four-year delay in meeting the ban. Furthermore, implementation of PAYT in Belgium was eased by the government consultation with local authorities as to the scheme's implementation.

Consultation with manufacturers, importers/distributors and retailers' groups helped to reshape the Irish plastic bag levy from its original proposed upstream producer charge to a downstream consumer charge. The significant involvement of retailers and the beverage industry in discussions around the design of the Finnish DRS and the packaging tax helped to achieve buy-in amongst stakeholders, including by negotiating the Government down from a 90% to an 80% recycling/reuse target initially.

A working group including various stakeholders was formed prior to the introduction of the Lithuanian environmental pollution tax. The Ministry of Environment, the largest companies and PROs discussed changes to the structure and rates of the Romanian packaging charge, whilst the Latvian Packaging Association (advocating business interests) has probably been the most visible civil society organisation in shaping the Latvian packaging tax, and an environmental consultation board of 20 annually elected environmental NGOs has been involved in commenting on the effectiveness of the tax, and has also called for revenues to go back to being used for environmental actions. Two rounds of public consultation were held relating to the UK Aggregates Levy Sustainability Fund, one on its overall aims and the other on more detailed disbursement of the fund, which led to a decision that grants would be managed by NGOs and government agencies. The Environment Ministry held stakeholder meetings during 2013-2014 to collect feedback on the Estonian mineral resource extraction charge; some of the recommendations were integrated directly into new plans whilst others led to additional studies. A public hearing process in 2014 led to the Finnish peat energy tax being reduced from the agreed EUR 5.9/MWh in 2015 to the previous level of EUR 1.9/MWh.

In other cases, **informal lobbying by interested parties** has influenced instruments. Some retailers were concerned that the Irish plastic bag levy would result in poorer hygiene standards (e.g. if it was applied to bags used to wrap fresh meat and fish products), but an exemption was given to such bags to allay this fear. There was some controversy and competitiveness concerns over allowing refillable containers to be entirely exempt from the Finnish packaging tax; it is unclear whether lobbying led to this being changed, or it was always intended to change the instrument's design once one-way deposit refund systems were more advanced. Industry and some unions were opposed to the Belgian Packaging Charge, claiming it would unduly burden Belgian producers and consumers; industry won a couple of court cases against the Government in the 2000s, leading to less preferential treatment for reusable/refillable over recyclable containers. Lobbying and campaigning by industry led to the reductions in the Estonian mineral resource extraction charges in 2016, and to a rate increase being overturned in 2013.

The **support and help of public institutions, the general public and NGOs** can help with the introduction and success of an instrument. Following a few high-profile pollution incidents that raised awareness of contaminated landfill sites, NGOs and the public were able to push for the Austrian Government to act, leading to the Austrian landfill tax. Environmental NGOs prepared a detailed proposal for greener waste management in Athens, including a cost-benefit analysis that was the first to factor in the existence of a Greek landfill tax, helping to make a case for the instrument. An effectiveness analysis by NGOs in 2005 proposed an increase in the rate of the Romanian packaging charge, which was indeed increased the following year; and in 2015 working groups involving NGOs were again considering how to increase the effectiveness of the instrument. Environmental groups lobbied for the reduction of environmental and economic impacts of waste disposal, helping to generate public support for PAYT schemes; meanwhile the first Dutch PAYT scheme was in Oostzaan, a region with a much higher vote share for the environmentally

active Green Left party. Some studies have suggested that citizens with experience of PAYT schemes are more likely to accept/support them than those who have not used them. Regional Green parties and environmental groups were key supporters of the Belgian Packaging Charge and Environmental Charge.

The **role of private actors** can also be crucial in some cases. For example, Finnish DRS have all been implemented and are run by private entities (the beverage industry and retailers). Prior to the introduction of the Irish plastic bag levy only 8% of surveyed consumers (in 1999) were willing to pay EUR 0.07 (half of the actual levy) for a plastic bag and 40% said they were not willing to pay at all, whilst 91% were in favour of the levy one year after its implementation; both the public and retailers have since praised its positive environmental impact.

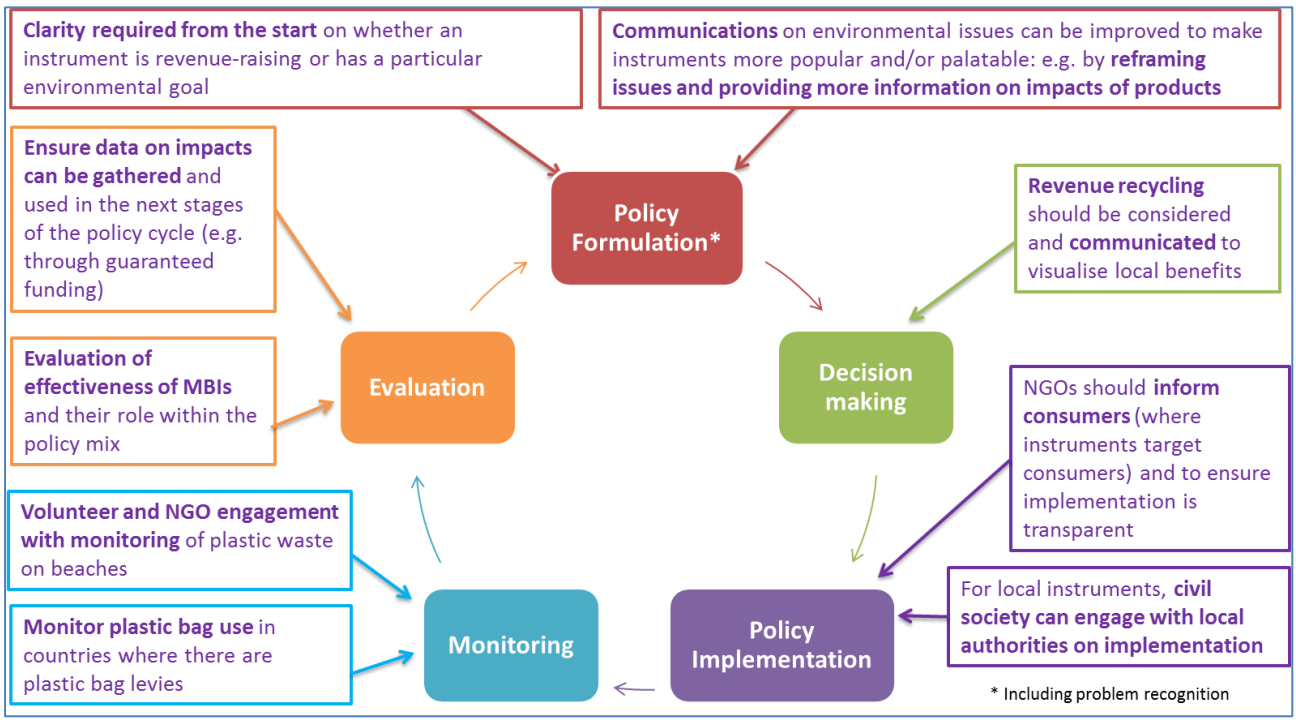
In other cases, it seems that **some stakeholders have had limited engagement with the instruments** summarised in this chapter at key stages of their development and implementation. Although one environmental NGO (BBLV) was vocal in supporting the introduction of the Belgian Environmental Charge, they were not actively consulted during the policy development of the instrument. Some NGOs did lobby for a UK aggregates levy, but only as a small part of campaigns to revise the planning system for mineral extraction, so this lobbying is not thought to have had a significant final impact on the introduction of the levy. In general, the impact of lobbying prior to the introduction of this instrument appears to have been relatively limited, partly due to the Government's determination for an environmental tax, and partly because the levy was not public-facing and only affected a limited industry sector. Apart from the government-initiated working group, stakeholders (including producers, PROs, citizens and NGOs) appear to have been relatively passive during the development of the Lithuanian environmental pollution tax.

There are also some examples of **stakeholder dissatisfaction/disappointment** either prior to or after the introduction of an instrument. National and local authorities in Greece, together with large parts of civil society, believe that the Greek landfill tax would simply increase the overall tax burden of households and companies, and may also lead to more illegal dumping of waste; their views can be seen as one of the reasons for the failure to implement the tax so far.

In addition, some economic actors (e.g. waste treatment plants and those who build them) have significant influence over national and local policymakers, so their financial concerns (e.g. waste management plants becoming uneconomical if waste quantities are reduced or recycling increased) influence policy decisions, making the introduction of economic instruments difficult. Public reaction to both the Belgian Packaging Charge and Environmental Charge was muted, perhaps due to the low levels of taxation, reduction in the product scope of the Environmental Charge, and the lack of formal earmarking of revenues, leading to a belief that the taxes aimed to raise revenue rather than achieve environmental goals. The aggregates industry argued that a UK aggregates levy was not the most appropriate tool; however an industry-proposed voluntary agreement approach was rejected by the Government in favour of imposing the levy.

During the workshop in Amsterdam, participants were also asked to identify where civil society could usefully be engaged to support environmental tax objectives in the future, and what types of tools and processes could help with this engagement. Figure 4 below presents some of the examples provided by participants for each part of the policy cycle. These are not discussed in detail in this section, but a summary discussion on potential future engagement opportunities is provided in section 8 of this report.

Figure 4 Potential future opportunities for civil society engagement with instruments related to waste management, products and materials



Best practice and replicability

The case studies summarised in this chapter present several lessons for the implementation of instruments.

The **link to environmental goals**, where they exist, should be specific and explicit. Examples of instruments with clearly stated environmental objectives include the UK and Austrian landfill taxes, Benelux PAYT schemes, Finnish DRS and packaging tax, Belgian Environmental Charge (although this instrument was abolished in 2014), Irish plastic bag levy, Lithuanian environmental pollution tax, and UK aggregates levy. The Belgian Packaging Charge is one example where this was poorly done, with no specifically stated environmental goal. Successful **communication campaigns**, such as those associated with the Belgian Environmental Charge, Irish plastic bag levy and Dutch and Luxembourg PAYT schemes can help to make this link clear to affected groups.

The use of **packages of related measures, and coherence with other instruments and policies**, can increase the likelihood that an instrument's objectives will be met. This is the case, for example, with the ban on landfilling of waste with a TOC of over 5% and incineration tax associated with the Austrian landfill tax, the complementary Finnish DRS and packaging tax, and the links between the UK landfill tax, landfill allowances scheme and UK aggregates levy, both of which were introduced after the landfill tax. Environmental charges and taxes can also make a contribution to broader tax reform by enabling other taxes to be reduced, as seen for example with the role of environmental charges within wider ecological tax reform discussions in Estonia, and the use of revenues from the UK landfill tax to offset a reduction in National Insurance contributions. The lack of environmental effectiveness of the Finnish peat energy tax demonstrates how barriers to effectiveness can be created when coherence with other sectoral policies is not ensured.

The **design of an instrument** has an impact on its effectiveness. The UK and Austrian landfill taxes are examples of **notifying the payer of a tax of future rates** adequately in advance for them to prepare for any increase. It is often useful to allow for **amendments to instruments to improve their effectiveness**, since inflexible instruments can become less effective over time. For example, authorities responsible for waste strategy are currently considering amendments to Benelux PAYT schemes (including additional EPR schemes and DRS to facilitate recycling by residents, reduced capacity for residual waste collection, and incentives for household waste sorting), and some consideration is being given to differentiated rates for different types of plastics within the Latvian packaging tax. **Changes in rates over time** have helped to drive improved outcomes from several instruments, including the UK landfill tax, Irish plastic bag levy and Lithuanian environmental pollution tax. The failure to (so far) implement the Greek landfill tax is perhaps an example of the need to ensure that an instrument is **suited to the existing social and economic context** into which they are being introduced. Instrument design should be clear so that the opportunities for misinterpretation are minimised; for example the Romanian packaging charge initially allowed for varying interpretations by economic operators (efforts have since been made to address this). The importance of **ensuring that the right infrastructures are in place** to support the implementation of an instrument is evidenced by the Benelux PAYT schemes. For example, a study in Ghent (Belgium) showed that civic amenity sites/container parks (for recyclables) should be operated in such a way that they do not inadvertently receive residual waste free of charge. Vehicles used for weight-based schemes need to have specific weighing equipment installed.

Instruments should be as fair as possible to the payer; this includes trying to eliminate the issue of 'free riders' who benefit from, but do not participate in, the implementation of an instrument. One example where this approach might be lacking is the Finnish DRS, where PALPA has decided to accept glass bottles from non-member companies in its reverse vending machines, to the consternation of its members, since they will in effect be paying for the recycling of products that are not theirs. The potential distributional impacts of PAYT schemes could be addressed by lowering the fixed component of the fee or through more general approaches to addressing social inequality, which would allow the incentive of the variable element of the fee to be maintained.

Sound **implementation and monitoring** of an instrument is also important for its success. One example of the impact this can have is the Romanian packaging charge, where monitoring by the Environmental Fund Administration uncovered serious misreporting by PROs that resulted in over EUR 37 million of missing revenue and some operating licences being revoked. Greater **standardisation of reporting** could help to avoid such issues in future.

Engaging stakeholders in the design and implementation of instruments can make an important contribution to their success. For example, the Finnish DRS have benefitted from close cooperation between key actors (retailers and industry). NGOs and other civil society groups can help to encourage the use of instruments by making the case for their introduction and/or modification, including by providing examples of successful instruments in other Member States (this could help, for example, to bring the Greek landfill tax to fruition). Several of the case studies summarised in this chapter suggest that greater engagement with civil society could be beneficial, e.g. the Romanian packaging charge and Latvian packaging taxes.

Appropriate use of revenues, including earmarking, can in some cases help to clarify the purpose of a tax and justify its introduction. Examples include revenues from the Austrian landfill tax exclusively financing the clean-up of contaminated sites, and revenues from the Greek landfill tax (yet to be implemented), Romanian packaging charge and Irish plastic bag levy, which all go to national environmental funds. Alternatively, using revenues to offset other taxes can help to increase their acceptability to the payer, as was

the case with the UK landfill tax, which was (at least initially) intended to be revenue-neutral through an associated reduction in employers' social security contributions.

Several of the instruments summarised in this chapter have elements that could be **replicated in other EU Member States**. The simple structure of the UK landfill tax (with only two rates) makes it easily replicable, and the annual duty escalator, set in advance, provides certainty on future rates. Certain elements associated with the Austrian landfill tax (bans on landfilling of certain wastes, rates differentiated according to technological level of the site) could perhaps usefully be replicated in other Member States, to drive recycling/composting and technological standards. The Benelux PAYT schemes are widely replicable, and offer examples of **different approaches to fit various local contexts**; for example sack-based collections are more likely to be used in urban areas, whilst charged biowaste collections may be more likely in rural areas. The Irish plastic bag levy and the plastic bag elements of the Belgian Environmental Charge and Latvian packaging tax provide examples of instruments that can be applied to **products with readily available substitutes**. The UK aggregates levy is also a candidate for replication, although replication would work best if it is accompanied with other instruments such as a landfill tax and planning regulations for mineral extraction (and taking into account potential cross-border impacts where neighbouring countries do not have a primary materials tax in place).

4. WATER QUALITY AND MARINE LITTER

The issues and challenges

Across the EU, there are concerns about the eutrophication of surface waters and the contamination of surface and ground waters by pesticides and fertilizers. Ninety per cent of river basin districts, 50% of surface water bodies and 33% of groundwater bodies across the EU are estimated to be affected by diffuse pollution, primarily from the agriculture sector[19]. There is increasing scientific evidence of the impacts of these issues on the environment, ecosystems and human health.

According to the European Commission[20], water quality status is gradually improving; in 2009, 43% of EU surface waters had good ecological status, rising to 53% in 2015. Over 90% of the completed EU Member States' river basin management plans (as required by the Water Framework Directive, WFD, 2000/60/EC) indicated that agriculture is a significant pressure on water, in part due to pollution by fertilizers and pesticides. In a 2015 Communication[21], the European Commission pointed out that although groundwater nitrate pollution had been reduced, further action was still needed to reduce and prevent pollution (63% of river basin districts reported that implementation of the Nitrates Directive (91/676/EEC) is not enough to tackle diffuse pollution to the extent needed to achieve the objectives of the WFD). The same Communication concluded that implementation of the Urban Waste Water Treatment Directive (91/271/EEC) has been 'challenging', in particular in the 13 EU Member States which acceded after 2004, due to the financial and planning requirements for the necessary infrastructure investments, and that sewer overflows remained one of the main pollution sources in urban areas. The 2015 Communication also pointed out that pollution from industrial activities is still significant for certain pollutants and water bodies.

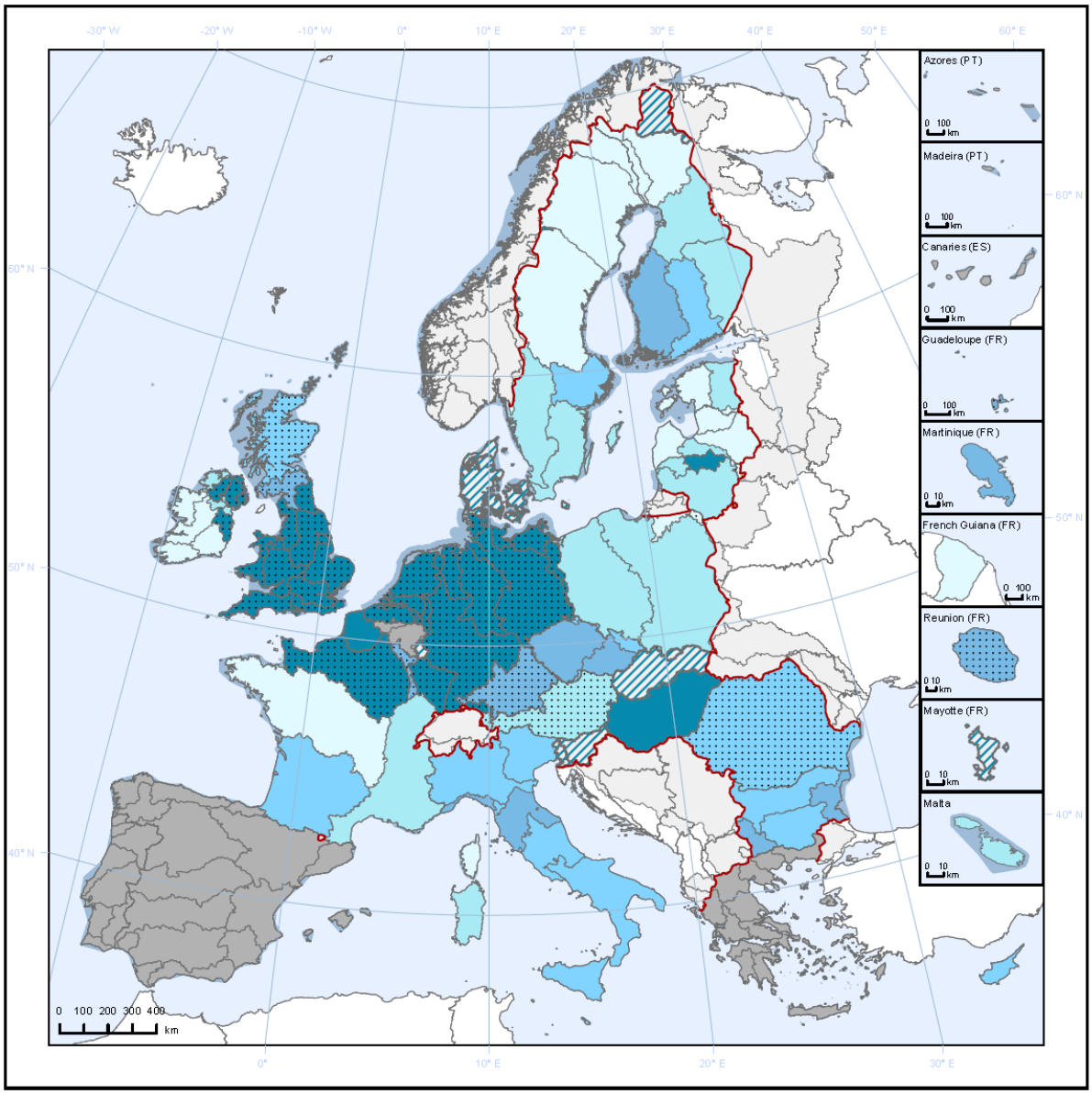
The Baltic Sea is a European water body of regional significance with 9 countries bordering a semi-enclosed sea area having limited water exchanges with the outside. Only through the narrow and shallow Danish straits is it connected to the outside marine world. The Baltic Sea area is home to 85 million people and the human pressures are so powerful that they are changing the ecosystem. The marine environment is under pressure from anthropogenic loads of phosphorus, nitrogen, organic matter and hazardous substances. The Baltic Sea receives more freshwater than inflows from the North Sea, and the bottom seabeds are contaminated from decades of discharges in the catchment area. The Helsinki Commission, HELCOM, has concluded that none of the open basins of the Baltic Sea has acceptable environmental status at present. Only a few coastal areas can be considered healthy. Waters near the larger cities tend to be classified as having poor status.

[19] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL: The Water Framework Directive and the Floods Directive: Actions towards the 'good status' of EU water and to reduce flood risks, COM(2015) 120 final, Brussels, 9.3.2015

[20] European Commission, DG Environment (2016) Water infographics, available at http://ec.europa.eu/environment/water/infographics.htm

[21] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL: The Water Framework Directive and the Floods Directive: Actions towards the 'good status' of EU water and to reduce flood risks, COM(2015) 120 final, Brussels, 9.3.2015.

Figure 5 Map of river basins with surface water bodies affected by pollution pressures from agriculture



Percentage of surface water bodies affected by pollution pressures associated with agriculture

- 0 - 5 %
- 5 - 20 %
- 20 - 40 %
- 40 - 60 %
- 60 - 100 %
- No relevant data reported to WISE
- Member State reported aggregated data only
- EU Member States that have not reported River Basin Management Plans
- National River Basin Districts (outside the EU)
- Coastal waters
- Country borders
- EU27 extent

Map produced by WRc plc on behalf of the European Commission©, DG Environment, 2012

Footnotes

1) The boundaries of the National River Basin Districts are displayed using version 1.5 of the Water Information System for Europe (WISE) River Basin Districts dataset available from the European Environment Agency:
http://www.eea.europa.eu/data-and-maps/data/wise-river-basin-districts-rbds-1.
This dataset is based on data reported to WISE by EU Member States, Andorra, Switzerland, Liechtenstein, Monaco and Norway.

2) The boundary of the Mayotte RBD (France) is displayed using the country border dataset.

3) The boundaries of the International River Basin Districts are derived from the WISE River Basin Districts dataset.

4) Country border data was provided by Eurostat and is derived from EGM at a scale of 1:3 million.

5) Coastal waters are defined in the Water Framework Directive as extending 1 nautical mile from the coastline. Some Member States included a larger part of their coastal waters within their River Basin District boundaries.

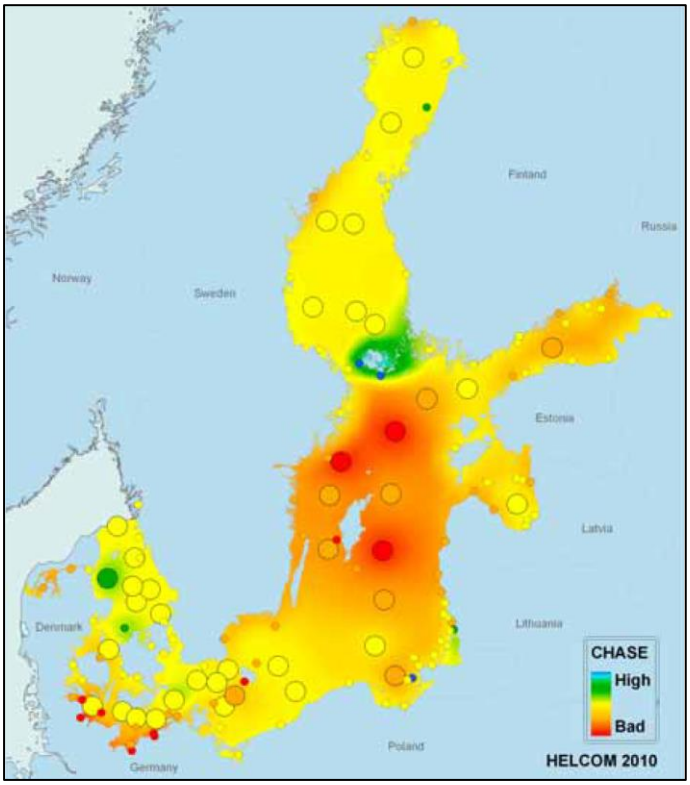
5) This map shows the surface water bodies reported to WISE as being subject to pollution pressures associated with agriculture as a percentage of all surface water bodies in each River Basin District. The pollution pressures associated with agriculture are:
- '2.2 Diffuse – Agricultural'
- '3.1 Abstraction – Agriculture'
- 5.3 River Management – Agriculture'.

Most Member States reported data at this level of detail. In some cases, data was only reported at the more aggregated level of:
- '2. Diffuse - Sources'
- '3. Water Abstraction'
- '4. River Management'.

It is not clear whether these pressures are as a direct result of agriculture.
The percentage of surface water bodies affected has been calculated using the data reported at the more accurate, disaggregated level in the first instance, supplemented with data reported at the less accurate, aggregated level by those Member States that only reported data at the aggregated level.

Although dioxine concentrations have been in decline, limits have been advised for the consumption of fish and mussel from the Baltic Sea by some Member States. Contaminants include PCBs, TBT, lead, cadmium and metabolites of PAHs too. The overall status of hazardous substances has been assessed by HELCOM[22] (see Figure 6) which concludes that all open sea areas of the Baltic Sea, except western Kattegat, is disturbed by hazardous substances. In the coastal areas only six of more than one hundred assessment areas are not disturbed. There are positive signs of decreasing trends of persistent organic pollutants, but their concentrations in the marine environment remain of concern. Concentrations of novel pollutants related to flame retardants and some heavy metals have been increasing in recent years. There are no signs of improvement in fish health.

Figure 6 Status of hazardous substances in Baltic Sea



The European Commission jointly with eight Member States and Russia are partners in HELCOM, the Baltic Marine Environment Commission. The enlargement of EU with Poland and the three Baltic states has levelled the differences in the legal framework and policy approaches to curbing pollution loads in the region, but much remains to be done. HELCOM is preparing its second holistic assessment of the Baltic Sea environment and the first assessment results are expected later this year.[23] The regional collaboration established serves as a good example for how other European regions may set long-term targets and provide efforts towards their implementation, facilitating close supervision and exchange

[22] HELCOM (2010) Ecosystem Health of the Baltic Sea: Initial Holistic Assessment, Baltic Sea Environment Proceedings no. 122, Helsinki.

[23] http://helcom.fi/helcom-at-work/projects/holas-ii

among Member States and large EU neighbours on obtaining good environmental status for the seas.

Marine Litter

Around 300 million tonnes of plastics are produced globally per year[24]. A significant amount of plastic and its value is lost in waste disposal, and much becomes marine litter. This in turn leads to pressures on ecosystems, society and the economy. Worldwide it is estimated that 4.8 to 12.7 million tonnes of plastic from mismanaged waste at coastlines enter the ocean annually[25]. Other inland sources and at sea sources contribute a further 75,000 to 1.1 million tonnes and 0.3 to 3.25 million tonnes of plastic waste respectively[26]. Plastic waste floats in the oceans, can be found on beaches and on the sea floor. Some plastic is recycled or reused and remains in the economy, but much is lost and ends up in the marine environment. Bottle caps, plastic bags, plastic food containers, wrappers and plastic cutlery are typical items to be found on beaches. Researchers have estimated that 48% of marine litter in the Baltic Sea originates from household-related waste, with waste generated by recreational or touristic activities contributing a further 33%[27].

A particular problem for marine litter is the fact that there are often complex pathways from source to areas of potential impact, and often multiple points of potential impact. For example a lost net in one country's waters can impact on fisheries or biodiversity in another jurisdiction. Buoys from fish farms in one country can, if lost or abandoned, create hazards and/or degrade into microplastic over time in multiple waters. Similarly, ships registered in one country can discharge waste in waters in another country's jurisdiction, or indeed in the high seas. This creates multiple problems regarding the legal reach of instruments. Marine litter has been rising up the EU political agenda and the Marine Strategy Framework Directive (2008/56/EC) requires that measures to address marine litter are adopted.

[24] Plastics Europe (2015) Plastics – the Facts (2015) An analysis of European plastics production, demand and waste data, http://www.plasticseurope.org/documents/document/20151216062602-plastics_the_facts_2015_final_30pages_14122015.pdf

[25] Jambeck et al. (2015) "Plastic waste inputs from land into the ocean." Science 347(6223): 768-771

[26] Sherrington et al. (2016) Study to support the development of measures to combat a range of marine litter sources, London: Report for European Commission DG Environment

[27] MARLIN Project (2013) Final Report of Baltic Marine Litter Project

Table 4 Sizes and examples of marine litter[28]

Nano (<1um)	Micro (<5mm)	Meso (<2.5cm)	Macro (<1m)	Mega (>1m)
• Nanofibres from clothing • Rubber dust from tyre wear • Nanoparticles in products & pharmaceuticals	• Microbeads from personal care products • Fragmentation of existing (plastic) products • Polystyrene • Plastic from blasting in shipyards • Particulates from waste incineration	• Bottle caps • Cigarette filters & butts • Plastic pellets • Windblown/ storm-washed waste	• Beverage bottles & cans • Plastic bags • Food & other packaging • Disposable tableware/ cutlery • Beer ties • Fishing lines, floats & buoys • Tyres • Pipes • Balloons and toys • Textiles	• Abandoned fishing nets and traps • Rope • Boats • Plastic films from agriculture • Construction PVC (Polyvinyl chloride)

The polluter-pays principle

The Treaty on the Functioning of the European Union has established the polluter-pays principle as a principle of EU law (Art 191(2) TFEU). According to a defining OECD[29] recommendation this principle means "that the polluter should bear the expenses of carrying out the measures decided by public authorities to ensure that the environment is in an acceptable state". To avoid distortion of competition the cost of measures "should be reflected in the cost of goods and services which cause pollution in production and/or consumption. Such measures should not be accompanied by subsidies that would create significant distortions in international trade and investment." It is in extension of this principle that WFD Art. 9 requires Member States to have water pricing policies in place that provide adequate incentives to use water resources efficiently, so as to contribute to the environmental objectives of the directive. Recovery of the costs should include not only operational costs but related "environmental and resource costs" too.

To foster the correct implementation of water pricing, the 2013 Common Provisions Regulation[30] has established ex-ante conditionalities for accessing Rural Development and Cohesion policy funds. An assessment of water pricing and cost recovery policies in Member States can lead to requirements for action plans on water pricing.

Water is used as a resource as well as a sink for economic activities, and WFD takes on a holistic approach to water management. Users of water as a sink for emissions are subject

[28] Adapted from Watkins et al. (2016) Marine litter: Socio-economic study. A report by IEEP for UNEP

[29] OECD, Recommendation of the Council on Guiding Principles Concerning International Economic Aspects of Environmental Policies, Doc. C(72)128 (May 26, 1972).

[30] Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013.

to WFD requirements with respect to water pricing in the same way as users of water as a resource. Water pricing policies are thus understood to include the pricing of discharges from urban and industrial point sources to surface waters.

WFD Art. 2(39) defines water use as "water services together with any other activity identified under Article 5 and Annex II having a significant impact on the status of water". The implication of this broad definition, and with Annex II mentioning land use and agricultural activity, should be that diffuse sources of pollution to water bodies could become subject to comparable requirements for water pricing as point sources. In particular the environmental and resource costs related to the depletion of good quality water resources warrant interest under the provisions of WFD art. 9, which prescribe Member States to provide "adequate incentives for users to use water resources efficiently and thereby contribute to the environmental objectives".

Levies and taxes on pesticides and fertilizers provide incentives to balance their diffuse emissions against implications for water resources. Some Member States have in place levies on pesticide use to support protection of water resources and reflect external costs involved for biodiversity and human health. There are also Member States with extensive experience in levies on fertilizer use. There would be opportunities for introducing further ex-ante conditionalities in the Common Provisions Regulation for accessing the European Agricultural Fund, pending pricing efforts supporting attainment of good ecological status of water bodies, including bodies used for drinking water purposes.

Tools used and design choices: similarities and differences

Economic instruments applicable in the area of water quality include wastewater charges, pesticides taxes and fertilizer taxes.

The instruments related to water quality and marine litter selected for case studies were:

- Belgian packaging taxes;
- Danish pesticide tax;
- Danish animal feed mineral phosphorus tax;
- Finnish beverage container deposit refund scheme (DRS) and packaging tax;
- Irish plastic bag levy;
- Italian phytosanitary product tax;
- Latvian packaging tax;
- Lithuanian environmental pollution tax;
- Dutch port fee reductions (in Rotterdam and Amsterdam);
- Polish wastewater fee;
- Romanian packaging charge; and
- Swedish fertilizer tax.

A summary of the key details of the specific instruments assessed for this chapter is provided in Table A1 in Annex 1, which provides information on the rates, revenues and impacts of the analysed instruments.

Raising and using revenues

Some of the cases use **earmarking of revenues,** though for somewhat different purposes: revenues from the Danish pesticide tax are recycled back to the agricultural sector (mainly through a reduction in land value taxes) and those from the phytosanitary

product tax in Italy are currently ring-fenced and earmarked to projects to develop organic farming and quality products. There is however a current proposal to end this ring-fencing as part of a revision of legislation, taxation and the broader strategy for organic agriculture. Although there was no formal earmarking of revenues from the fertilizer tax in Sweden, from 1984-1994 the revenues were ring-fenced and used by the National Board of Agriculture for research and environmentally orientated projects. From 1995 until its abolition in 2009, revenues were paid to the national treasury. Revenues from the wastewater fee in Poland are ring-fenced for investment in environmental protection and go to the National (and Regional) Funds of Environmental Protection & Water Management as well as to local governments. From 2007-2015 the National Fund allocated over PLN 21 billion (EUR 5.25 billion) to environmental protection and water management, although this also included funding from the EU, EFTA and other donor organisations. The rate of the land value tax for farmland has been reduced to compensate for the Danish tax on animal feed mineral phosphorus. Ring-fencing of revenues for environmental purposes is expected to improve environmental effectiveness, in particular where levy rates are low or modest, but may not be regarded as fully economically effective. Ideally levy rates should reflect pollution damage costs (external costs) whereby market prices are corrected to provide an appropriate signal. An earmarking of revenues for a full or partial reduction in other tax burdens for the relevant target groups is more in line with economic orthodoxy, and may also leverage political effectiveness. From the cases examined, there is limited evidence available to challenge these widely accepted assumptions.

Regarding the **payers and collectors of the revenues**, the two analysed Danish taxes are collected by the national tax and custom authorities and are paid by farmers and breeders. The Swedish fertilizer tax was paid by manufacturers and importers to the National Board of Agriculture. The tax on phytosanitary products in Italy is was initially paid to the Ministry of Finance both by those placing the product on the market and by onward vendors (effectively doubling the revenue). Since 2000 the tax is only paid by those licensed to place products on the market. The wastewater fee in Poland is collected by the Marshal Offices in the 16 Polish voivodeships (regions) from entities requiring an environmental permit and that discharge sewage to water or soils, including businesses, agricultural holdings and households that discharge more than $5m^3$/day (few households reach this level). Some exemptions exist, e.g. if the annual fee would be less than PLN 800 (EUR 200), in emergency scenarios, when sludge is used for agricultural purposes, and in some cases related to discharge of cooling water and water used for freshwater fish farming.

Effectiveness and efficiency insights

It appears that the fertilizer tax in Sweden led to **environmental benefits**, including a reduction in excessive 'precautionary' applications of fertilizers which were previously common amongst farmers, and an increase in the efficiency in the use of alternatives, mainly organic fertilizer (including manure) from farm animals, whereby total applications could be reduced. It is estimated that the tax lowered the optimal fertilizer dose (e.g. from 145 to 135 kg N/hectare for wheat). It has also been estimated that if the tax were to be reintroduced, it would lead to an annual 6% reduction (amounting to 10,042 tonnes) of nitrogen leaching to surface waters. The phosphorus component of the tax was phased out by 1994 after a 50% reduction goal was met. In addition its successor, the cadmium tax component has been assessed as very effective, contributing to a reduction in cadmium content per tonne of P from 25g in 1995 to less than 10g in 2000. The environmental impact of the Danish animal feed mineral phosphorus tax has been more limited than expected, partly due to the tax rate not being adjusted with inflation. On the other hand the Danish pesticide tax has been going through several stages of reform to improve its effectiveness, and the new 2013 tax base clearly targeting toxicity *per se* is expected to leverage its environmental effectiveness. A general issue arises with products such as

fertilizers and pesticides for which short term demand tends to be inelastic (i.e. it does not decrease significantly when the price increases) but most of the case studies suggest that over a longer timescale there will be some behavioural impacts, depending on tax rates and tax base designs.

It is **difficult to assess and disentangle the specific environmental impacts of some instruments**, since there are also other influencing factors at play. For example, although the total tonnage of phytosanitary product sold in Italy fell by around 25% between 2000 and 2013, and land in organic cultivation (as a % of total agricultural land use) increased from 6.7% to 11.5% between 2000 and 2014, no studies have been identified which quantify how much of this impact has resulted directly from the Italian phytosanitary product tax. The impact may be limited due to the low tax rate and the fact that it only applies to part of the market (i.e. only products that are classed as posing particular hazards, and by ministerial derogation not to synthetic fertilizers). Similarly, although there have been significant improvements in wastewater treatment and water protection in Poland over the past 40 years, e.g. constantly declining levels of water and soil pollutants and an apparent correlation between the fee level for biogenic and organic substances and the amount of those substances found in Polish rivers, no studies have been identified which quantify how much of this can be attributed to the Polish wastewater fee and how much to other factors such as significant investments in water and wastewater infrastructure and the requirements of the EU's environmental *acquis*. The environmental impact of the fee may also be limited by exemptions for cooling water discharges from thermal power plants and permitted sludge use for agricultural purposes.

Some of the instruments lead to positive environmental impacts due to their **impact on behaviour**, for example when environmentally harmful activities are made more expensive. For example, the Danish tax on animal feed mineral phosphorus resulted in a higher efficiency in the use of animal feed, and the Swedish fertilizer tax contributed to farmers using low-cadmium fertilizer to avoid paying the cadmium tax, reducing excessive 'precautionary' applications of fertilizers, and increasing their use of alternatives such as organic fertilizer. Some instruments can lead to undesirable side effects, but the incidents of illegal imports of pesticides into Denmark have related to non-approved products, and not to the Danish pesticide tax itself. The Polish wastewater fee has provided an increased (economic) motivation to apply best available techniques to water treatment to reduce the amount of fees due. The total discharge to surface waters of biological oxygen demand (BOD) and nutrients from point sources was reduced by 24% during the first 7-8 years of the scheme.[31]

The **economic impacts** of the Italian phytosanitary product tax can be assumed to be very limited, since the revenues of EUR 3 million are tiny in comparison with the EUR 40-50 billion value of the agriculture sector. It has been estimated that the Swedish fertilizer tax led to a 'modest' competitive disadvantage for Swedish agricultural products, since most other EU countries did not apply a fertilizer tax and farmers were not compensated fully for the tax (SOU, 2003).

The **social impacts** of the Danish pesticide tax vary according to different types of producers, since land prices and the associated reduced land value tax differ across Denmark and therefore have varied impacts on individual farmers. Due to its support for organic agricultural practices, the Italian phytosanitary product tax is likely to have made a (admittedly small) contribution to the broader transition to organic agriculture. The

[31] Jarosinski, W., 2002, Polish National Report on nutrient loads pp. 153–168 in Lääne, A., et. al., Evaluation of the implementation of the 1988 Ministerial Declaration regarding nutrient load reductions in the Baltic Sea catchment area, The Finnish Environment 524, Helsinki: Finnish Environment Institute.

wastewater fee in Poland has been evaluated as having a positive redistributional effect, since the revenues can be directed to environmental protection projects in areas where they are most needed, including less prosperous regions.

Box 3 Modelling: Waste water fee[32]

The study modelled a theoretical waste water fee based on an existing fee in Poland:

- Average rate of EUR 7.50 per kg of pollutants discharged;
- Tax introduced from 2017 onwards in all EU Member States;
- Rate assumed to increase with inflation to 2030;
- Additional scenario included to show macroeconomic impacts if 97% of revenues from the charge used ('recycled') to invest back into water and waste infrastructure, with remaining 3% assumed to cover administrative costs of the fee.

Key results

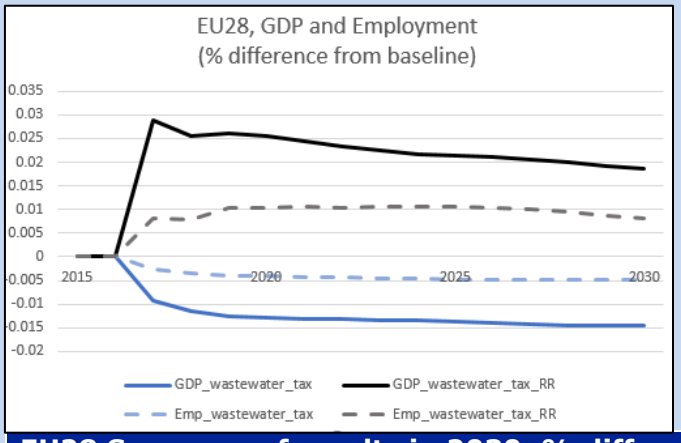
The results are presented as differences from the model baseline, which is consistent with the future trends published by the European Commission[33]:

- With revenue recycling through investment in water and waste infrastructure, double dividend: positive GDP and employment results, with benefits to sectors associated with investment (e.g. construction, engineering);
- Without revenue recycling, GDP decreases by a very small amount, with negative impacts due to higher costs to industries that discharge effluents (mainly chemicals and electricity), possible small inflationary effect for the whole economy, potential cost to households due to the charges that they must pay directly, and small potential impact on sectors dependent on household expenditure (e.g. retail, hotels);
- Output for sewerage and the waste sector falls as demand decreases;
- Measure expected to raise around EUR 3.9bn in 2017 and EUR 6.1bn in 2030.

EU28 sectoral output in 2030, % difference from baseline	
Sewerage & waste	-0.03
Other retail	-0.03
Chemicals nes	-0.02
Food, drink & tobacco	-0.02
Electricity	-0.01
Machinery, equipment	0.24
Repair & installation	0.23
Metal products	0.15
Electrical equipment	0.12
Construction	0.07

[32] Additional information on the modelling exercise, including underlying assumptions and additional explanation of the results, can be found in an Annex at the end of this report.

[33] *EU Reference Scenario 2016: Energy, transport and GHG emissions Trends to 2050*, European Commission and *The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060)*, European Commission.



Source(s): E3ME, Cambridge Econometrics

EU28 Summary of results in 2030, % difference from baseline		
	With revenue recycling	Tax only
GDP	-0.015%	0.019%
Consumer spending	-0.024%	-0.009%
Imports (extra-EU)	-0.01%	0.053%
Exports (extra-EU)	-0.003%	-0.008%
Investment	-0.01%	0.151%
Consumer price index	0.002%	-0.005%
Employment	-0.005%	0.008%
Revenues from wastewater fee (m EUR 2016)	6,086	6,086

Source(s): E3ME, Cambridge Econometrics

Drivers for action, political process and windows of opportunity

All of the instruments summarised in this chapter had a stated **environmental objective** behind their introduction. All five of the instruments (Danish pesticide tax, Italian phytosanitary product tax, Swedish fertilizer tax, Polish wastewater fee and Danish animal feed mineral phosphorus tax) aimed **to address pollution by specific substances**. The Danish pesticide tax and Italian phytosanitary product tax also aimed to address **human health risks** from the substances subjected to the taxes. The Italian tax was explicitly aimed at supporting the development of **organic agriculture**.

Some instruments were introduced based on the **recommendations of experts or policy evaluation processes**. Examples include: the Swedish fertilizer tax, recommended by a Government Commission on the Application of Chemicals in Agriculture and Forestry; the Danish pesticide tax, put on the agenda by the Dithmer Commission (made up of civil servants from various ministries); and the Danish animal feed mineral phosphorus tax, which came out of a scheduled review and update of the Action Plan for the Aquatic Environment, which changed the policy focus towards phosphorus.

In a couple of cases, the instruments summarised in this chapter were introduced as **part of a wider package of measures**, which offered a window of opportunity for their establishment. This is the case for both the Danish pesticide tax, which was part of a wider green tax reform, and the Danish animal feed mineral phosphorus tax, which was introduced as part of a package of measures aiming at reducing pollution of surface water. Poland's waste water tax was redesigned under the 1991 National Environmental Policy, agreed after the demise of communism.

In some cases, the **need to apply various pieces of legislation** acts as a driver and window of opportunity to introduce an instrument. For example, the law establishing

minimal level of pollutants for having untreated tap water from groundwater sources was key in gaining a wide support for the Danish pesticide tax, and EU water legislation is a key driver for the ongoing implementation of the Polish wastewater fee.

Some of the instruments were introduced following **consultation with interested stakeholders** which influenced their design. For example, as a result of the negotiation process, compensatory measures were introduced alongside the Danish pesticide and animal feed mineral phosphorus taxes. Trade associations, organic farmers and chemical manufacturers fed into hearings on the draft legislation for the Italian phytosanitary product tax.

The minister for agriculture (and the Green Party to which the minister belonged) strongly supported the Italian phytosanitary product tax, helping to drive it through. This suggests that for some instruments, one or more **individual policy-makers can be catalysts** in making the case for the instrument.

Unsurprisingly, one **barrier** for the introduction of taxes and fees is the **opposition of stakeholders** targeted by the instruments. For example, the Italian phytosanitary product tax was strongly opposed by some manufacturers, leading to the tax never being levied on synthetic fertilizers, apparently by ministerial derogation. In the case of the Swedish fertilizer tax, the motion to revoke it suggested that it had only had **limited environmental impacts** (although this view was challenged by Naturvårdsverket, the Swedish Environmental Protection Agency). In addition, the issue of surface water quality fell down the list of policy priorities in the face of growing concerns over climate change, suggesting that **changing political priorities** can contribute to the repeal of – or failure to introduce – an instrument.

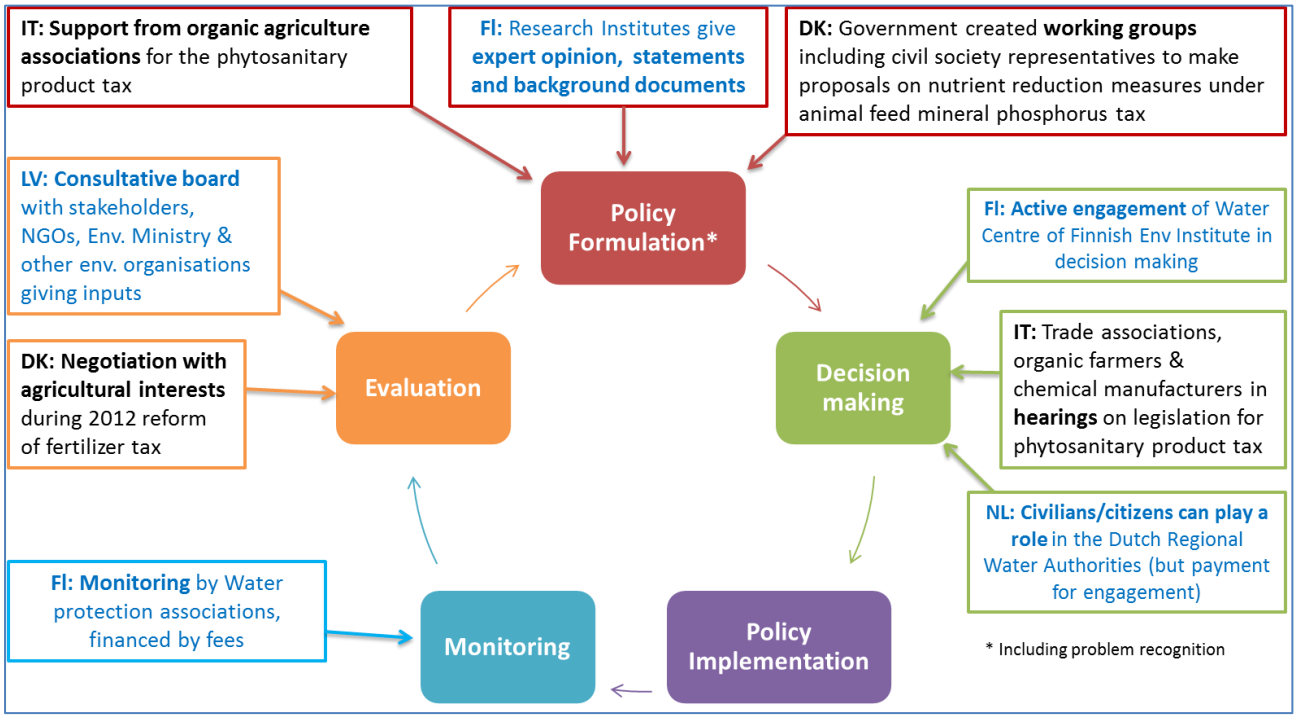
Stakeholder and civil society engagement

Key stakeholders with regards to the instruments summarised in this chapter include governmental bodies and political parties, the agriculture sector, trade associations, chemicals manufacturers, scientific experts and (environmental) NGOs. These groups have had varying levels of involvement with and influence over the design, introduction and implementation of the different instruments.

Figure 7 below summarises some of the key examples of civil society engagement with water quality-related instruments. These examples are drawn from both the case studies undertaken by the project team (in black text), and the experiences shared by stakeholders who attended the project workshop in Copenhagen (in blue text). Note that no detail on the latter examples is included in the discussion below the figure, since additional detail was not discussed during the workshop.

In several of the cases summarised in this chapter, **taxes and fees have been opposed by those who (would have to) pay them**. This was the case for agricultural organisations and farmers regarding the Danish pesticide and animal feed mineral phosphorus taxes (although the opposition in the latter case was related more to concerns over environmental effectiveness than the cost to farmers), and the Swedish fertilizer tax (including proposals in 1986 to double the tax rate). Some manufacturers/chemicals producers (e.g. those producing synthetic fertilizers) were strongly opposed to the Italian phytosanitary product tax, leading to their products being excluded from the scope of the tax.

Figure 7 Examples of civil society engagement with water quality-related instruments



There was at least some **discussion/negotiation with concerned stakeholders** prior to the introduction of each of the five instruments summarised in this chapter, whether through formal consultation processes or more informal lobbying by interested parties. For example, negotiation with agricultural interests was crucial for the initial design and 2012 reform of the Danish fertilizer tax. In relation to the Danish animal feed mineral phosphorus tax, the Government set up working groups of civil servants, scientific experts and representatives of farmer organisations and environmental NGOs to review evidence and make proposals to policymakers for future measures on nutrient reductions. Trade associations, organic farmers and chemical manufacturers fed into hearings on the draft legislation for the Italian phytosanitary product tax. Farmers' organisations succeeded in securing the earmarking of revenues from the Swedish fertilizer tax to agri-environmental subsidies when the tax rate was doubled in 1988. There are some signs that the design and levels of the elements of the Polish wastewater fee have been influenced by lobbying from the energy, agriculture and fish farming sectors.

The **support and help of public institutions and NGOs** can help with the introduction and success of an instrument. For example, at the time of its introduction, the Italian phytosanitary product tax had cross-party political support and support from associations for organic agriculture, although other stakeholders were opposed (see above) whereas some manufacturers (e.g. those producing synthetic fertilizers) were strongly opposed.

In other cases, it seems that **some stakeholders have had limited engagement with the instruments** summarised in this chapter at key stages of their development and implementation. For example, environmental groups were at best on the periphery of discussions around the introduction of the Danish pesticide tax in 1996 (the Danish Society for Nature Conservation – the main environmental organisation – did not comment on the proposal), with agricultural organisations playing a much more prominent role. Similarly, it seems that environmental NGOs did not play a significant role in the development of the Swedish fertilizer tax, although they did call for a substantial increase in the tax. Whilst

there was a public consultation on the draft law for the Polish wastewater fee, it seems that no other stakeholder engagement was carried out, and there is no sign of significant direct engagement with the wastewater fee by environmental NGOs.

There are also some examples of **stakeholder dissatisfaction/disappointment** either prior to or after the introduction of an instrument. In the case of the Danish animal feed mineral phosphorus tax, environmental NGOs expressed doubts about relying solely on environmental taxation to reduce nutrient use, suggesting instead a package of measures with taxation as only one element. Meanwhile, the Italian phytosanitary product tax revenues have tended to be allocated to governmental research institutes rather than organic associations and other external organisations.

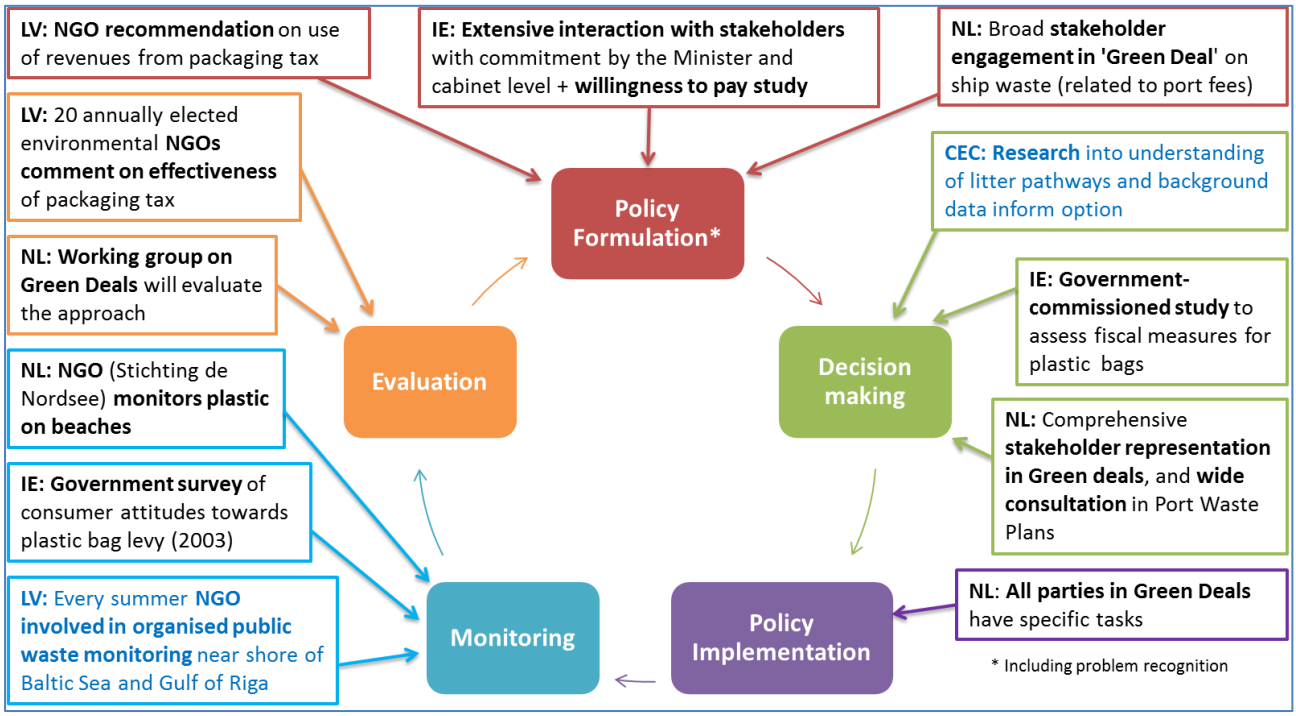
Clear understanding and communication of the scale and nature of the problem being addressed is a key step in encouraging action to address marine litter and a key input to the policy formulation stage of the policy cycle. Civil society engagement in **communicating the scale of the problem**, the social, ecological and economic impacts, and manifesting the public support for action, can each help in raising commitments to take tackle marine litter.

In Ireland, **voluntary beach clean ups**, civil society engagement in these actions and call for engagement, has helped raise the profile on addressing marine litter. Civil society were engaged via the government led consultation process. A **survey of consumer attitudes** was also held by the Government, first upstream on willingness to pay for plastic bags and later under the monitoring stage on how consumer attitudes changes (in this case greater support and willingness to pay once the scheme was actually underway and proving effective). **Public consultation** has proven a useful tool to engage civil society and one that can be replicated quite systematically for other instruments. This is particularly the case for marine litter-related instruments, where the environmental problem is very visible (although there are also problems not visible to the naked eye), and motivates public support (i.e. to have clean beaches).

In the Dutch port fees case with the zero level port charges for separated plastic waste above $6m^3$, civil society has and/or will have **a role at each stage of the policy cycle**, from engagement in the Green Deals themselves to implementation, monitoring and evaluation.

Figure 8 below summarises some of the key examples of civil society engagement with instruments related to marine litter. These examples are drawn from both the case studies undertaken by the project team (in black text), and the experiences shared by stakeholders who attended the project workshop in Copenhagen (in blue text). Note that no detail on the latter examples is included in the discussion below the figure, since additional detail was not discussed during the workshop.

Figure 8 Examples of civil society engagement with instruments related to marine litter

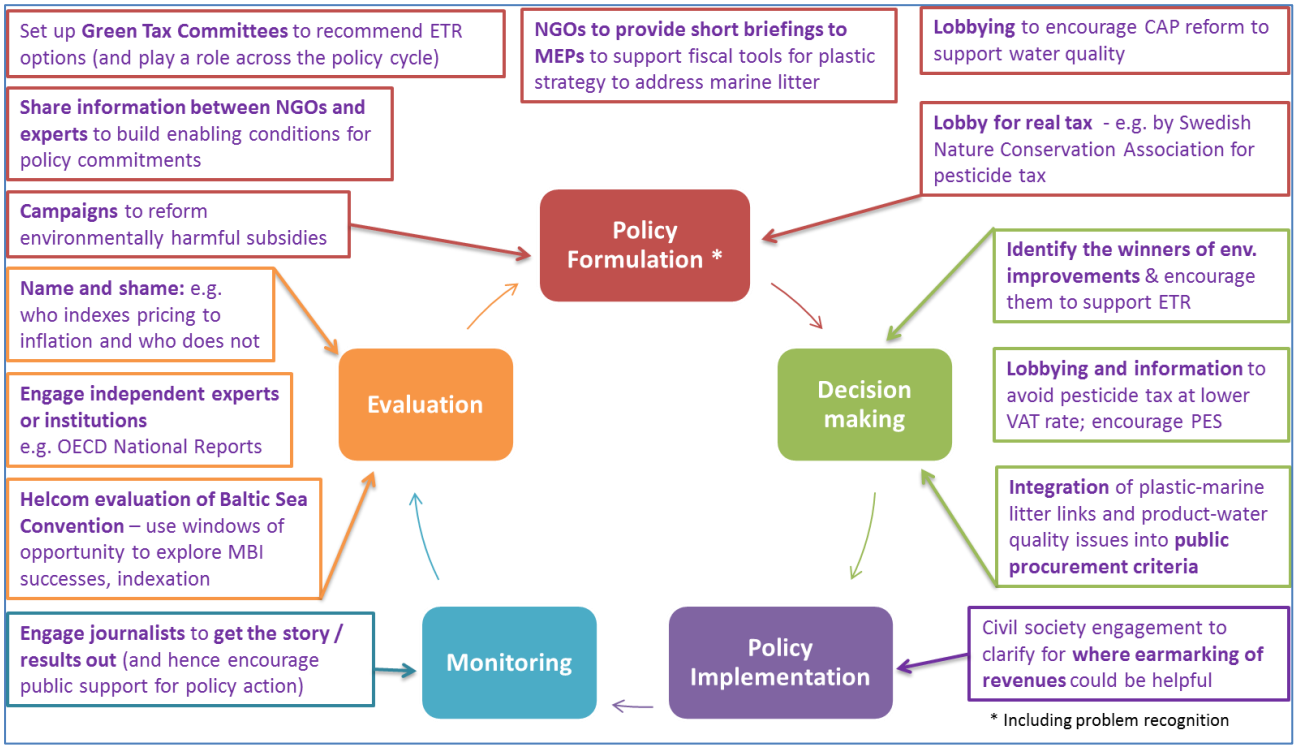


The process in the Netherlands was part of a wider 'Green Deal' approach that created a **formal process and vehicle for civil society engagement**. At the decision making stage it includes stakeholder representation not only in the deals, but consultation in the port waste plans too. NGOs (e.g. Stichting de Nordzee) are also involved in monitoring of plastic on beaches. There is also a working group on the green deals that will evaluate the approach.

The **evaluation phase** can be used for both an assessment of progress and effectiveness, but also a source of recommendations for subsequent policy formulation stage. For example, the evaluation of the Latvian packaging tax included inputs from an environmental consultation board of 20 annually elected environmental NGOs, which commented on effectiveness of the instrument. They also recommended that revenues to go back to being used for environmental actions. Civil society engagement in the evaluation stage is also one important means of bringing on board evidence of impacts to help in evidence-based revision of the instrument.

During the workshop in Copenhagen, participants were also asked to identify where civil society could usefully be engaged to support environmental tax objectives in the future, and what types of tools and processes could help with this engagement. Figure 9 below presents some of the examples provided by participants for each part of the policy cycle. These are not discussed in detail in this section, but a summary discussion on potential future engagement opportunities is provided in section 8 of this report.

Figure 9 Potential future opportunities for civil society engagement with instruments related to water quality and marine litter



Best practice and replicability

A number of lessons can be learned from the case studies analysed in this chapter.

The **design of an instrument** has an impact on its effectiveness. For example, the effectiveness of the Polish wastewater fee has been weakened by a design that compromises its environmental integrity, including loopholes that effectively exempt important pollution sources[34]. The impact of the Italian phytosanitary product tax has also been limited since it does not apply to some key products (i.e. synthetic fertilizers). Similarly, the environmental effectiveness of the Danish animal feed mineral phosphorus tax could be considerably improved if it applied not only to mineral phosphorus but to phosphorus at large, including phosphorus in mineral fertilizers.

Environmental taxes and fees should ideally be applied using the polluter pays principle, to ensure they are **targeted in the right place to achieve the desired behaviour change**. For example, it could be argued that the Italian phytosanitary product tax may have a greater impact on behaviour if the end user, rather than the producer, was made liable for the tax.

Sound **implementation and monitoring** of an instrument is also important for its success. The Polish wastewater fee has suffered from weak enforcement as a result of

[34] In August 2016 a proposal to revise the Act on Water Law was soon to be subjected to a parliamentary vote. The proposal would create a new public body, "Polish Waters", responsible for financing water management investment. "Polish Waters" would inform obligated entities how much they need to pay under the wastewater fee. This could help to address existing inefficiencies in the wastewater fee system.

limited resources within the Marshals' Offices and the Voivodeship Inspectorates of Environmental Protection to verify compliance, as well as a lack of standardised electronic reporting. The Italian phytosanitary product tax could benefit from improved monitoring of revenues generated, and more consistent and timely reporting on the disbursement of revenues, to help demonstrate the value of the tax. Regarding pesticides in general, the only Eurostat indicator is amounts of active ingredients sold in the Member States, which means that comparisons of pesticide loads across Europe are complicated.

Engaging stakeholders in the design and implementation of instruments can make an important contribution to their success. The ongoing reform of the Polish wastewater fee provides an example of civil society not being duly consulted, resulting in concerns that it will affect water and sewage prices for end consumers, including the most economically vulnerable, and that the past achievements of the instrument could even be largely cancelled out.

The **appropriate use of revenues, including earmarking,** can in some cases help to justify the existence of a tax or fee, or at least to make the purpose of the tax clear to those affected (and the general public). In some cases, such as the Italian phytosanitary product tax, the earmarking of revenues may have both encouraged support for the instrument and **enabled it to meet its environmental objective** of supporting organic agriculture (total tonnage of phytosanitary products sold declined, and organically cultivated land increased, between 2000-2013, but similar trends have been observed in Member States without such a tax, so how much of this can be attributed to the tax is unclear). The earmarking of revenues from the Polish wastewater fee for investments in environmental protection across the country, helping to tackle economic and social disparities between regions, can be considered one of the more successful elements of the fee.

Most of the instruments summarised in this chapter have some potential for **replicability in other EU Member States**. The Danish pesticide tax could be replicated, provided the tax is based on an assessment of the most relevant indicators for the country in question. Whilst the Italian phytosanitary product tax is highly replicable, effectiveness could be improved through a more comprehensive tax (see above) based on an indication of environmental impact (as is the case with the Danish pesticide tax) rather than purely the value of product sold. Taxes on nitrogen in mineral fertilizer, such as the fertilizer tax in Sweden, could be relevant to all those Member States and river basins where excessive application is creating health and environmental burdens. Such a tax can help to avoid the need for more costly restrictions on land use. Finally, in view of dwindling global phosphorus reserves, wider adoption of taxes such as the Danish animal feed mineral phosphorus tax could support demand management for this important resource, in particular if a higher tax rate were applied.

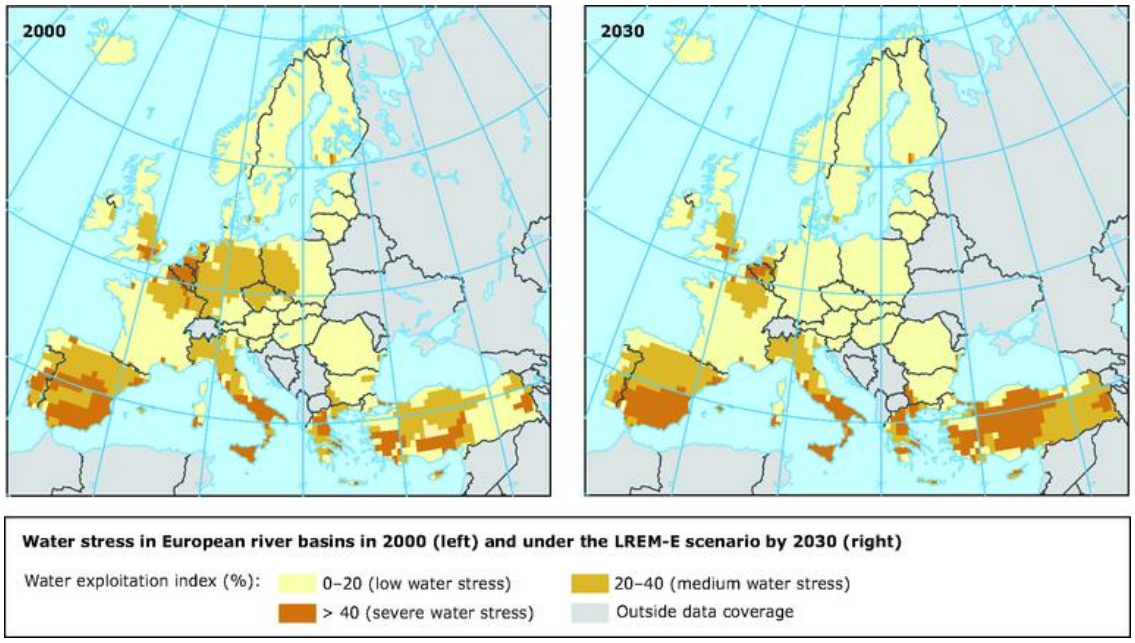
5. WATER STRESS AND AVAILABILITY

The issues and challenges

Problems of water stress and lack of fresh water availability are prevalent across some parts of Europe – see

Figure 10. It is expected that these problems will be further exacerbated as a result of climate change. Activities in several economic sectors place pressures on water resource management through water pollution, over-abstraction, land-use practices and structural changes among others. In particular, agricultural activities (water storage and abstraction for irrigation) have changed the flow regime of many river basins and lowered groundwater levels, especially in southern Europe. Growing demand for food production and bioenergy crops are increasing demands on water resources, which together with reduced water availability due to climate change, further worsen the extent and severity of water scarcity in some parts of Europe[35].

Figure 10 Water stress in European river basins in 2000 and forecast scenario in 2030[36]



In response to the worrying pressure on the quality and quantity of water resources in Europe, Member States have adopted various legislative measures including the landmark Water Framework Directive (WFD) (2000/60/EC) which introduced an integrated, 'ecosystem-based approach' to protecting and managing water resources in the EU. The WFD has led to the adoption of various measures in Member States to implement its

[35] EEA (2015) Hydrological systems and sustainable water management, http://www.eea.europa.eu/soer-2015/europe/hydrological-systems

[36] EEA (2005) Report– European environment outlook, N°4/2005 http://wwws3.eea.europa.eu/data-and-maps/figures/water-stress-in-europe-2000-and-2030/fig-3-3-water-stress.eps/image_large

provisions including on cost recovery and incentive water pricing set out in Article 9. The WFD is complemented by other EU water policies such as those concerning groundwater, drinking water and bathing water. Despite efforts and some progress, almost half of Europe's water bodies missed the WFD target to reach good ecological status in 2015 and other provisions of the Directive, such as on water pricing, are not yet fully implemented.

The polluter-pays principle

The Treaty on the Functioning of the European Union has established the polluter-pays principle as a principle of EU law (Art 191(2) TFEU). According to a defining OECD[37] recommendation this principle means "that the polluter should bear the expenses of carrying out the measures decided by public authorities to ensure that the environment is in an acceptable state". To avoid distortion of competition the cost of measures "should be reflected in the cost of goods and services which cause pollution in production and/or consumption. Such measures should not be accompanied by subsidies that would create significant distortions in international trade and investment." It is in extension of this principle that WFD Art. 9 requires Member States to have water pricing policies in place that provide adequate incentives to use water resources efficiently, so as to contribute to the environmental objectives of the directive. Recovery of the costs should include not only operational costs but related "environmental and resource costs" too.

To foster the correct implementation of water pricing, the 2013 Common Provisions Regulation[38] has established ex-ante conditionalities for accessing Rural Development and Cohesion policy funds. An assessment of water pricing and cost recovery policies in Member States can lead to requirements for action plans on water pricing.

Water is used as a resource as well as a sink for economic activities, and WFD takes on a holistic approach to water management. Users of water as a sink for emissions are subject to WFD requirements with respect to water pricing in the same way as users of water as a resource. Water pricing policies are thus understood to include the pricing of discharges from urban and industrial point sources to surface waters.

Tools used and design choices: similarities and differences

Economic instruments applicable in the area of water stress and availability include among others taxes and charges on water abstraction, water pricing policies, water trading systems and payments for ecosystem services (PES). A number of these instruments are in place in EU Member States with significant variations in coverage and nature of the instrument applied. Although in many countries there is cost recovery of water services (in that prices cover operating costs), environmental costs of water supply are rarely integrated in water pricing systems, with due exceptions such as Denmark[39].

[37] OECD, Recommendation of the Council on Guiding Principles Concerning International Economic Aspects of Environmental Policies, Doc. C(72)128 (May 26, 1972).

[38] Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013.

[39] Withana et al (2014) Environmental tax reform in Europe: Opportunities for the future, A report by the Institute for European Environmental Policy (IEEP) for the Netherlands Ministry of Infrastructure and the Environment. Final Report. Brussels. 2014.

The water stress related instruments selected for case studies were:

- Bulgarian water abstraction charge;
- Cypriot water pricing;
- French water abstraction charges;
- Maltese water pricing;
- Dutch taxes and fees of regional water authorities; and
- Portuguese Water Resources Fee.

A summary of the key details of the specific instruments assessed for this chapter is provided in Table A1 in Annex 1, which provides information on the rates, revenues and impacts of the analysed instruments.

The **design of these instruments varies significantly**. **Rates applied** vary by user (e.g. domestic, industry, agriculture), source (e.g. groundwater or surface water) and in some cases by location / zone such as in France, the Netherlands and Cyprus in order to take into account relative water scarcity and pressure of abstraction on available water resources. As a result, the rate per m^3 of water abstracted can differ substantially between regions within a country. For example, in France the rates applied by the Water Agency Rhône-Méditerranée-Corse in 2016 range from EUR 0.15 per 1,000 m^3 for canal filling in zones without a water deficit to EUR 68.31 per 1,000 m^3 for drinking water in zones with a water deficit. The OECD has indicated that the French water charging system is well-designed. However, the tax level is relatively low and is based on gross abstraction, whereas net abstraction may be a better base. Approximately 75% of revenue comes from households, 22% from industry and 4% from agriculture. These shares are very similar to the Netherlands (74% households, 24% industry and 2% agriculture). In other words, contributions from agriculture are limited, in spite of the agriculture sector being large in both countries.

In Cyprus, if users exceed the allowed level for their tariff band, the tariff increases sharply. The agricultural sector uses a significant amount of drinking water for irrigation purposes. A full-cost study demonstrates that whilst household water use is close to full-cost recovery, water used for irrigation purposes is far from full-cost recovery (WDD, 2011). In 2014, Cyprus decided to charge for groundwater pumping, but for political reasons the decision has not yet been implemented. A new regulation (48/2017) was implemented in April 2017, setting new prices.

In Malta applies an annual metering fee for underground extraction, but there is no water charge for abstracted water. In addition, there is a fixed charge for private boreholes, but borehole owners are allowed to extract as much water as they want.

Exemptions are sometimes applied for different users. Some instruments include **incentives to encourage behaviour change** such as charging lower base values for residual water use in Portugal.

In some countries such as France and the Netherlands, responsibility for water pricing instruments is delegated to the **sub-national, regional or local level**. For example in the Netherlands, water management and its financial regulation is a highly decentralised system with so-called Regional Water Authorities (RWAs) responsible for the most important levies and fees related to water use and pollution, the central Government only plays a minor role.

Some of the **instruments have been in place for several decades**, for example Cyprus has had a tradition of domestic and irrigation water pricing since the 1960s due to its semi-arid climate, water abstraction charges were introduced in France in 1964 and decentralised environmental levies, fees and charges were introduced in the Netherlands in late 1960s.

The instruments have been **adopted for various reasons**, for example to recover the financial costs of water provision in Cyprus, to provide incentives while financing local abatement policies according to the 'polluter pays principle' in the Netherlands, to collect revenues for the investment programmes of the Agences de l'eau' (Water Agencies) in France, to raise revenues for environmental protection and achieve sustainable water use in Bulgaria and to transpose the EU WFD in Portugal. A Danish water tax was introduced in 1995 as part of a wider environmental tax reform to lower payroll taxes. The tax was phased in gradually from DKK 1 to DKK 5 per m^3 (around EUR 0.67/m^3). Total annual revenue is around DKK 1 billion (EUR 134 million), but declining due to reduced water use. The tax is one element of a package to achieve full-cost pricing for water, together with water supply tariffs and waste water charges.

Raising and using revenues

As indicated in Table A1 in Annex 1, the scale of revenues raised by the instruments and their use varies significantly across the countries. In Cyprus, revenues from the water charges are collected through water bills and go to the **general government budget**. In Bulgaria and Portugal, revenues are allocated to **water management related activities** and in the case of Bulgaria also support **biodiversity protection** through funding for the Natura 2000 Network. As mentioned above, revenue from the Danish tax was used to lower payroll taxes.

In France, revenues from the charge (together with those from water pollution charges) are used to **finance the activities of the Water Agencies** according to the generally accepted principle of 'water pays for water'. Although the revenues are not earmarked for any specific type of expenditure, they are often used for environmental investments. During the Barcelona workshop, one stakeholder pointed out that there has been some controversy about revenues being used to finance some environmentally harmful projects. Similarly in the Netherlands, revenues from the waste water treatment levy, the water systems levy, and the pollution levy are earmarked to fund necessary **investments and maintenance** by the RWAs which are 95% funded through their own levies. Only around 20% of the costs for water management are financed by the Dutch central government, due to the highly decentralised water governance system and regional level taxation.

Effectiveness and efficiency insights

The effectiveness of the instruments has also varied significantly between the countries. In some countries the low level of the charges have had a **limited incentive effect**. For example in Portugal many individuals are unaware of the fee and its effect on their water bill while in the agriculture and industry sectors, energy costs are considered a more significant driver of changes (e.g. to improve efficiency in irrigation systems) than water charges given their limited economic impact. Similarly the impact of the water abstraction charge in France on the amount of water used is almost negligible as the charge constitutes only a very small part of drinking water bills of consumers and just a few per cent of irrigation costs of farmers. At the Barcelona workshop, a stakeholder stated that the French charge is more about raising revenue than incentivising behavioural change. Nonetheless, the amount of water abstracted in France has been gradually declining since 2000 as a result of several charges paid by water users such as the much higher charge for water pollution and the fact that a substantial part of the water bill is charged at a variable (per m^3) rate. Together these measures result in a water pricing structure that contains at least some incentives for water conservation. In Malta, there are significant

problems with abstraction from illegal boreholes and some users (e.g. hotels) buying illegal water.

Some instruments have had **notable impacts on the environment**. For example the application and substantial increase of the Dutch water pollution levy seems to have contributed to a sharp decline in overall emissions directly discharged to open water towards water treatment plants and an increase in rates of pollutants removed by waste water treatment between 1981-2014 (e.g. in 1981 untreated sewage had a nitrogen concentration of 53 mg/l and a concentration of 25 mg/l after treatment – a removal rate of 53%. The removal rate of nitrogen was 86% in 2014). The Danish tax has had substantial effects; water use has reduced by 50% and the tax has also provided an incentive to reduce water leakages.

The increase in Bulgarian water abstraction charges from 2012 onwards led to a decrease in usage across users and a reduction in total loss of water reported by water supply and sewerage operators. However a substantial increase in the amount of water abstracted and used for the production of hydropower (due to subsidies for energy produced by small and medium hydropower plants) has led to an increase in water abstraction, thus highlighting how policies in other sectors can influence the effectiveness of certain instruments.

In terms of wider impacts of the instruments, water charges have **stimulated innovation** in the Netherlands as reflected in the high number of patents filed in the area of water and waste water management and innovations by waste water treatment plants in new technologies for purification and recovery of energy and materials from waste water sludge. **Investments in the water sector** funded through revenues from the Bulgarian abstraction charges (and co-financed from EU funds) have contributed to improved quality of surface waters. In Cyprus, if full cost recovery water pricing is implemented, estimated **water savings** would reduce the dependence on water from desalination plants which use large amounts of fossil fuel based electricity, damage marine ecosystems and rely on government subsidies. Producing freshwater from desalination plants costs more than EUR 1 per cubic metre and is markedly higher than the expected welfare loss of water consumers from water prices that comply with the full cost recovery principle and reflect the scarcity and environmental costs of water use.

In some countries such as France, the Netherlands and Portugal, there is a skewed distribution in the **burden of the water charges** between different types of water use with households paying much more than agriculture and industry. For example in France, the highest rates (up to a maximum of EUR 0.10 per m^3) are levied on drinking water. In the Netherlands, the new system of water charges and fees introduced in 2009 resulted in a higher tax burden for households, and lower taxes for firms (agriculture in particular) and owners of conservation areas with an estimated tax shift of approximately EUR 79 million from (agricultural) firms and (conservation) land owners to households.

Box 4 Modelling: Water abstraction charge[40]

The study modelled a theoretical water abstraction charge based on an existing water abstraction charge in France:

- Average water abstraction charge of EUR 30 per thousand m3, applied directly to consumers and businesses;
- Charge introduced from 2017 onwards in all EU Member States;

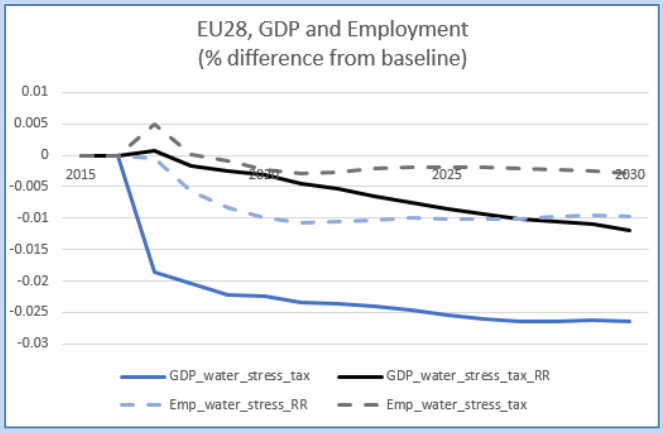
[40] Additional information on the modelling exercise, including underlying assumptions and additional explanation of the results, can be found in an Annex at the end of this report.

- Rate assumed to increase in line with inflation to 2030;
- Additional scenario included to show macroeconomic impacts if revenues from the charge are used ('recycled') to invest back into water infrastructure (water pays for water principle).

Modelling results

The results are presented as differences from the model baseline, which is consistent with the future trends published by the European Commission[41].

- Small GDP impacts, with negative impacts due to higher water prices paid by consumers and industries;
- An increase in water prices of approximately 3%, resulting in a demand reduction of 0.75% for industry and between 0.3 and 1.5% for households;
- Loss of real income and higher costs to industries (in particular water supply and intensive water users), which can be minimised through revenue recycling due to increased investment in the water supply industry;
- With revenue recycling, sectors associated with investment (e.g. construction, engineering) benefit from investment in water infrastructure.
- Measure expected to raise around EUR 1.9bn in 2017 and EUR 2.8bn in 2030.



EU28 sectoral output in 2030, % difference from baseline	
Water supply	-2.21
Sewerage & waste	-0.15
Electricity	-0.03
Textiles & leather	-0.03
Chemicals nes	-0.03
Machinery, equipment.	0.10
Repair & installation	0.09
Electrical equipment	0.05
Manufacturing nes	0.03
Construction	0.02

Source(s): E3ME, Cambridge Econometrics

EU28 Summary of results in 2030, % difference from baseline		
	With revenue recycling	Tax only
GDP	-0.026	-0.012
Consumer spending	-0.043	-0.038
Imports (extra-EU)	-0.016	0.012
Exports (extra-EU)	-0.008	-0.017
Investment	-0.015	0.063
Consumer price index	0.06	0.059
Employment	-0.010	-0.003
Revenues from water abstraction charge (m EUR 2016)	2,821	2,821
Source(s): E3ME, Cambridge Econometrics		

[41] *EU Reference Scenario 2016: Energy, transport and GHG emissions Trends to 2050*, European Commission and *The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060)*, European Commission.

Drivers for action, political process and windows of opportunity

Various drivers have supported the adoption of the instruments. In particular, the **need to implement specific pieces of legislation** has played an important role in the introduction and reform of instruments in this area. For example the introduction of a water resources fee in Portugal followed the transposition of the EU WFD in national legislation, while the Directive was one of the main drivers in the development of the Bulgarian water abstraction charges. In France, the Directive led to adoption of the 2006 Act on Water and the Aquatic Environment which adapted the structure of the existing charges and also introduced a number of additional ones, to better reflect the requirements of the WFD concerning the pricing of water services (although it has been criticised by the French Auditor's Office for not meeting the 'polluter pays' principle sufficiently).

The need to fulfil the requirements of the WFD also provides a window of opportunity for further action. For example in Bulgaria, the Government aims to increase water abstraction charges from 2017 as a means to fulfil the requirements of the WFD as the current charges are considered too low to stimulate investment in environmentally friendly technologies. In Cyprus, requirements to implement the WFD, the preparation of River Basin Management Plans (RBMPs) for compliance with the Directive and pressure by the European Commission on national water authorities to implement full cost recovery pricing measures foreseen in legislation could provide windows of opportunity for water pricing reform in the country.

Another key driver is **water scarcity**. This is the case for example in Malta, where heavy investment in desalination has been necessary to provide water to fulfil the requirements of a large tourism sector and an agriculture sector able to grow three crops per season.

In some cases, an **external actor can open a new window of opportunity for reform**. For example in the Netherlands, a 2014 report by the OECD has initiated a process to evaluate the current levy system given concerns among others of the shift in the distribution of costs towards households following the last reform in 2009 and the lack of specific policy to address diffuse sources of the agricultural sector. Following publication of the OECD report, the Ministry of Infrastructure and the Environment established a tax commission to evaluate the system. This process will be linked to a broader evaluation of long term financing issues of sustainable water use in the Netherlands.

In some cases, the fact that taxes can provide an **opportunity for fiscal consolidation** through the revenue raised can help to drive the introduction of water use related taxes.

During the Barcelona workshop, stakeholders pointed out that the **reform of the EU Common Agricultural Policy** could provide a window of opportunity for considering the application of (higher) charges/taxes for agriculture-related water use (although this could prove to be controversial).

In some countries, effective action on water pricing is hindered by various **barriers**. For example in Cyprus, full implementation of the WFD, in particular provisions on water pricing face a number of **political barriers**. Although a Regulation 'on pricing and full cost recovery of water supply services' was adopted in 2014, provisions on charging for water scarcity (resource cost) and environmental costs have not been activated due to opposition from policymakers, national authorities, consumer and farmer associations. The main concern relates to the affordability of water for low-income households and farmers, particularly during the economic downturn. However, these concerns are somewhat exaggerated as preliminary analysis indicates that water expenditures of Cypriot households are regressive and represent a low fraction of household income, while equity concerns can be mitigated through measures such as volumetric block-pricing already applied in the capital Nicosia. Stakeholders at the Barcelona workshop indicated that other barriers include the **lack of transparency** in the application and use of taxation, and

vested interests from certain economic sectors that are opposed to taxes (or increased taxes), for example the agriculture sector which is typically a high-volume water user yet in some cases does not contribute more than a few percentage points of total water charges (e.g. in France, the Netherlands). This could potentially be countered by communicating to the public that if water costs are not paid by water users, they must be covered by general budgets which are financed by all taxpayers.

Stakeholder and civil society engagement

Stakeholders who have engaged with the instruments summarised in this chapter include governmental bodies, water agencies, consumer associations and citizens, businesses, farmers' associations, environmental NGOs and academics.

In the cases analysed, stakeholders have been engaged in the design and implementation of the instruments to varying degrees and at different stages in the policy cycle – see **Error! Not a valid bookmark self-reference.**. In those countries such as France and the Netherlands where the main responsibility for water charges lies at the regional or sub-national level, stakeholders are **engaged in policy processes either directly or indirectly**. For example in France, Water Agencies decide on matters such as rates, zones, and use of revenues. Stakeholders are represented in the Agencies through their representatives as administrators of the Agencies are appointed by the State and catchment committee (regional, departmental and local councillors, user representatives, associations). In the Netherlands, a leading principle governing water management is 'stake-pay-say'- i.e. those who have a stake in the duties performed by the RWAs should in principle bear the costs and be represented in governing bodies. Thus an exhaustive list of stakeholders is represented in RWA boards. Furthermore, regulations that affect citizens generally do not come about without participation procedures. Policy implementation and enforcement is performed by an executive committee appointed by the board.

Figure 11 below summarises some of the key examples of civil society engagement with instruments for water stress and availability. These examples are drawn from both the case studies undertaken by the project team (in black text), and the experiences shared by stakeholders who attended the project workshop in Barcelona (in blue text). Note that no detail on the latter examples is included in the discussion below the figure, since additional detail was not discussed during the workshop.

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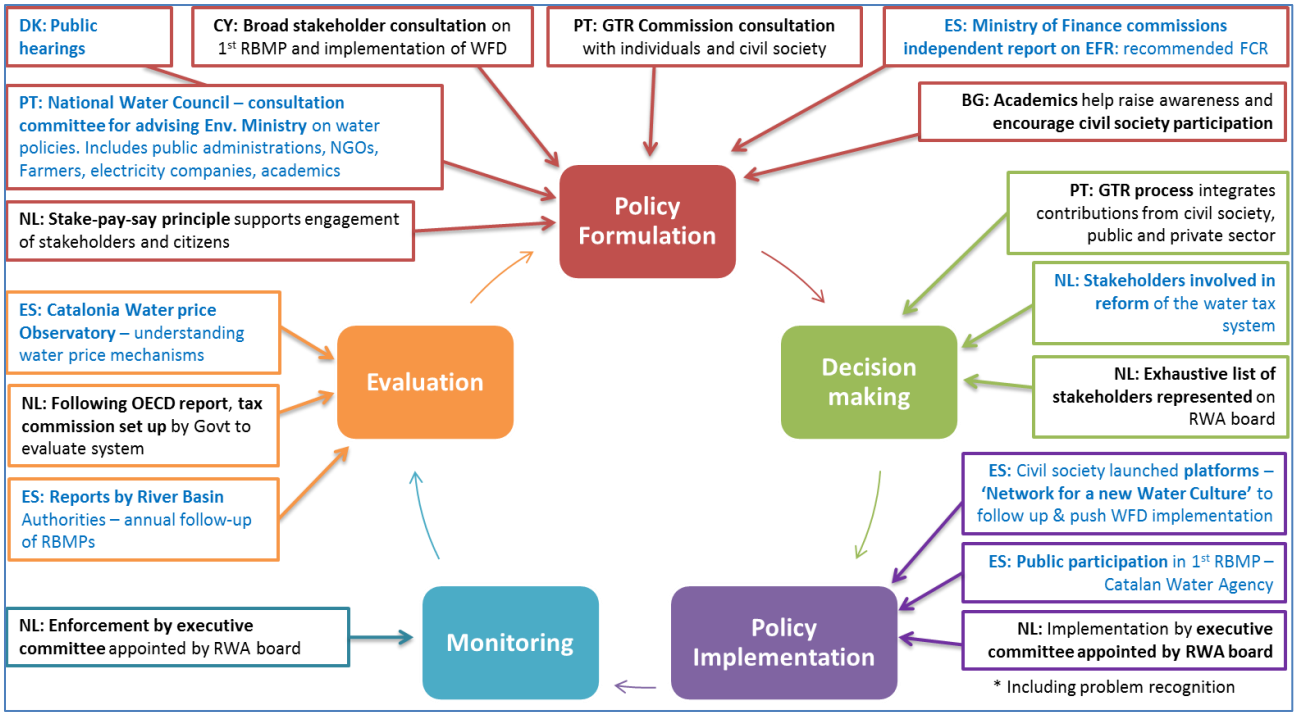
Figure 11 Examples of civil society engagement with instruments for water stress and availability

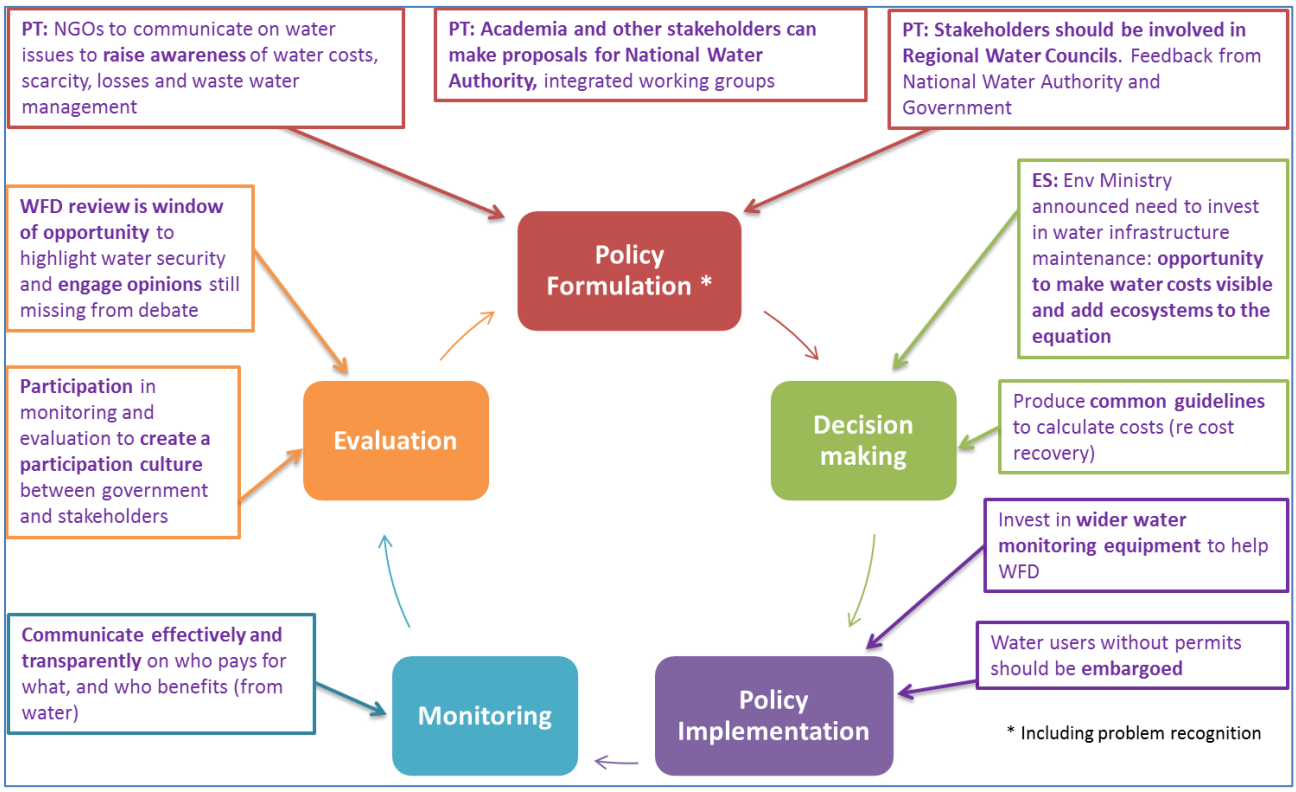


In other countries, stakeholders have been engaged in **policy evaluation processes**. For example in Portugal the public discussion on ETR launched in 2014 included the creation of a GTR Committee and engaged various stakeholders. This process led to the adoption of new legislation which included some of the proposed revisions to the water resource fee. In Cyprus, a broad range of stakeholders (including consumer associations, farmer associations and co-operatives, local authorities, academics and environmental NGOs) have been involved in discussions on water pricing, although only environmental NGOs and some academics supported implementation of the full cost recovery principle. In the Netherlands, following publication of a 2014 OECD report, the Ministry of Infrastructure and the Environment established a tax commission to evaluate the current water tax system. Although the commission is mainly composed of managers from within the water sector, it has created several opportunities to involve many stakeholders in the evaluation process, including firm representatives, farmers and NGOs.

In some countries, the **lack of transparency and inclusiveness** in the policy development and implementation phase has been criticized. For example, in Bulgaria the Government began discussions on reforming the charges in 2011. Industry representatives were rarely involved in these discussions and did not support the increase of the charge in 2012. Transparency of revenue allocation has been a major problem since the introduction of the charge. According to some stakeholders, a more transparent and inclusive process might have increased their approval of the charges.

During the workshop in Barcelona, participants were also asked to identify where civil society could usefully be engaged to support environmental tax objectives in the future, and what types of tools and processes could help with this engagement. Figure 12 below presents some of the examples provided by participants for each part of the policy cycle. These are not discussed in detail in this section, but a summary discussion on potential future engagement opportunities is provided in section 8 of this report.

Figure 12 Potential future opportunities for civil society engagement with instruments related to water stress and availability



Best practice and replicability

Some key lessons learned from the implementation of the instruments analysed and potential insights for other countries are set out below.

Although the Portuguese water resources fee is implemented in a biased way, the principle of **reflecting various components of the fee** (i.e. abstraction of public water for private use, direct or indirect discharge of effluents in water resources which may cause significant impact, aggregate extraction of public water resources, land occupation of public water resources and/or occupation and creation of water plans, private use of water) **in different economic sectors** is positive as is the inclusion of incentives to encourage behaviour change such as charging lower base values for residual water use.

Concerns about the potential adverse impacts of higher water prices on social equity are often exaggerated as preliminary analysis in Cyprus indicates. **NGOs, water authorities and experts should explain the real effects** of such measures and provide best practice examples from other countries in how to implement such instruments while addressing potential adverse impacts.

Although water is a necessary good, its consumption is not entirely inelastic as people do respond to higher water prices and hence **pricing can lead to water conservation in a way that is less costly** to society than other measures (e.g. water rationing, expansion of water supply through costly infrastructure projects or desalination systems).

Revenues from water abstraction charges can play an important role in **supporting projects and initiatives in the field of environmental protection** and management as has been the experience in Bulgaria.

Although some aspects of the Dutch situation are fairly unique, such as the comprehensive water quantity regulation through dykes and artificial waterways, the **design of the cost recovery levy** provides fairly good insights for replicability. The specifics of the levy base have clearly had a strong impact on businesses' behaviour in the Netherlands. Moreover, the levy also seems to have contributed positively to innovation in the drinking water sector.

Some elements of the French water abstraction charge can also be considered as exemplary in **meeting the WFD requirements of 'cost recovery' and 'adequate incentives'**, in particular:

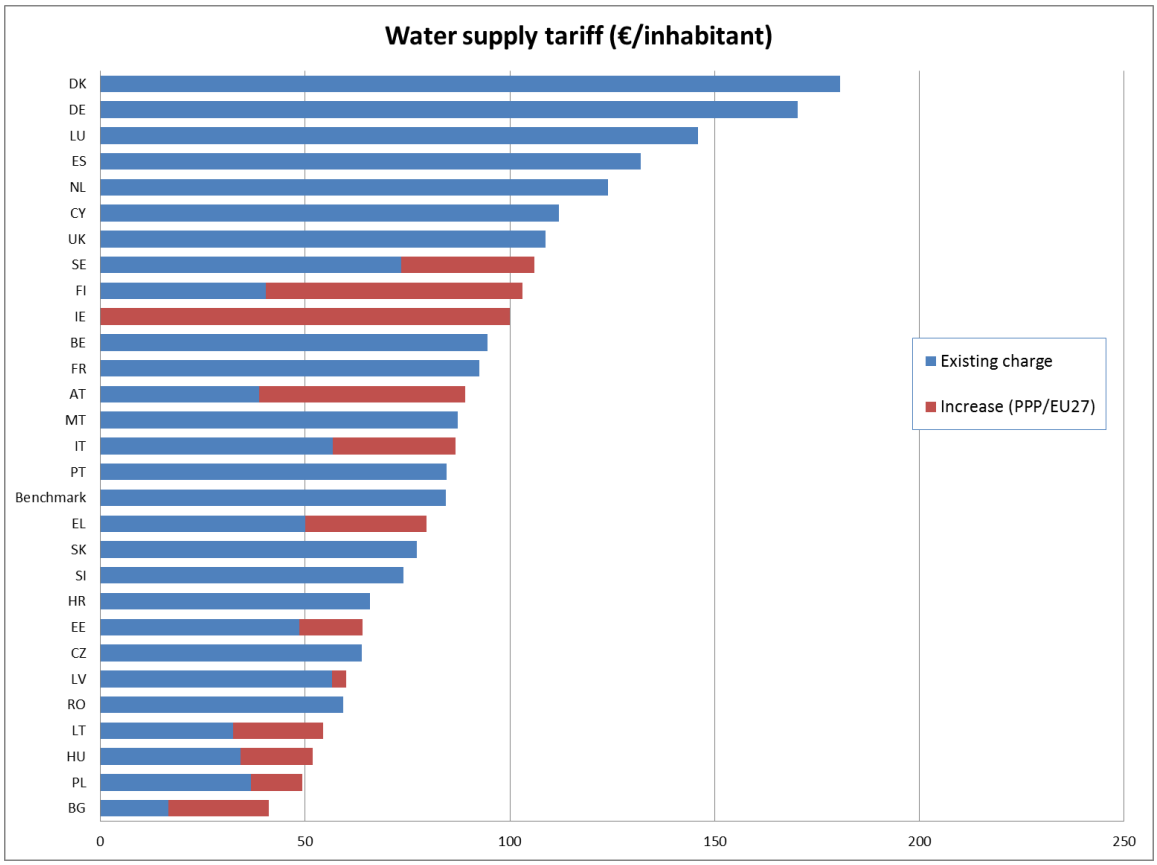
The 'water pays for water' principle underlying the charge ensures a close relationship between water use and financing for the protection of water resources. This may also contribute to the perceived legitimacy and acceptance of the instrument.

The fact that the charge is proportional to the amount of water abstracted (although differentiated between types of use and water scarcity zones) implies that there is at least a basic incentive (admittedly very small) to save water. Each additional m^3 abstracted has to be paid for; the marginal cost of water use is never zero (except for the exempted uses). This (micro-) incentive is passed on along the value chain (at least for households and industry), together with other (more substantial) variable components of the water bill.

Figure 13 shows the results of a benchmarking analysis of water pricing in EU Member States.[42] With water prices for supply and discharges in France providing a point of reference in terms of good practice, and applying a correction for the relative price levels across the European Union, the analysis is suggestive of which Member States may need to adjust their water pricing schemes for households to reach full cost recovery. Overall, most Member States seem to price water supply to households as could be expected according to the stipulated costs, with the notable exception of Ireland and some other Member States. In contrast, water pricing for waste water discharges from households appears to offer potential for adjustment in most Member States if they should secure full cost recovery (and where sewage treatment is not fully extended, Article 9 of the WFD suggests that the environmental costs still need to be priced).

[42] Study on Assessing the Environmental Fiscal Reform Potential for the EU28, Final Report, ENV D.2/ETU/2015/0005, http://ec.europa.eu/environment/integration/green_semester/studies_en.htm

Figure 13 Existing and potential household water pricing for full cost recovery

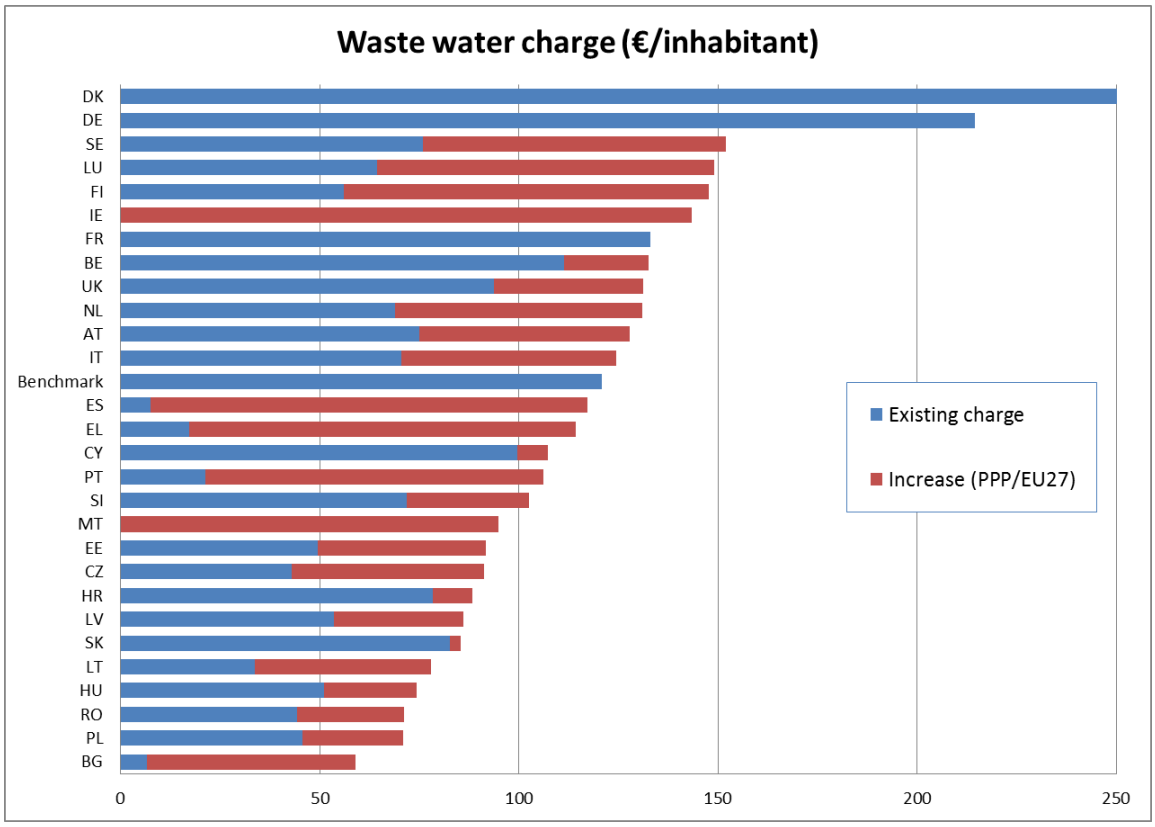


6. BIODIVERSITY AND LAND USE & MANAGEMENT

The issues and challenges

Loss of biodiversity has reached an unprecedented pace in the EU over the last decades. For example, the assessment of the Habitats Directive for 2007–2012 shows that only 23% of assessed animal and plant species and 16% of the assessed habitat type were in a favourable conservation status in that period[43]. 60% of the assessed species and 77% of the assessed habitat were in unfavourable conditions. In order to address this issue, in 2010 the European Commission adopted an EU biodiversity strategy to 2020, which stated as an objective to halt the loss of biodiversity and ecosystem services and to restore ecosystems in so far as is feasible. However, the mid-term review of the EU Biodiversity Strategy showed that, even though progress has been made, biodiversity loss and the degradation of ecosystem services in the EU is continuing.

Almost half of the EU land is covered by farmland (including arable land and permanent grassland), and for this reason agriculture and cattle raising have a key impact on biodiversity, and the state of the environment in general. Forests and wooded land cover more than 42% of the EU land area, and even though they have increased by 17 million



[43] EEA (2015) SOER 2015 - The European environment, State and outlook 2015, http://www.eea.europa.eu/soer-2015/europe/biodiversity

ha since 1990[44], they are subjected to increasing pressure due to fragmentation, soil sealing and climate change. Both forest and agricultural land can play a key role in the conservation and maintenance of biodiversity, if properly managed.

If carried out in a sustainable way, they can also contribute to a wide range of environmental objectives, including carbon storage, regulation of quality and quantity of fresh water, protection against natural disasters, reduction of soil erosion, and opportunities for recreational activities.

Economic instruments can be used to improve the sustainability of agricultural and forest land in order to complement (not replace) the legislation in place on pollution limits and required management practices. Examples are taxes on fertilisers and pesticides, fishing and hunting fees and public and/or private financing for the conservation and sustainable use of forests.

Tools used and design choices: similarities and differences

Economic instruments applicable in the area of biodiversity and land use and management include taxes on the use of environmentally harmful products, taxes and fees on the use of natural resources, subsidies and payment for ecosystem services (PES) programmes, ecological fiscal transfers, biodiversity offsetting and fishing quotas and licences. With the exception of subsides for land use, not of the instruments are systematically used. However there is interesting practice with each of the different tools.

The instruments related to biodiversity and land use and management selected for case studies were:

- Austrian tree protection act (Vienna);
- Croatian Forest Public Benefit Fee;
- Danish pesticide tax;
- Danish animal feed mineral phosphorus tax;
- Estonian hunting and fishing fees;
- Finnish tax on the use of peat for energy;
- German result-based agri-environment measure (Baden Württemberg)
- German biodiversity offsetting;
- Irish fishing fees;
- Italian phytosanitary product tax;
- Portuguese ecological fiscal transfers;
- Slovenian payments for private forest management;
- Spanish mature forest payments (Girona province);
- Swedish fertilizer tax; and
- Icelandic fisheries instruments.

A summary of the key details of the specific instruments assessed for this chapter is provided in Table A1 in Annex 1, which provides information on the rates, revenues and impacts of the analysed instruments.

[44] EEA (2015) SOER 2015 - The European environment, State and outlook 2015, http://www.eea.europa.eu/soer-2015/europe/biodiversity

Raising and using revenues

Only the revenues obtained from seven of the analysed instruments are **earmarked for environmental projects and activities**, including:

- The pesticide tax in Italy: the revenues are used to support organic farming and quality products through a) the "Fund for the development of organic farming and quality products", which provides farmers with incentives and technical assistance, and finances activities aiming at informing consumers about organic, typical and traditional foods; b) the "Fund for research in the sector of organic agriculture and quality products";
- The Forest Public Benefit Fee in Croatia: the revenues are used to finance mainly forest management and restoration activities, but also demining, firefighters and scientific work[45];
- The hunting and fishing fees in Estonia: the a significant part of the revenues – 77% in 2015 - is transferred to the Environmental Investment Centre, which uses them to finance grants to research, conservation and awareness raising projects;
- The fishing fees in Ireland: 50% of the revenues are earmarked to the Salmon Conservation Fund, which supports conservation projects aiming at supporting the conservation and sustainable management of salmon stocks and habitats they depend on. The fund collected EUR 5.2 million between 2007 and 2015;
- The fishery instruments in Iceland: the revenues are used by the Government to help finance the fisheries management system;
- The Vienna Tree Protection Act: the revenues are used for the conservation of the green infrastructure of the city;
- The offsetting projects in Germany are earmarked by definition, as they are used to compensate the unavoidable impacts on biodiversity and ecosystems of developments.

In addition, the two Danish taxes summarised in this chapter are not earmarked as such, but their revenues are mostly used for the agricultural sector, mainly through a reduction in land value taxes. Similarly, the Swedish tax on fertilisers was not earmarked, but the revenues generated between 1984 and 1994 were used for research and environmentally oriented projects managed by the National Board of Agriculture, who levied and administered the tax (e.g. investment in fertiliser management units, advisory services and research programmes in the agricultural and forestry sectors). After 1995 the revenues accrued to the national treasury and were not earmarked anymore even though some funds were still allocated for environmental improvements in agriculture.

On the contrary, the Portuguese Ecological fiscal transfers (EFTs) are **not** earmarked, and the municipalities can decide how to use them. The remaining instruments are subsidies and an offsetting programme and therefore the issue of earmarking is not relevant for them.

The two analysed Danish taxes and the Italian tax on fertilisers are collected by the national tax and custom authorities, whereas the Swedish tax on fertilisers (now abolished) was collected by the National Board of Agriculture from 1984 to 1994, and by the Swedish taxation authorities after that.

[45] 13% is used to demine forests, 5% for firefighting activities and 5% for scientific research in the forestry field. The remaining 77% is used for forest management activities, both in public and private forests. The revenues generated from the fee allowed public expenditure on karst forests to be doubled.

In addition, it is interesting to note that whereas the fertiliser tax in Sweden and the two analysed taxes in Denmark are **paid by end users** (i.e. farmers), the Italian pesticide tax is **paid by those authorised to put the products on the markets**.

As regards subsidies, the result-based agri-environment measure (RB-AEM) in place in Baden-Württemberg (Germany) remunerates farmers with species-rich grassland. It is financed though the Common Agricultural Policy (CAP) and is managed by the CAP managing authority of Baden-Württemberg, i.e. the Ministry for Rural Areas and Consumer Protection. The Selvans programme in the province of Girona (Catalonia, Spain) was initiated in 2005 as a public forestry aid call (with complementary funds from donors channelled through the NGO Xarxa de Custòdia del Territori), which carried out stumpage acquisition of mature forest spots in public and private property. After a budgetary cut in 2012, the programme was split into two differentiated programmes. The public aid was kept as a standalone call and focussed on stumpage acquisition of only public mature forests, whereas Selvans was hosted by the NGO Acciónatura, and focussed mostly on raising private funds for financing reserves in public and private forests. The Slovenian financing and co-financing investments in private forest management are received by private forest owners, funded by the Ministry of Finances and managed by a public body, the Slovenian Forest Services. These three subsidies can be considered **Payment for Ecosystem Services** (PES) programmes, as they are voluntary transactions that remunerate owners or managers of natural resources for the ecosystem services they provide, where the payment is conditional on agreed rules of natural resource management.

The Croatian Forest Public Benefit Function Fee is paid by all companies and business associations that carry out economic activities in Croatia, with the exception of those who manage forests. It was collected from the state-owned Croatian Forests before 2015 and by the Ministry of Agriculture afterwards (the change was due to constant accusations of advocacy groups that the funds were not being spent properly).

As regards the fishing and hunting fees in Estonia and Ireland, they are paid by commercial and recreational fishers and hunters. The earmarked revenues are managed by specific public bodies (the Environmental Investment Centre (EIC) and the Irish Salmon Conservation Fund) and the remaining revenues go the general budget. The fees related to the Austrian Vienna Tree Protection Act are collected by Vienna municipality, who uses them to improve the city's green infrastructure.

The Portuguese Ecological Fiscal Transfers (EFTs) are fiscal transfer from the national government to municipalities, who can decide how to spend the related budget.

Effectiveness and efficiency insights

The impact of the tax related instruments, including the Finnish peat energy tax, the pesticide tax and phosphate fodder tax in Denmark, has been **limited** so far. The Finnish peat energy tax is decided based on political considerations, without taking into consideration peat's energy content and level of CO_2 emissions. Consequently, the tax is ineffective in internalising and reducing the environmental impacts of peat extraction and use. In Denmark the ineffectiveness has possibly been caused by the low level of taxes and also because the demand of the taxed products tends to be inelastic, i.e. it does not decrease significantly when the price increases. As regards the former, the new version introduced in 2013 is expected to have a much greater impact (its objective is to reduce the pesticide load by 50% before the end of 2016), but an evaluation is currently being undertaken. As regards the phosphate fodder tax, the reduction in the use of phosphorus was estimated at 2,000 tonnes between 2004 and 2015, as compared to an ex-ante assessment of 4,500-5,000. Also, revenues of this latter instrument remain about three

times higher than expected, indicating less reduction in the use of mineral phosphorus than forecasted.

The impact of other instruments is **more significant**. For example the fishing fee in Ireland has resulted in a significant reduction of salmon fishing (from over 250,000 salmon in 2001, the year when it was introduced, to over 20,000 in 2015). In Iceland, since the introduction of Individual Transferable Quota (ITQs) most stocks have slowly increased, in particular the valuable cod stock. The Swedish fertilizer tax has also had a positive impact: the tax lowered the optimal fertilizer dose (e.g. for wheat from 145 to 135 kg N/ha). When the phosphorus tax component was phased out in 1994, as the reduction goal of 50% has been met, consumption of phosphorus increased by more than 20% in the following two years, and then decreased from 25 grams in 1996 to less than 10 grams in 2000, partly due to the introduction of a cadmium tax[46]. The Croatian Forest Public Benefit Fee has a significant environmental impact, as it allowed to prepare 6,774 ha for natural forest development and to manage 28,973 ha of young forest by 2015. In addition the program plays an important role in fire prevention (361.66 ha of firebreaks/ firefighting passages are to be prepared by the end of 2016).

The impact of subsidies to farmers or forest owners tends to be **difficult to assess**. This is because estimating additionality (the extent to which the environmental improvement would have happened even without the subsidy) would require to compare the current situation with an alternative baseline scenario without the subsidy. However, the land included in these programmes can be considered a proxy of their impact. In the case of the Slovenian and German programmes, the area covered by the instrument decreased. In fact, the hectares of private forests where silviculture work has been carried out thanks to the Slovenian public subsidies decreased between 2006 and 2014, partly due to a reduction in available funds, especially after 2011. After an initial increase, the land included in the RB-AEMs in Baden-Württemberg decreased from 66,112 ha in 2003 to 47,133 ha in 2007, and then increased slightly more than 49,000 ha between 2009 and 2011, before decreasing to 38,603 in 2015, mostly due to the low level of payment. On the contrary, the area covered by the Spanish Selvans programme increased by 82% in 2015, from a little more than 1,000 ha to 4,475 ha, thanks to the fact that Selvans was established as a stand-alone project, managed by the NGO Acciónatura. The impact of the Vienna Tree Protection Act have not been assessed so far, but it is generally agreed that it has contributed positively to maintain the green space of the city, which is quite big (50% of Vienna's metropolitan area). The total tonnage of phytosanitary products sold in Italy between 2000 (when the Italian tax on fertilizers was introduced) and 2014 has declined by 25%. However, since the tax is quite low and only affects a subset of fertilizers in the market, it is more likely that its impact on reducing sales of some products is relatively limited, and other important factors have played a role, including national and EU policies to support organic farming and an increased demand for organic products (the rate of agricultural area used for organic farming in Italy has increased from 6.7% to 11.5% between 2000 and 2014).

A number of studies over the last years have revealed that a substantial proportion of offsets in Germany were not implemented or did not actually achieve their compensation goals. This was considered to be due to limited availability of land (under the former stricter like-for-like and on-site requirements) and a lack of clarity over monitoring and control responsibilities. Subsequent amendments to the legislation and learning have

[46] However, a government committee published a report in 2003 which argued that the Swedish fertilizer tax had little impact on the use of fertilizers, and indicated a yearly reduction of 1,500 tonnes N (but without details or references to justify this figure). However, two recent reports have challenged this conclusion, and are presently informing the policy debate in Sweden on the possible reintroduction of the fertilizer tax.

improved offsetting in practice by enabling a more efficient and effective process. However, a substantial proportion of offsets is still not implemented or achieves their objectives. Despite this, offsetting is considered to reduce overall rates of biodiversity loss from built developments, although this cannot be quantified as no overall evaluation of the instrument has been carried out in Germany. Other reforms that allowed the establishment of eco-accounts, which allow trading in offset credits and are therefore analogous to habitat banks, are considered by many key stakeholders to have significantly improved offsetting in practice by providing a more efficient and effective process, simplifying and speeding up the development planning process.

For other instruments, **the environmental impact has not been estimated yet**, including the hunting and fishing fees in Estonia, and the EFT in Portugal.

One of the reasons of the positive environmental impacts of some of the analysed instruments is their **impact on behaviour**. In some cases, this is due to the economic signalling that makes environmentally harmful activities more expensive, encouraging an increased efficiency. For example, the Danish tax on animal feed mineral phosphorus resulted in a higher efficiency in the use of animal feed and the Swedish tax on fertilizers provided an incentive to reduce excessive applications of fertilizers, which were common practice before it. The latter also represented a strong incentive for farmers to use low cadmium fertilizers, encouraged substitution through improved use of nutrients in organic fertilizer from farm animals and encouraged manure trade between livestock and arable crop farmers. Also, the fishery management programme in Iceland resulted in a more efficient industry, technological development, lower emissions, newer ships and an overall lower cost of fishing.

In other cases, the positive impact on behaviour is due to an **increased awareness on the benefits of nature conservation**. For example, before the establishment of the RB-AEMs in Baden-Württemberg, species-richness was a consequence, and not an objective of extensive farming. Thanks to the measure, many farmers have acquired more knowledge on the impact of their farming practices on grassland biodiversity. In addition, the measure plays an important role in raising awareness among society in general on the importance of species-rich grassland and on the key role played by farmers in its conservation. **The positive impact of market-based instruments on behaviour is also due to the flexibility they allow**. For example with RB-AEMs farmers are not required to adopt a specific set of management practices, and as a result they are encouraged to choose optimal mowing dates and the amount and type of fertilizers in order to ensure biodiversity conservation with the maximum possible grassland productivity.

Some of the instruments can also result in **undesired behavioural changes**, as for example the increase in illegal import of pesticides that has been related to the Danish pesticide tax. However, the fishing and hunting fees in Estonia resulted in a decrease of illegal fishing and hunting activities, because the system is very user-friendly (e.g. users can pay the fee by telephone). As another example, the change in the regulation on salmon fishing in Ireland resulted in increased pressure on other fish stocks. This is because the salmon season lasts only a few months, and commercial fishermen rely on other fish for income during the rest of the year.

In some cases, the instruments have also **positive social impacts**. For example, the increased state of conservation of forests allowed by the subsidies to forest areas allowed by the Selvans programme, the payments for private forest management in Slovenia, the Forest Public Benefit Fee in Croatia and the Austrian Tree Protection Act result in increased opportunities for research and for recreational and tourism activities (and consequent health benefits).

In addition, some of the instruments summarised in this report can also **create new jobs**. For example, the establishment of offsetting programmes in Germany resulted in jobs created in public bodies related to overseeing and advising tasks. They also resulted in the creation of new jobs for consultants and offset providers (which may be public bodies, NGOs, private companies and landowners), related to different tasks including impact assessment, offset design, consultation, habitat creation / restoration, maintenance and monitoring process.

Other positive social impacts are **specific to the situation in the country**. For example the Forest Public Benefit Fee in Croatia allowed to demine more than 3 million m^2 of forests, which resulted in increased security and the possibility of using the forest again for recreational and economic purposes (there are still 35,525 ha of forest areas with mines, and the income from the instrument will be used in future to demine the most mine polluted areas in Croatia). The Portuguese EFTs may have a positive social impact, as it provides an important contribution to the budget of municipalities with a large area of their territory under Natura 2000 or other protected areas schemes. In many cases these municipalities are located inland and are characterised by ageing population and less access to public services. The social impacts of the two Danish taxes summarised in this chapter can be positive or negative for different kinds of producers, as land prices, and therefore the amount reimbursed to individual farmers through reduced land value tax, differ across Denmark. Also, since the Danish pesticide tax is established individually for each type of pesticide, it can favour some categories of farmers and disadvantage others.

In some cases, the introduction of market-based instruments results in **changes in the organisation of the entire sector**. For example, one of the consequences of the introduction of a fishery management system based on Total Allowable Catch (TAC), limits set annually for different species and Individual Transferable Quota (ITQ) in Iceland is that unprofitable fishing companies went out of business, and others merged and rationalised their operation. All this process reduced overcapacity, increased vessel size and concentrated quotas in bigger companies. It also resulted in job loss, but also in healthier fish stock, improved quality of landed catch and improved coordination between supply and demand, resulting in a more economically profitable sector.

Box 5 Modelling: Fishing tax[47]

The study modelled a theoretical tax on fish catches:

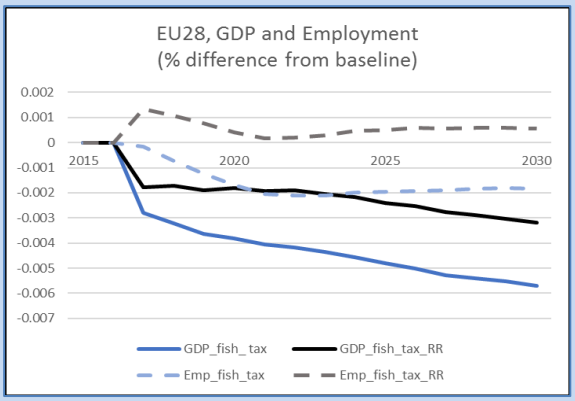
- Taxes on monetary value of fishing industry output increased by 5%;
- Tax applied from 2017 onwards in all EU Member States;
- All increases in government revenues absorbed as an improvement in the government balance;
- Additional scenario included to show macroeconomic impacts of recycling 100% of revenues from tax increase into reducing employers' social security contributions.

Modelling results

[47] Additional information on the modelling exercise, including underlying assumptions and additional explanation of the results, can be found in an Annex at the end of this report.

The results are presented as differences from the model baseline, which is consistent with the most recent future trends published by the European Commission[48]:

- Small negative GDP impact*, driven primarily by lower consumer expenditure;
- Reduction in employment;
- Without revenue recycling, tax passed on to consumers through prices, increasing price of food overall and reducing household expenditure in other areas, reducing overall economic activity in some sectors (e.g. consumer goods, services);
- With revenue recycling, smaller negative impact on GDP and increased employment, due to reduced cost of labour. Increased employment leads to increased demand for consumer goods and services, dampening the negative effects of the tax on the fishing industry;
- Measure expected to raise around EUR 678m in 2017 and EUR 877m in 2030.



EU28 sectoral output in 2030, % difference from baseline	
Fishing	-0.17
Food Drink and Tobacco	-0.02
Hotels and Catering	-0.03
Other Retail	-0.01
Other Wholesale	-0.01

Source(s): E3ME, Cambridge Econometrics

** Note: the model does not take into account impacts on fish stock levels of the tax, and hence future stock levels. These may, in due course, affect the value of landings and hence economic indicators.*

EU28 Summary of results in 2030, % difference from baseline		
	With revenue recycling	Tax only
GDP*	-0.003	-0.006
Consumer spending	-0.006	-0.01
Imports (extra-EU)	-0.002	-0.004
Exports (extra-EU)	0.00	-0.001
Investment	0.001	0.00
Consumer price index	0.012	0.015
Employment	0.001	-0.002
Revenues from fishing tax (m EUR 2016)	877	877
Source(s): E3ME, Cambridge Econometrics		

** Note: the model does not take into account impacts on fish stock levels of the tax, and hence future stock levels. These may, in due course, affect the value of landings and hence economic indicators.*

Drivers for action, political process and windows of opportunity

[48] *EU Reference Scenario 2016: Energy, transport and GHG emissions Trends to 2050*, European Commission and *The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060)*, European Commission.

Most analysed instruments are **part of a wider package of measures**, which offered a window of opportunity for their establishment:

- The Danish pesticide tax was part of a wider green tax reform, which was designed in the 1990s based on the work of a government commission of civil servants from various ministries;
- The Danish animal feed mineral phosphorus tax was introduced as part of a package of measures aiming at reducing pollution of surface water, in the context of the third stage of the ambitious "Action plan for the aquatic environment" (1987), which aimed at reducing nutrient pollution in surface waters;
- The Slovenian payments for private forest management were included in the Forest Act (1993), which established the obligation for private owners to manage their forests;
- The Portuguese EFTs were introduced in the context of the revision of the Local Finances Law in 2007;
- As all CAP-financed AEMs, the RB-AEMs in Baden-Württemberg is included in the Rural Development Programme (RDP) that is prepared every five years. The preparation of the 2000-2006 RDP represented a key window of opportunity for a team of biodiversity experts to propose the use of a RB-AEM to protect species-rich grassland in the region. In turn, the 2014-2020 RDP allowed the RB-AEM payment to be increased;
- The salmon licences in Ireland are an element of the broader salmon management tagging scheme for wild salmon and sea trout that has been in place since 2001;
- The Forest Public Benefit Function Fee in Croatia was adopted as part of the Yugoslavian Forest Act in 1983, and then included in the 1990 Law on Forest, which was introduced after the independence of the Republic of Croatia;
- The fishing and hunting fees in Estonia are laid down in the Estonian Environmental Charges Act (2005);
- The Total Allowable Catch (TAC), the Individual Transferable Quota (ITQ) and fishing fees in Iceland are part of the fisheries management system introduced in 1990, which includes many other measures, such as area and fishing gear restrictions;
- The Italian tax on fertilisers was introduced together with obligations for public institutions to use organic and quality products in their canteens;
- Offsetting was introduced in Germany as part of the 1976 Federal Conservation Act. It is also regulated by the Federal Building Code, which regulates impacts on nature and landscape in the urban environment. Offsetting is carried out within a comprehensive strategic planning framework[49].

Besides the inclusion in a wider package of measures, there are other important **windows of opportunity** that facilitated the introduction of some of the instruments summarised in this chapter. For example, the increased use of RB-AEMs in the EU of recent years is related to the rising interest of experts and managing authorities in ways to increase the cost-efficiency, effectiveness, conditionality and additionality of CAP-financed AEMs.

Other key windows of opportunities are sometimes **offered by institutions not directly related in the development of the instrument**. For example, the increased use of RB-AEMs in the EU has been encouraged by an assessment of AEMs by the European Court of Auditors in 2011, which criticised the unclear objectives and low level of monitoring found

[49] Various levels of spatial plans define settlement zones and rural zones, identify biographical zones that offsets must fall within and areas that may be used for offsetting within these. Project proposals must include assessments of the expected environmental impacts and set out the proposed impact mitigation and, if required, offsetting, which must be coherent with the relevant spatial plans.

in many AEMs. A key window of opportunity for the establishment of salmon fishing licences in Ireland was the initiative of Irish and UK conservation NGOs, who led the European Commission to take Ireland to the European Court of Justice for a failure to implement the EU Habitats Directive's provisions for salmon.

Another important window of opportunities is represented by the **legislative framework**. For example, the law establishing minimal level of pollutants for having untreated tap water from groundwater sources in Denmark was key in gaining a wide support for the Danish pesticide tax.

Sometimes, **a negative event can bring positive outcomes**. For example, the Selvans programme was converted into a stand-alone project when the public aid was reduced due to the financial crisis, and this resulted in a significant increase in the subsidised forest areas.

In some cases, the **key role of one or more experts**, who suggested the introduction of the instruments to the responsible public authorities and contributed to their design, was a mayor driver, as for example for the RB-AEM in Baden-Württemberg, the two Danish taxes analysed in this study, the Italian fertiliser tax, the Selvans programme, the Slovenian payments for private forest management, the Portuguese EFT and the Irish salmon fishing licences (see next section).

In addition, **engaging the beneficiaries of a specific policy** can be a very effective strategy to ensure success. For example, a stakeholder at the Berlin workshop mentioned that active lobbying by environmental NGOs helped to build an alliance of market-oriented and ecological interests to push forward a reform of agricultural subsidies in Switzerland, which implied a reduction of direct payments linked to output and an increase in conservation payments. The NGOs brought together stakeholders interested in trade liberalisation and those concerned about environmental sustainability to obtain the reform of agricultural subsidies. This example is also mentioned in a recent OECD study (OECD, 2017). During the Berlin workshop it was also suggested that farmers are usually interested in long term sustainability, so in some cases they may support green subsidies and taxes.

An important window of opportunity may be offered by **public concern over a specific issue**. For example, the reform of the pesticide tax and the introduction of a new scheme based on savings certificates in France (similar to energy savings certificate), which were both mentioned at the Berlin workshop and are included in the OECD (2017) report, was facilitated by an increasing public concern about the rising use of pesticides, despite ambitious reduction targets. This concern resulted in campaigns by NGOs, media attention, market choices (demand for organic products) and also strong support at ministerial level. Similarly, the Danish tax on pesticides was facilitated by a strong public preference for having untreated tap water from groundwater sources.

Finally, **specific political circumstances** may offer a good window of opportunity for reforms. For example, a stakeholder at the Berlin workshop gave the example of the Green Liberal Party's success in 2011 elections, which facilitated the reform of agricultural subsidies in Switzerland.

Regarding barriers, the above-mentioned OECD report suggests that barriers to reform can be categorised into four categories: concerns on competitiveness; impact on income distribution; influence of vested interests and rent seeking; and political and social acceptability of reform.

In general, a key barrier for taxes and fees is the **opposition of the stakeholder groups** that are targeted by the instruments. For example, even if the forest public benefit fee in Croatia is very low, the industry sector, represented by the Croatian Association of

Employers and the Chamber of Commerce, carried out a vigorous campaign against the fee, which, as a result, was cut in 2010 and in 2012. As another example, the fishing industry in Iceland opposed strongly to the development of regulatory restrictions and taxes, as they were used to free and unlimited access to the fish stock. In Sweden, the opposition of farmers managed to abolish the tax on mineral fertilisers in 2009.

In some cases, the **opposition was overcome by establishing compensatory measures**, as it happened in the case of the two Danish taxes, the fishing fees in Ireland, the Estonian hunting fee and the Swedish tax on fertilisers (see the following section).

As regards subsidies, the most important barrier is the **lack of financial resources**. For example, a range of stakeholders categories including foresters, the Slovenian Academy of Sciences and Art and the Coalition for forests (a coalition of NGOs), have been pointing out over the last decade the fact that the Slovenian Forest Service does not have enough funds to put in place the needed forest management activities. The Selvans programme in Spain is also hampered by insufficient funding to ensure long-term sustainability and a general uncertainty on the available funds in the future. In order to overcome this problem, the programme aims at converting the current short-term agreements into voluntary long term ones (from 25 to 50 years) and to raise additional private funds.

Other barriers are **specific to some of the analysed instruments**. For example, a key barrier for the RB-AEM in Baden-Württemberg are the current subsidies on biogas, as they result in an increasing economic attractiveness of biogas production, which is not compatible with the conservation of wildflower biodiversity. One important barrier for the Danish pesticide tax is the low elasticity of the pesticide demand with respect to the price (Danish farms are more focussed on optimising physical yields and pay relatively little attention to the increased costs due to the tax).

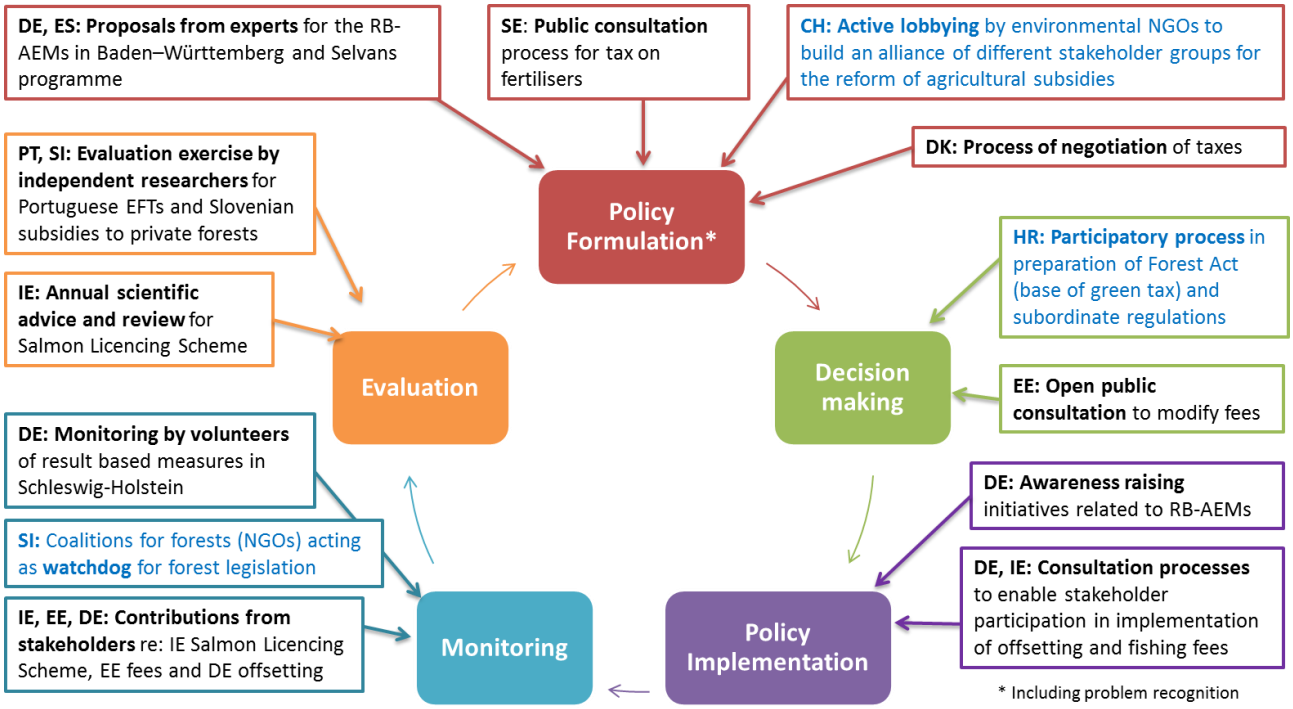
Finally, other barriers mentioned during the Berlin workshop include the **lack of capacity to apply a policy** (e.g. as observed for the subsidies for private forest owners in Slovenia) and the **frequent turnover of NGO staff**, which hampers their capacity to become fully involved in the design, delivery and monitoring of economic instruments.

Stakeholder and civil society engagement

Key stakeholders who have engaged with the instruments summarised in this chapter include governmental bodies and political parties, farmers' organisations, hunters, fishing companies and fishermen, fertilizer manufacturers, landowners, coastal communities, (environmental) NGOs and scientific experts and academia. These groups have had varying levels of involvement with and influence over the design, introduction and implementation of the different instruments.

Figure 14 below summarises some of the key examples of civil society engagement with instruments related to biodiversity and land use and management. These examples are drawn from both the case studies undertaken by the project team (in black text), and the experiences shared by stakeholders who attended the project workshop in Berlin (in blue text). Note that no detail on the latter examples is included in the discussion below the figure, since additional detail was not discussed during the workshop.

Figure 14 Examples of civil society engagement with biodiversity and land use & management instruments



In general, **subsidies are more welcomed than taxes**. For example, farmers who decided to engage in the RB-AEM in Baden-Württemberg welcomed the measure, as it helped the economical sustainability of extensive management practices (even though many complain that the payment is too low to ensure a wide participation).

As is to be expected, the **taxes and fees tend to be opposed by those who pay them**. In fact, as underlined by a participant at the Berlin workshop, in general the gains of economic instruments are shared among many people, whereas the losses often accrue to fewer, more organised stakeholders. For this reason it is important to engage the latter and increase their acceptance. Examples of opposition to taxes and fees include the hostility of farmers to the Danish pesticide and animal feed mineral phosphorus taxes and in the case of the Swedish fertilizer tax; hunters in the case of the Estonian hunting fee; fishing companies against the Icelandic fishing fees; and fertilizer manufacturers against the introduction of the Italian fertilizer tax (which led to the tax never being levied on synthetic fertilizers). As a counter-example, the Austrian Tree Protection Act is generally well accepted (only 10-15 cases from a total of several thousand are appealed each year), even though some property owners are reported to argue that private ownership is restricted by the Act.

As discussed during the Berlin workshop, environmental taxes may have a **disproportionate effect on individuals and small businesses who have a relatively low income**. This negative impact can be reduced using rising block tariffs. In addition, to increase acceptance of taxes, their negative effects can be counteracted by positive incentives.

In some cases, opposition against fees can be explained with a **lack of information** on its objectives and functioning. A clear example of that is the Croatian Forest Public Benefit Fee, which has raised a lot of opposition despite the fact that it is very low, which can be partly explained with the lack of awareness on the purpose of the instrument (forest protection). The opposition to the instrument resulted in two reductions of the fee in 2010 and 2015, and since 2013 several campaigns have been launched by different business associations for the fee to be abolished. On the same note, the Portuguese EFTs have been negatively affected by the lack of an effective participation of entities and citizens.

In some cases, **opposition has been overcome by establishing compensatory measures**. For example, farmers obtained that most revenues of the Danish pesticide tax and the animal feed mineral phosphorus tax are returned to the agricultural sector through a percentage reduction in land value tax. In addition, as a result of the negotiation process the Danish pesticide tax has been compensated with a reduction of a tax on stain products to benefit potato growers, and it was decided that part of the revenue from the pesticide tax would be used to finance the so-called Potato Tax Fund. In Ireland, a voluntary hardship scheme was introduced, which allowed commercial fishermen, and especially salmon fishermen, to exit the fishery sector thanks to compensation payments. The scheme had a budget of EUR 25 million, and granted fishermen a payment of six times their average annual catch during the period 2001-2005, multiplied by the average price of salmon over the period, plus a payment equal to six times the 2006 licence fee over a three year period (2007-2009). In other words, there was a fixed part and a variable part, the latter depending on the size of the business. Another way to reduce opposition is to keep the tax and fees low, as decided for the Estonian hunting fee, at least for the first few years. As another example, in Sweden farmer organisations opposed to the Intensity Group's proposal of doubling the fertilizer tax (the Intensity Group was a committee established by the Minister of Agriculture to assess possible agricultural policy changes). As a result, the government agreed to continue ring-fencing revenues from fertilizer taxes to agro-environmental subsidies as the tax rate was doubled in 1998.

Finally, **burden sharing** among different categories is a good strategy to reduce opposition. For example in Ireland both commercial and recreational fishermen were affected by the new regulation on salmon fishing. In fact, a Salmon Conservation Stamp was introduced on all angling licenses, which represented a 100% increase in the license fee.

In other cases, criticisms relate to the fact that the **payment is too low**, as in the case of the RB-AEMs in Baden-Württemberg and the Slovenian payments for private forest management.

Criticisms or insufficient results of some of the instruments summarised in this chapter can be linked to **unfair distribution**. For example the Icelandic fishery management system based on quotas was being criticised by coastal communities depending on fishery and NGOs for giving quota holders the right on a public good (the fish stocks) free of charge, resulting in local job losses and related depopulation of coastal areas.

In some cases, **changes in the design may improve acceptance**. For example, German offsetting had been criticised in the 1980s by some NGOs, who feared that it could be counterproductive by allowing damage to biodiversity that could and should be avoided or reduced (as a significant proportion of offsets were not implemented or did not actually achieve their compensation goals due to limited availability of suitable land). In order to reduce this risk, the reforms of the legislations carried out in 2009 included clearer requirements for compliance monitoring, introducing the requirement for project proponents to provide a justification why avoidance cannot be undertaken if offsetting is proposed. Although it is suspected that some offsetting may be avoidable, there appears to be no evidence of serious widespread contraventions of the mitigation hierarchy and currently most NGOs support the offsetting requirements and engage in the process. As another example, as a result of the criticisms related to the unfair distribution of the Icelandic ITQs, a levy was introduced for their owners, whose revenues were used to finance the Fishery Development Fund and fisheries monitoring and surveillance. The fee was then replaced in 2002 with a General Resource Tax, which was in turn complemented in 2012 with a Special Resource Rent Tax (they were converted into the current annual fishing fee).

Some of the instruments summarised in this chapter were introduced after a **public consultation process** involving representatives from all key interested stakeholder

groups, which increased acceptance and support. For example, the two Danish instruments analysed in this study were based on a large consultation process, involving civil servants from different ministries, agricultural organisations, environmental NGOs and other interested actors like for example the Danish Water and Wastewater Association and the Danish Ecological Council.

As another example, after the introduction of the Swedish tax on fertilizers, a committee called the Intensity Group was set up by the Minister of Agriculture to analyse potential changes in agricultural policies. The committee included the Federation of Farmers, the Swedish Society for Nature Protection, consumer organisations and scientific experts. Mechanisms are in place for both scientific information and public views to influence the design of the salmon fishing licence in Ireland, including public consultation and involvement of scientific experts and other key stakeholders. The programme was designed following a consultation process (87 meetings with individuals representing 46 different agencies, organisations groups and individual stakeholders). In addition, any change in the licence fees requires a 30 day public consultation period open to all stakeholders and the approval of the Fishery District Committees, which include representatives of commercial fishers and anglers.

In Iceland in order to prepare the adoption of the General Resource Tax in 2002 (which was then merged with the Special Tax on Profits into the actual annual fishing fee), the government established a Resource Committee, including all political parties represented in the parliaments. The outcome of this process was a report by several scientists handed to another committee created to evaluate and possibly revise the Icelandic fishing policies, the Revision Committee. A similar report was commissioned by the Government in 2010, in order to explore options to retrieve more of the fisheries resource rent. Another good example is participatory budgeting, where budget is allocated to projects chosen by citizens (e.g. through an online survey). A participant at the Berlin workshop pointed out that broad stakeholder consultation was organised in Switzerland to reform agricultural subsidies: environmental NGOs encouraged the engagement of agricultural groups who would benefit from reform (e.g. organic and small-scale farmers).

As a negative example, the strong opposition against the Croatian forest public benefit fee can be in part explained with the absence of a consultation process (NGOs were not allowed in Croatia when the fee was established), because not enough information has been disseminated on the objectives of the instruments and the use of its revenues. The offsetting legislation in Germany was developed following the establishment of the Stein Commission, which included representation from key NGOs including the German Council for Landscape Maintenance. Subsequently relevant stakeholders have been further consulted over reforms to the system, as there is a requirement in Germany for all proposals for legislation and reforms to be subject to such consultations. There are also mandatory public consultation procedures for planning authorities that enable wider engagement of stakeholders in relation to the strategic location of offsetting and the acceptability of individual project proposals.

Many instruments were introduced through **negotiation processes**. For example, the Danish pesticide tax was designed as a result of a negotiation involving the Ministries of Agriculture, Taxation and Environment on alternative design options. As another example, the Slovenian Forest Act was established after a negotiation process that involved forest owners (who did not want to have forest management plans) and forestry experts (who claimed that management plans were needed in order on ensure forest sustainability). At the end of this, the 1993 Forest Act was published, who established the obligation for private forest owners to prepare forest management plans and the establishment of the Slovenia Forest Service, which helps private owners to do so and also provides part of the needed financing for the sustainable management of forests. Civil society (mainly the academic sectors and some environmental NGOs) were also engaged in the formulation of

the Portuguese EFTs. As another example, the Estonian commercial fisherman are consulted each year when the new fishing rates are established.

Key experts played an important role in promoting and designing many of the instruments summarised in this chapter. For example, the RB-AEM in Baden-Württemberg was established thanks to the suggestion of three biodiversity experts, who were inspired by a similar measure in place in Switzerland. They designed the instrument and prepared the related list of 28 key indicator species/taxa of wildflowers to be used as a proxy of biodiversity in species-rich grassland. Also, in 2014, together with the NGO Blumenwiesen-Alb e.V., they managed to convince the managing authority to increase the payment in the new version of the scheme.

As another example, the two analysed Danish taxes were introduced following the recommendation of commissions of experts and civil servants. The Selvans programme was put in place thanks to the personal leadership and dedication of the person who suggested the creation of the programme, then provided scientific advice on its design and finally dealt with the cut in public funding in 2012-13 by dedicating the programme only to private forests and asking the NGO Acciónatura to manage it, thereby allowing an increase in the extension of the protected area and the types of instruments founded. The Slovenian payments for private forest management were introduced thanks to the efforts of forestry experts, who managed to negotiate the establishment of the Slovenian Forest Service, which had the right to develop forest management plans.

The Portuguese EFTs were introduced following the suggestion of academics and NGOs, and was prompted by meetings of civil society representatives with the Portuguese Parliamentary Environment Committee and other members of the Parliament. Scientific evidence provided by the Standing Scientific Committee (the main scientific advisory body for salmon fisheries in Ireland) and the North Atlantic Salmon Conservation Organisation on the decreasing status of salmon stocks was a strong driver for the reform of the Irish salmon fishing licences. In Italy the fertilizer tax was introduced mainly thanks to a MP of the Italian Green Party, who lobbied for its introduction and had cross-party political support and support from organic agriculture associations.

In addition, in some cases the **support and help of public institutions and NGOs** allows feasibility in technical terms and credibility in political terms. For example, the establishment of Selvans was supported by the NGOs Xarxa de Custodia del Territori (who managed the programme until 2013) and Acciónatura (who managed it afterwards) and of the Girona provincial council.

As another example, initiatives from civil society plays a key role in motivating farmers and spreading awareness on the importance of species-rich grassland in Baden Württemberg (e.g. the meadow championships[50], which reward farmers with the most species-rich and ecologically valuable meadows with various prizes, and activities like a photo contest in 2008, a writing contest in 2010, a drawing contest in 2012 and a meadow championship in 2015). Offsetting in Germany was introduced in response to wider concerns of the state of nature and landscapes, e.g. resulting from rapid urbanisation in the 1960s, and the lack of an up to date nature conservation and landscape protection legislation at the time. Such concerns were raised by a number of scientists and NGOs, including the German Council for Landscape Maintenance. Importantly, the Council called for legalisation that applied beyond protected areas, and this led to the inclusion of offsetting in the legislation to address impacts on biodiversity and landscapes in the wider environment.

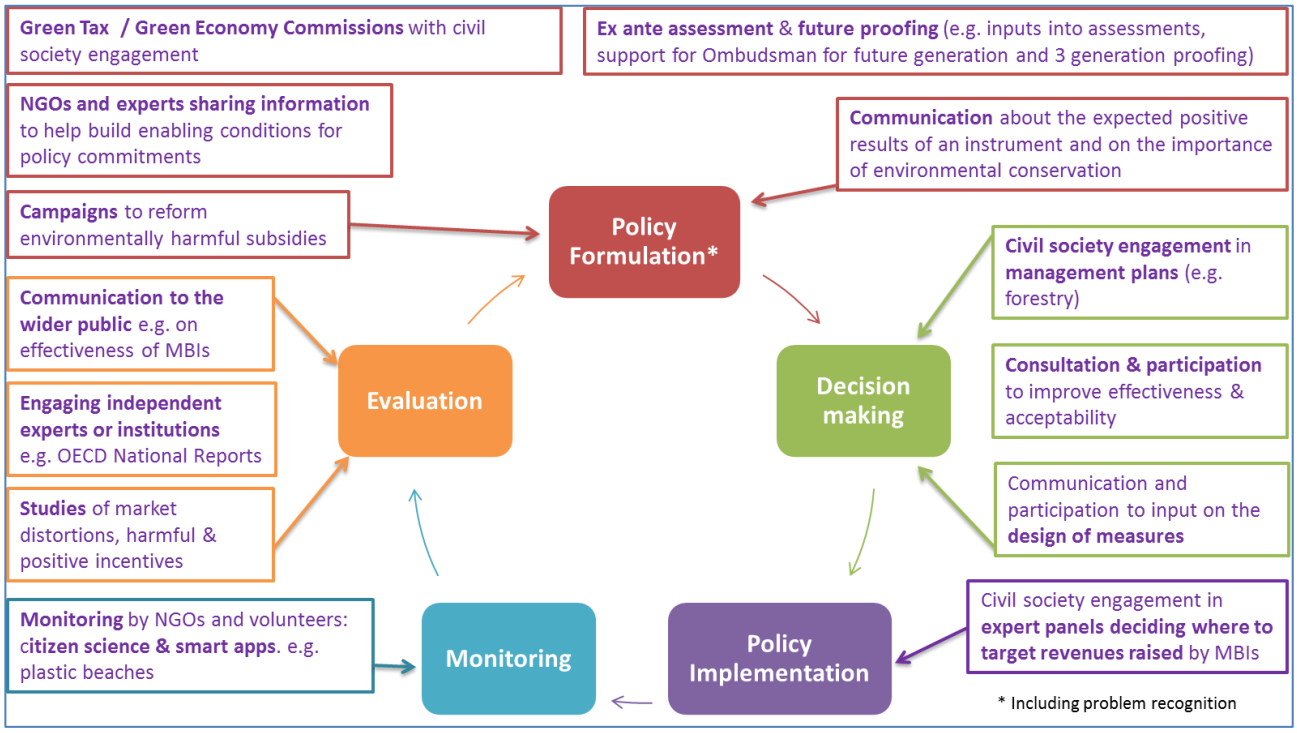
[50] See www.wiesenmeisterschaften-bw.de.

One finding that emerged from the Berlin workshop is that in general too little is done to **communicate and explain the results of monitoring and evaluation** of economic instruments to the beneficiaries of incentives and those affected by taxes, and to the local community and society more widely. In general, taxes need to be presented as part of a policy mix and it is very important to explain the reasons for the measures that are put in place.

During the workshop in Berlin, participants were also asked to identify where civil society could usefully be engaged to support environmental tax objectives in the future, and what types of tools and processes could help with this engagement.

Figure **15** below presents some of the examples provided by participants for each part of the policy cycle. These are not discussed in detail in this section, but a summary discussion on potential future engagement opportunities is provided in section 8 of this report.

Figure 15 Potential future opportunities for civil society engagement with biodiversity and land use & management instruments



Best practice and replicability

Most of the instruments are replicable to other countries and areas of environmental policy. For example, the fishing and hunting fees in Estonia and the fishing fee in Ireland could be usefully replicated in other countries, as they proved to be effective. Key elements that explain their success are **a high degree of earmarking of the revenues for research, conservation and awareness raising projects, a good communication and the involvement of key stakeholders** in the design of the instruments.

The RB-AEM in place in Baden Württemberg can also be usefully replicated in similar contexts, i.e. areas where species-rich grassland need to be maintained, as it is able to ensure high conditionality and improve farmers' motivations and environmental awareness.

Also, there are no reason why EFTs similar to the ones in place in Portugal could not be applied in other countries, possibly extending the approach to other environmental fields (e.g. the efficient use of natural resources or positive responses to environmental problems like adaptation to climate change), and, most importantly, earmarking the distributed funds to be used for environmental protection.

The two taxes on pesticides and animal feed mineral phosphorus in Denmark, as well as the Swedish tax on fertilizers could also be potentially replicated, but the phosphate fodder tax should be higher than it is actually in Denmark in order to ensure a higher effectiveness.

Programmes financing forest management and conservation through private voluntary contributions (as the Selvans programme), with a fee (like the Forest Public Benefit Fee in Croatia) or public financing (as the Payment for private forest management in Slovenia) could also be usefully replicated.

Public-private co-investments like those of the payments for private forest management in Slovenia **will more likely work better in countries with bigger average forest property** and more concentrated forest ownership than in Slovenia, where every fourth citizen is a forest owner. In fact, a more concentrated forest ownership will make management and control more effective and efficient.

Tree protection as the one provided by the Vienna Tree Protection Act is replicable in cities of different sizes and geographies across Europe. Considering that cities everywhere are under pressure from development, tree protection legislation provides a useful tool to protect green space in the cities and provide revenues for maintaining them.

Other instruments are not easily replicable, because of the specific characteristics of the country or the sector. For example, the Icelandic fishing management system cannot be replicated in other countries tout court because of the unique Icelandic geographical conditions, resulting in minimal influence of neighbouring coastal states sharing fish stocks with Icelandic fishermen.

In principle, offsetting could make a substantial contribution to the achievement of the EU target of halting the loss of biodiversity and degradation of ecosystem services by 2020, provided that it is included in the mitigation hierarchy, i.e. implemented only after measures that aim to avoid and reduce impacts. However, experience from Germany and internationally indicates that offsetting can be counterproductive. Therefore if it is to be replicated elsewhere in the EU it would need to be regulated according to internationally best practice principles and standards such as those set out by the Business and Biodiversity Offsets Programme and properly monitored and robustly enforced (i.e. more so than in Germany).

A number of lessons can be learnt from the case studies analysed in this section. First of all, it is **important to ensure the support from all key categories of involved stakeholders, through consultation and negotiation**, especially when designing taxes and fees. The programmes where this has been effectively done are among those with a greater degree of success (e.g. the Estonian and Irish fees), even though negotiation is not enough to ensure success (for example the two Danish taxes analysed in this study, even though established after a consultation and negotiation process, have had results below expectation so far, possibly because of a too low rate).

Second of all, for some taxes and fees **support can be gained by putting in place compensatory measures**, i.e. by putting in place accompanying compensation mechanisms (as done e.g. for the two Danish taxes summarised in this chapter, the Swedish tax on fertilizers and the fishing fees in Ireland) or **ensuring a fair distribution of the conservation burden** (as done in part with the fishing fees in Iceland)

In addition, it is **important to ensure a good communication on the purpose and use of taxes and fees in order to obtain consensus**, as shown by the Croatian Forest Public Benefit Fee, where the strong opposition can be partly explained with the lack of public information on how the revenues are used.

In general, **taxes, fees and subsidies can be used as awareness raising instruments on the importance of environmental protection**, encouraging a behavioural change. As an example, the transparent communication on how Estonian hunting and fishing fees are acts as an enabling factor for the general public to understand why sustainable use of natural resources is important. Detailed information on the use of revenues and conservation projects funded with the hunting and fishing fees is disseminated through the Environmental Investment Centre's website, and it plays a great role in supporting general acceptance of the fees. As another example, the introduction of the RB-AEMs in Baden-Württemberg made farmers more aware of the impact of their farming practices on grassland biodiversity and on the importance of conserving grassland biodiversity.

In addition, some of the examples shows that **public support and financial help is needed** to establish the programmes financed by private actors like Selvans and the Forest Public Benefit Fee in Croatia. However, public financing tends to change according to economic cycles and policy agenda, making diversification for the funding sources and conservation tools necessary, as shown by the Selvans example.

Our example also show that the **design of the instruments has an important impact on its effectiveness**. For example, in contrast to similar schemes in most other countries, the Icelandic system of ITQs as permanent shares of Total Allowable Catch (TACs) gives fishermen the incentive to support lower TACs in order to maintain the value of their quota. The Icelandic case shows that a fishery management system based on ITQ can lead to closer alignment between scientific advice and TACS and gradual improvement of fish stocks. As another example, German offsetting projects were required to be on-site and in-kind (i.e. being of the same type of lost nature and landscape components and having a direct spatial and functional connection to them). However, as a result of this restriction it was often difficult to find suitable sites that could provide good quality offsets, and therefore many compensation requirements were not delivered. In response to this, in 2002 and 2009 amendments were made in the legislation that relaxed this requirement so that offsetting was more feasible. Under the current law, compensation restoration is still preferred, but where this is not feasible or appropriate, then offsetting may be through 'substitution measures' or 'replacement compensation', which only requires a loose spatial and functional relationship to the impact area. This change in the rules improved the effectiveness and efficiency of offsetting in Germany. Finally, the case of the peat tax in Finland highlights the important interplay with other sectoral policies and policy instruments – in this case the domestic forestry policy – as a possible barrier to be overcome in order to proceed with a reform of environmentally harmful subsidies.

Finally, the **contribution of scientific research is key for ensuring effectiveness and also obtaining credibility through robust and independent scientific evidence**, as shown by almost all case-studies summarised in this chapter, where scientific contribution was used to introduce, design, manage and monitor the instruments (e.g. the Irish Salmon Licence Scheme, where scientific advice and review is used to update the scheme every year; the Irish Salmon Licence Scheme, the Danish pesticide tax, the Estonian fees, where monitoring is carried out with the contribution of the involved stakeholders; the Icelandic fishery management system, where independent Marine Research Institute conducts stock assessments and provides scientific advice to decision makers).

7. KEY DESIGN ISSUES AND INSIGHTS FROM BEST PRACTICES

In designing an economic instrument, certain issues need careful consideration including the tax rate applied, the tax base selected, exemptions granted, compensation measures, how revenues will be used, among others. This requires prior assessment of the positive and negative impacts of different options and in-depth consultation with relevant stakeholders. The final choice of these parameters will reflect a number of political, economic, social and environmental considerations and will determine the overall effectiveness of the instrument.

This study has explored a range of country experiences with the use of economic instruments to address pollution and natural resource use. Some key lessons learned from the design and implementation of the economic instruments analysed in the study and best practice insights are elaborated below. For further detail on each case, please refer to the full case study in a separate Annex to this report and the relevant thematic chapter.

The importance of setting clear objectives

Prior to the introduction of an economic instrument, it is very important to define precise objectives and to carefully tailor the design of the instrument in line with this. The objectives of the instrument and the link to environmental goals, where they exist, should be specific and made clear at the start of the process. For example, both the Belgian Environmental Charge and the Irish plastic bag levy had clearly stated environmental objectives and were accompanied by successful communication campaigns that helped make this link clear to affected groups. This increased the acceptability of the instruments and contributed to their success. The 'water pays for water' principle underlying the French water abstraction charge ensures a close relationship between water use and financing for the protection of water resources and may also contribute to the perceived legitimacy and acceptance of the instrument.

Tax rates applied and adopting a phased, predictable approach to future changes

The tax rate applied has a strong impact on the effectiveness of an economic instrument and its ability to stimulate behaviour change. Some countries adopt a low rate, particularly when an instrument is first introduced, to help reduce opposition. This was for example the case with the UK landfill tax and the Austrian landfill tax. Some countries opt to set the tax rate high from the beginning such as in Sweden where the high rate of the NOx fee is considered a key factor in its success - this high rate was made possible by the connected reimbursement mechanism which helped increase acceptability.

Changes to tax rates over time can drive improved outcomes. However, such changes require advance warning to maintain support and a step-wise process (i.e. increasing rates slowly over time and in a predictable way) to help affected groups plan their activities, thereby reducing their losses and increasing acceptability. For example, although the UK landfill tax was initially set at a low rate, it has subsequently increased substantially with an annual duty escalator set in advance which provides certainty on future rates. As the standard tax rate applied increased, quantities of waste landfilled have fallen from around 50 million tonnes landfilled in 2001-02 to around 12 million tonnes in 2015-16. Similarly the application and substantial increase of the Dutch water pollution levy contributed to a sharp decline in overall emissions directly discharged in open water towards water treatment plants and an increase in rates of pollutants removed by waste water treatment between 1981 and 2014.

Defining the tax base and calculation approach

The scope of the tax base, where/on whom it is applied and how it is calculated can influence the effectiveness of the instrument, its ability to achieve the desired behaviour change and its acceptability. For example:

- The impact of the Italian phytosanitary product tax has been limited as it does not apply to some key products, in particular synthetic fertilizers. Similarly, the environmental effectiveness of the Danish animal feed mineral phosphorus tax could be considerably improved if it applied not only to mineral phosphorus but to phosphorus at large, including phosphorus in mineral fertilizers.

- The licencing scheme for salmon fishing in Ireland increased the price of recreational and commercial salmon fishing licenses, thus ensuring a fair distribution of the conservation burden between stakeholders which helped increase support. The licencing scheme has helped regulate fishing pressures on salmon stocks while providing an important source of funding for efforts to support the conservation and sustainable management of salmon stocks and their habitats.

- The design of cost recovery water taxes and fees of regional water authorities in the Netherlands and the specifics of the levy base has had a strong impact on businesses' behaviour as businesses have invested in their own water treatment plants to avoid payment of levies and adopted innovative practices in the waste water treatment sector.

- Since 2013, the pesticide tax in Denmark is calculated individually for each approved pesticide, based on human health risks, environmental load (toxicity to non-target individuals) and environmental fate (bioaccumulation, degradation, leaching to groundwater). This new approach is expected to reduce the pesticide load by 50% before the end of 2016.

Managing administrative costs

Keeping administration costs low can help convince affected economic operators that an instrument will not be unduly burdensome. For example in Ireland, the government ensured administration costs of the plastic bag levy were kept low for retailers as revenue collection and reporting is readily and easily integrated with their Value Added Tax (VAT) collection systems. Thus net additional costs are modest, and generally lower than the savings resulting from not having to purchase and store as many bags.

Incentivising behaviour change and innovation

Certain design features can ***incentivise behaviour change***, for example:

- In Sweden, revenues from the SO_2 tax and NOx fee are channelled through an innovative reimbursement mechanism to regulated entities. In the case of the SO_2 tax, if SO_2 emissions are reduced through cleaning or binding to the ash, a part of the tax proportionate with the saved amount of SO_2 emissions is reimbursed. For the NOx fee, the reimbursement mechanism is based on how energy efficient the plants are, thus firms emitting low volumes of NO_x per unit of energy produced are net beneficiaries of the scheme while those firms with large NO_x emissions per energy unit are net tax payers. This motivates regulated plants to achieve minimal NOx emissions instead of aiming to be just below the limit values. The limit values provide a ceiling for emissions while the fee provides additional economic incentives for further reductions.

- In the Czech Republic, businesses with emissions below best available technologies (BAT) emission concentrations pay a reduced air pollution fee with higher reductions applied for increasing emission reductions achieved.

- The water resources fee in Portugal includes incentives to encourage behaviour change such as charging lower base values for residual water use. Its principle of reflecting various components of the fee (i.e. abstraction of public water for private use, direct or indirect discharge of effluents in water resources which may cause significant impact, aggregate extraction of public water resources, land occupation of public water resources and/or occupation and creation of water plans, private use of water) in different economic sectors is a positive design element, although it is implemented in a biased way.

- The fact that the French water abstraction charge is proportional to the amount of water abstracted (although differentiated between types of use and water scarcity zones) implies that there is at least a basic incentive (admittedly very small) to save water. Each additional m^3 abstracted has to be paid for so the marginal cost of water use is never zero (except for exempted uses). This incentive is passed on along the value chain (at least for households and industry), together with other (more substantial) variable components of the water bill. The charges together with the water pollution levy and the fact that a substantial part of the water bill is charged at a variable (per m3) rate provides an incentive for efficient water use.

- In Iceland, the fishery management programme includes Total Allowable Catch (TAC) limits, set annually for different species based on scientific advice, and Individual Transferable Quota (ITQ). In contrast to similar schemes in other countries, the Icelandic system of ITQs as permanent shares of TACs gives fishermen the incentive to support lower TACs to maintain the value of their quota. Since the introduction of ITQs, most stocks have slowly increased, in particular cod stocks, leading to closer alignment between scientific advice and TACs and gradual improvement of fish stocks. The system has resulted in a more efficient, economically profitable industry, encouraged technological development, lower emissions, newer ships and an overall lower cost of fishing.

- In some cases, a certain amount of flexibility in the design of the instrument can facilitate implementation. For example with the result-based agri-environment measure in Baden-Württemberg (Germany), farmers are not required to adopt a specific set of management practices, but rather are encouraged to choose optimal mowing dates and the amount and type of fertilizers to ensure biodiversity conservation with the maximum possible grassland productivity.

Some instruments ***influence behaviour by making environmentally harmful activities more expensive***, for example:

- The Swedish fertilizer tax provided an incentive to reduce excessive applications of fertilizers, which were common practice before its introduction. The tax provided a strong incentive to farmers to use low-cadmium fertilizers to avoid paying the cadmium tax, reducing excessive 'precautionary' applications of fertilizers, and encouraged substitution through improved use of nutrients in organic fertilizer from farm animals and encouraged manure trade between livestock and arable crop farmers.

- The increase in the Lithuanian environmental pollution tax on batteries in 2012 appears to have led to more producers choosing to adopt producer responsibility measures rather than paying the tax (only 20% paid the tax in 2015 compared with 95% in 2004).

- Under the Benelux PAYT schemes, households tend to generate less waste after the introduction of fees. Waste generation in Oostzaan (the Netherlands) dropped by 30% in the year following the scheme's introduction (1993-94), communes in Luxembourg with charges based on the amount of waste generated produced 25% less waste than those without such charges in 2012. Comparative results across the system types in the Netherlands and Belgium suggest that weight based schemes have the greatest impact in terms of waste prevention, whilst recycling rates are highest for sack-based schemes (partly due to the greater amount of waste available for recycling).

Some instruments ***influence behaviour by increasing awareness of the benefits of certain activities*** such as nature conservation. For example, before the establishment of the result-based agri-environment measure in Baden-Württemberg (Germany), species-richness was a consequence, and not an objective of extensive farming. Thanks to the measure, many farmers have acquired more knowledge on the impact of their farming practices on grassland biodiversity and on the importance of conserving grassland biodiversity. In addition, the measure plays an important role in raising awareness among society in general on the importance of species-rich grassland and the key role played by farmers in its conservation.

How economic instruments are designed can also ***stimulate innovation and investment***. For example, water charges in the Netherlands have stimulated innovation as reflected in the high number of patents filed in the area of water and waste water management and innovations by waste water treatment plants in new technologies for purification and recovery of energy and materials from waste water sludge. In the Netherlands 273 patents were filed in the period 1977-2010 which is 5.6% of the overall number of patents in this category in the EU. This is a substantial number (the Netherlands ranks 5th behind Germany, France, UK and Italy). Currently waste water treatment plants are active in new purification technologies, like the well-known Nereda technology, as well as technologies for recovery of energy and materials from waste water sludge.

Similarly, the Swedish NOx fee stimulated innovations within regulated plants through the refund system (which motivates regulated plants to achieve minimal NO_x emissions instead of aiming to be just below the limit values) and a requirement to install monitoring equipment. When the fee was introduced in 1992, 7% of the plants subject to the tax had NO_x abatement technologies installed; this increased to 62% the year after and to 72% in 1995. The reimbursement mechanism of the NOx fee reduced potential negative impacts on competitiveness and helped increase acceptance of the fee among industry.

The role of the wider policy context and instrument mix

Introducing economic instruments as part of a wider package of measures can offer a window of opportunity for their establishment and ensure coherence with the broader policy context, which can contribute to the successful implementation of an instrument and increase their acceptability. For example:

- The introduction of the 1996 Danish pesticide tax, which extended the tax base to agricultural use, was part of a wider green tax reform in the 1990s. The Danish animal feed mineral phosphorus tax was introduced as part of a package of measures aimed at reducing nutrient leaching and pollution of surface waters and as such was not opposed by farmer organisations.

- Environmental charges had an important role in wider ecological tax reform discussions in Estonia during 2004-2005, and the 2006 increase in the Estonian mineral resource extraction charge was part of wider changes to taxation that included a reduction in income tax and increased taxes on the use of environmental resources.

- In Ireland, to address the negative socio-economic impacts a more stringent salmon management regime would have on the livelihoods of commercial salmon fishermen, a voluntary hardship scheme was established to support fishermen who opted to exit the sector. The uptake of the scheme was facilitated by calculations of the level(s) of compensation payment and "business as usual" forecast of diminishing net revenues due to already diminishing stocks.

The wider policy mix/package can also influence the effectiveness of economic instruments, complementing the incentive role played by taxes. For example:

- In Sweden, regulations on SO_2 and NOx set limit values and ceilings while the SO_2 tax and NOx fee provide further economic incentives for emission reductions.

- The Austrian landfill tax was the first element in a related package of measures, which later went on to include a ban on the landfilling of waste with a total organic carbon content of over 5% and an incineration tax. This package of instruments has been very successful in environmental terms.

- The Finnish packaging tax incentivises participation in the deposit refund system by offering a lower rate of tax for participants in a registered deposit refund system. Until 2005, only refillable bottles in a deposit refund system were exempt from the tax entirely, with one-way containers still liable to pay between 12.5% and 25% of the tax. From 2008, one-way containers were also exempt from the tax if in a deposit refund system. This change has been credited as the main driver for the switch from refillable to one-way containers in Finland over the last ten or so years. The synergy between the packaging tax and deposit refund system has been an important driver in encouraging high rates of use of the deposit system.

Clear communication and stakeholder engagement

Clear communication is critical to the success of an economic instrument. The language used can also help increase acceptance as noted during the Berlin workshop – for instance noting that an economic instrument will put a price on nature (i.e. phrasing it in economic terms) tends to result in opposition to the instrument, whereas presenting an instrument as a way to protect nature and increase environmental awareness (i.e. phrasing it in environmental terms) it would be more readily accepted. Some examples of good approaches to communication include the following:

- Transparent communication on the Estonian hunting and fishing fees enables the general public to understand why sustainable use of natural resources is important. Detailed information on the use of revenues and conservation projects funded by revenues from hunting and fishing fees is disseminated through the website of the Environmental Investment Centre and plays a significant role in supporting general acceptance of the fees.

- The introduction in 2007 of an environmental charge in Belgium covering single-use plastic bags, single-use plastic film, single-use aluminium foil and disposable plastic cutlery followed a communication campaign and an industry voluntary agreement over several years. This engagement meant the charge provoked less discontent when introduced and is considered highly successful in meeting its specific goal of reducing single-use plastic bag usage. From 2008 to 2009, distribution of single-use plastic bags dropped by 60% while the sale of reusable bags rose from 7.6 million (2003) to 76.6 million (2010). The charge was discontinued at the end of 2014 and Belgian regions are now considering plans for a regional tax on single-use plastic bags.

- Barriers to implementing the plastic bag levy in Ireland (including concern of retailers that they would be blamed for the price of bags, that the introduction of the levy would encourage shoplifting and concerns among butchers of weaker hygienic standards) were addressed through a very successful publicity campaign to launch the levy by the Department of the Environment, Heritage and Local Government which conveyed the environmental reasons for the introduction of the charge. The campaign, which cost EUR 358,000, aimed at making a link between price and good environmental behaviour in the public mind, and reduced public resistance to implementation of the levy.

In addition, if governments and policy-makers cultivate a good relationship with independent experts and civil society organisations that support the use of a particular instrument, those organisations can help to provide credibility and evidence-based arguments in support of the instrument which can be communicated to the wider public. For example in France the Government realised that it needed to engage not just with large farming unions but also with smaller and more specialised producer groups (e.g. organic farmers), who would be more likely to support the pesticide reduction initiative.

The role of revenue use

There are different options for how revenues from economic instruments are used from contributing to a wider tax-shifting programme to raising revenues, recycling revenues or a mix of these approaches. How revenues are used has an important influence on the impact and effectiveness of the instrument, its political and public acceptability, and its potential to mitigate adverse impacts and overcome obstacles. It is important that the use of revenues is clearly articulated and communicated and made visible, as this can help improve acceptance of the instrument.

Revenues can help ***reduce opposition to the introduction an instrument and increase acceptability*** for example by helping those affected, especially early adopters and innovators as well as vulnerable groups. For example, there was little opposition to the UK landfill tax, due largely to the original intention for it to be revenue-neutral by offsetting a reduction in employers' National Insurance (i.e. social security) contributions by 0.2 percentage points. Recycling revenues from the Danish pesticide tax back to the agricultural sector (mainly through a reduction in land value taxes as well as a reduction of a tax on stain products to benefit potato growers) helped increase acceptance of the tax. Revenues from the Swedish NOx tax are repaid to the whole power plant sector on the basis of the emissions of each plant, which has the added benefit of enhancing the economic incentive to reduce emissions.

The ***earmarking of revenues for a specific (or general) environmental purpose*** can increase acceptance for the instrument amongst stakeholders and the general public, by helping to clarify the purpose of a tax and justify its introduction. Examples include the Austrian landfill tax (revenues are used exclusively to finance the containment and treatment of contaminated sites), the Romanian packaging charge (revenues are paid into the Environmental Fund, which finances environmental and climate related projects) and the Irish plastic bag levy (revenues are allocated to the Environmental Fund, which is used to finance environmental organisations and projects related to waste prevention and recovery, greener products and local community initiatives).

This earmarking of revenues can also help ***increase the environmental effectiveness of the instrument and improve its socio-economic impacts***. For example:

- Investments in the water sector funded through revenues from the Bulgarian abstraction charges (and co-financed from EU funds) have contributed to improved quality of surface waters and play an important role in supporting projects and initiatives in the field of environmental protection and management.

- Revenues from the wastewater fee in Poland are ring-fenced for investment in environmental protection and allocated to the National (and Regional) Funds of Environmental Protection & Water Management as well as to local governments. This earmarking of revenues has a positive re-distributional effect as revenues can be directed to environmental protection projects in areas where they are most needed, including less prosperous regions, thus helping to tackle economic and social disparities between regions.

- Revenues from the Romanian packaging charge are paid into the Environmental Fund, which finances environmental and climate related projects. This disbursal of revenues is considered to be well shared between regions taking into account their economic and social needs and therefore having at least some re-distributive impact.

Evaluation and review processes

It is important to allow for amendments to instruments to improve their effectiveness, since inflexible instruments can become less effective over time. Regular monitoring and evaluating the impact of instruments (including unintended impacts) and subsequent revisions are critical to ensuring the continued effectiveness of the instrument. A number of countries have revised economic instruments based on the results of evaluation processes and/or in recognition of the ineffectiveness of the current instrument design, helping to improve the effectiveness of the instruments and its acceptability. For example:

- In the Czech Republic, recognition of the ineffectiveness of air pollution fees led to a consultation process engaging different stakeholders and to the eventual adoption of a revised instrument in 2012 with higher fees and a schedule of annual increases. A new mechanism was introduced to encourage further emission reductions and changes to the use of revenues adopted including an allocation of some revenues to regions where the source of pollution is located to finance environmental protection and to the state budget for air pollution related activities. Although it is too early to assess the impact of the revised fees, the changes are expected to motivate operators to reduce emissions of major pollutants.

- In the UK, a survey of waste management companies led to the decision to increase the landfill tax rate in 1998-99 and the introduction of a duty escalator as companies pointed out the low level of the tax was reducing its effectiveness.

- German offsetting projects were initially required to be on-site and in-kind (i.e. of the same type of lost nature and landscape components and having a direct spatial and functional connection to them) which made it difficult to find suitable sites that could provide good quality offsets, and therefore many compensation requirements were not delivered. In response to this, in 2002 and 2009 amendments to the legislation relaxed this requirement so that offsetting was more feasible. Under the current law, compensation restoration is still preferred, but where this is not feasible or appropriate, offsetting may be through 'substitution measures' or 'replacement compensation', which only requires a loose spatial and functional relationship to the impact area. This improved the effectiveness and efficiency of offsetting. Moreover, to reduce the risk that offsetting could be counterproductive by allowing damage to biodiversity that could and should be avoided or reduced (a concern that had been expressed by some NGOs), the 2009 reform included clearer requirements for compliance monitoring, introducing the requirement for project proponents to provide a justification why avoidance cannot be undertaken if offsetting is proposed. Although some offsetting may be avoidable, there appears to be no evidence of serious widespread contraventions of the mitigation hierarchy and currently most NGOs support the offsetting requirements and engage in the process.

8. SUMMARY OF ELEMENTS RELATED TO CIVIL SOCIETY ENGAGEMENT

In addition to outlining the key design elements of economic instruments to address pollution and natural resource use in the EU Member States, this study has also made significant efforts to investigate whether, and how, civil society has been engaged with the instruments throughout the policy cycle, including at the formulation, decision-making, implementation, monitoring and evaluation stages.

Some of the key lessons emerging from the case studies are outlined in the sections below. A few general methods of engaging civil society are outlined first, where the experiences from the case studies have identified similar methods. These general methods have been and can be used at all stages of the policy cycle. The following section then outlines some additional specific examples relating to each stage of the policy cycle, since there are a wide range of examples that can offer inspiration for civil society engagement in the future. For further detail on aspects of civil society engagement relating to each specific case, please refer to the full case study in a separate Annex to this report and the relevant thematic chapter.

General methods of civil society engagement

Engaging a broad range of stakeholders

The case studies undertaken within the study helped to highlight the many types of civil society (i.e. non-government) stakeholders who have an interest in the use of economic instruments to address pollution and natural resource use. Depending on the type of instrument and the environmental theme addressed, this may include: NGOs; industry and business (e.g. waste management, water agencies, producers and manufacturers, trade associations, agricultural bodies, hunters and fishers); political parties; academics, individual and scientific experts; consumers; landowners; and the public. These groups have had varying levels of engagement with and influence over the design, introduction and implementation of various economic instruments.

The case studies therefore act as a reminder to policy and decision makers to seek to identify interested stakeholders, and to engage the widest possible range of those interested when developing and implementing such instruments.

In addition, it is worth noting that many instruments have been successful (or been made successful) by taking into account the specific concerns of affected stakeholder groups. Whilst the gains of economic instruments are typically shared among many people, the losses/negative impacts often accrue to fewer, more organised stakeholders. For this reason it is important to engage the latter to increase their acceptance of the instrument. Examples of taking such views on board include: retailers securing an exemption from the Irish plastic bag levy for bags used for fresh meat and fish; and industry winning a couple of court cases against the Government in the 2000s in relation to the Belgian Packaging Charge, leading to less preferential treatment for reusable/refillable over recyclable containers.

Formal consultation of stakeholders

In the case of several of the instruments studied, stakeholder engagement has been undertaken through formal processes, for example **official (public) consultations**. This was the case for proposals for the Swedish NOx fee and sulphur tax, the UK landfill tax (720 responses to a public consultation led to a change in the instrument design i.e. different rates for inert and non-inert wastes, and a change to a weight-based tax), the

UK Aggregates Levy Sustainability Fund (two consultations on its overall aims and on more detailed disbursement of the fund), the Austrian landfill tax (negotiations were held between the Government, waste operators, federal state governments and municipalities prior to introduction, and a long public consultation was held after the announcement of the landfill ban to decide what alternative waste treatment methods to invest in), PAYT in Belgium (government consulted with local authorities on how to implement the schemes), the salmon fishing licence in Ireland (designed following a consultation process with 46 different stakeholder groups), and academics and environmental NGOs in the formulation of the Portuguese EFTs.

In several cases, consultations with groups who will be affected by an instrument have led to changes in the instrument's design. Examples include discussions with manufacturers, distributors and retailers' groups on the Irish plastic bag levy, the Finnish DRS and the packaging tax and the Romanian packaging charge, with agricultural interests and farmers' organisations on the Danish and Swedish fertilizer taxes, and with forest owners and forestry experts during the development of the Slovenian Forest Act. In each case, consultation with stakeholders helped to achieve stakeholder buy-in and support of the instruments.

Other methods used for formal stakeholder engagement have included **public hearings** (in the case of the Finnish peat energy tax and the development of the Italian phytosanitary product tax) and various types of **stakeholder working groups** (formed prior to the introduction of the Lithuanian environmental pollution tax, used to collect feedback on the Estonian mineral resource extraction charge, set up to review evidence and make proposals on future measures related to the Danish animal feed mineral phosphorus tax, and the Resource Committee involved in the preparation of the Icelandic General Resource Tax in 2002).

It should be noted that these formal engagement processes have been used at several stages of the policy cycle. Prior to implementation they can assist in designing realistic instruments that are deemed acceptable by those affected, whereas at the evaluation stage the involvement of civil society stakeholders can help to identify the successes and failings of instruments, to feed into considerations on the future of the instruments.

Involving stakeholders in ongoing collaborative processes

Some countries have set up **environmental/green tax commissions** involving civil society stakeholders. Examples include the Swedish Environmental Tax Commission in 1987, which involved a broad representation of interests in analysing the possible introduction of environmental taxes, the Portuguese Green Tax Commission which included individual experts and representatives of civil society, and the 'Green Deal' approach in the Netherlands which created a formal process and vehicle for civil society engagement. A slightly different approach was seen in Slovenia, where the Government **created an NGO** (Umanotera) to lead on green budgetary reform. Such processes ensure that stakeholders are engaged with discussions from an early stage, thereby helping to ensure their buy-in and support for the wider objectives of wider green tax reform.

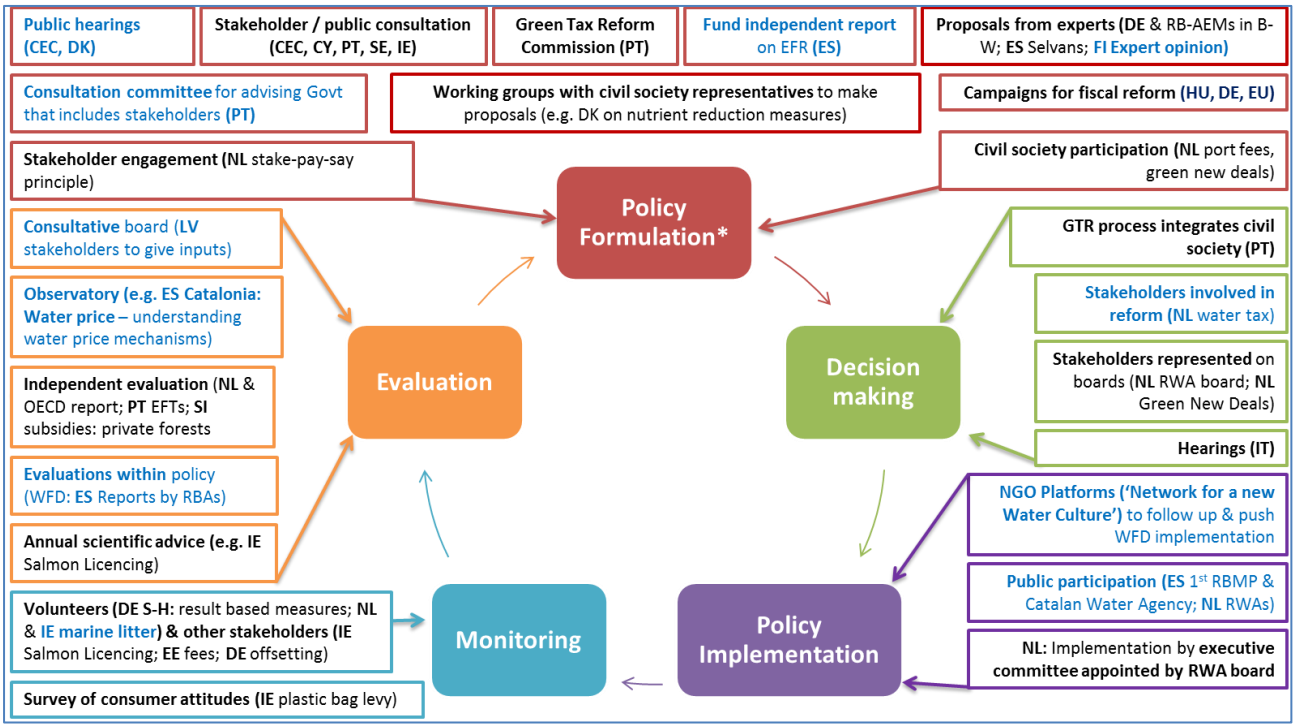
In other cases, civil society organisations are engaged in instruments through ongoing collaborative processes, such as formal **consultation or management boards** which include key stakeholders. Examples include the environmental consultation board of 20 annually elected environmental NGOs which comments on the effectiveness of the Latvian packaging tax, the formal representation of stakeholders within Regional Water Authorities in the Netherlands and Water Agencies in France, and the Intensity Group committee set up to analyse potential changes in agricultural policies in relation to the Swedish tax on fertilizers. NGOs are involved in the management of Sustainability Fund grants under the UK Aggregates Levy. Changes in the fees for the salmon fishing licence in Ireland require a 30 day public stakeholder consultation period and the approval of the Fishery District

Committees, which include representatives of fishers, and commercial fisherman are consulted each year when the new Estonian fishing rates are established. Stakeholders were also closely engaged in the evaluation and revision of Czech air pollution fees over a four year period.

Civil society engagement at each stage of the policy cycle

The following sections outlines some additional specific examples of civil society engagement relating to each stage of the policy cycle. A summary of some of these are included in Figure 16 below, which draws on examples from both the case studies undertaken by the project team (in black text), and the experiences shared by stakeholders who attended the project workshops (in blue text).

Figure 16 Examples of previous civil society engagement across the policy cycle



Policy formulation (including problem recognition)

It is worth noting that both the case studies and the workshops held during this study indicate that a large amount of civil society engagement so far has been undertaken during the policy formulation phase, for example through formal consultations, informal discussions and lobbying.

In some cases, **key experts or individuals have played an important role** in recognising the need or potential for a new instrument and contributing to its development. The NGO Clean Air Action Group played an important role in initiating discussions on the Hungarian air pollution load charges with the Ministry of Environment and providing background information to the Ministry. The RB-AEM in Baden-Württemberg was established thanks to the suggestion of three biodiversity experts, who also designed the instrument and convinced the managing authority to increase payments in a new version of the scheme. The offsetting legislation in Germany was developed following the establishment of the Stein Commission, which included representation from key NGOs including the German Council for Landscape Maintenance. The Selvans programme was put in place largely due to the personal leadership and dedication of one individual (who suggested the programme, provided scientific advice on its design and engaged an NGO

to manage it when public funding was cut), whilst the Italian phytosanitary product tax was introduced mainly thanks to a MP of the Italian Green Party who championed its introduction and gathered cross-party political support and support from organic agriculture associations. The Slovenian payments for private forest management were introduced thanks to the efforts of forestry experts.

Civil society, including experts, academics and NGOs, has also been involved in **reports, research or campaigns** that have led to the development of instruments. In Spain, a report by independent experts supported the development of environmental tax reform. NGOs and the public pushed for the Austrian Government to take action after a few high-profile pollution incidents, leading to the Austrian landfill tax, and a public campaign led to the introduction of a deposit refund scheme in Germany. The two analysed Danish taxes were introduced following the recommendation of commissions of experts and civil servants, and the Portuguese EFTs were introduced following the suggestion of academics and NGOs. Civil society engagement in communicating the scale of the marine litter problem and its impacts has arguably led to public support for action, which in turn has helped to inspire action.

In a number of the case studies, it was felt that **civil society was not adequately engaged** or the views expressed by civil society were not adequately taken into account. Examples include: the process to design the Spanish tax on F-gases which was considered to be largely top-down; limited impact of lobbying prior to the introduction of UK aggregates levy (partly due to the Government's determination for an environmental tax); a lack of engagement with industry representatives on the Bulgarian water abstraction charge; a lack of active consultation of environmental NGOs during the policy development of the Belgian Environmental Charge; and environmental groups being rather distant from discussions around the introduction of the Danish pesticide tax, the development of the Swedish fertilizer tax and the Polish wastewater fee.

In spite of the wide experience of civil society engagement at the problem recognition and policy formulation phase, it should be noted that engagement is valuable throughout the entire policy cycle to improve both the effectiveness of instruments (e.g. by drawing on the available knowledge and expertise of stakeholders) and the acceptance of instruments. Some examples of engagement at these other points in the policy cycle are provided in the following sections.

Decision-making

Engagement with civil society at the decision-making stage can help improve the design and acceptance of instruments by those who will be impacted. Perhaps unsurprisingly, taxes and fees may be opposed by those who (would have to) pay them. Examples of **adaptations and concessions that may enable instruments to be successfully introduced**, with greater support from those affected, include:

- Recycling of revenues to the affected sector, e.g. the majority of revenues of the Danish pesticide tax and the animal feed mineral phosphorus tax are returned to the agricultural sector through a percentage reduction in land value tax, and revenues from the Swedish fertilizer tax were ring-fenced to agro-environmental subsidies as the tax rate was doubled in 1998;

- Excluding certain products/activities from the scope of a tax, as in the case of synthetic fertilizers and the Italian phytosanitary product tax, and informal discussions with industry on the Slovakian air pollution fees that may have led to revisions to the legislation that were favourable to certain industries;

- The introduction of a voluntary hardship scheme in Ireland to allow commercial salmon fishermen to exit the fishery sector thanks to compensation payments;

- Taking into account concerns when setting tax rates, e.g. in the case of reductions in the Estonian mineral resource extraction charges in 2016 and the overturning of a rate increase in 2013, and maintaining a low fee rate for the first few years of the Estonian hunting fee;

- Ensuring that tax burdens are shared, for example in the case of the Irish regulation on salmon fishing impacting upon both commercial and recreational fishermen.

In a small number of cases, serious opposition by stakeholders may effectively **halt the introduction of an instrument**. National and local authorities and large parts of civil society believe that the Greek landfill tax would increase the overall tax burden of households and companies. This is one of the reasons that the tax has so far not been implemented.

Policy implementation

Fewer examples have been found of civil society playing a key role at the policy implementation phase, although there are some examples that may provide inspiration for future engagement at this stage of the policy cycle.

In a few cases, civil society organisations are involved in the **management of instruments**. The Finnish DRS have all been implemented and are run by private entities (the beverage industry and retailers), which ensures that this important stakeholder group has an integral role in the instruments and an inherent interest in their success. The establishment and management of the Selvans programme in Spain was supported by two NGOs. Stakeholders may be consulted on changes in fees, as in the case of the salmon fishing licence in Ireland and Estonian fishing rates. Stakeholders may also be involved in decisions on the **distribution of revenues** from instruments, as in the case of NGOs helping to manage grants through the UK Aggregates Levy Sustainability Fund. Civil society organisations can also play a role in **raising awareness on instruments**. For example, civil society initiatives play a key role in motivating farmers and spreading awareness on the importance of species-rich grassland in Baden Württemberg.

Monitoring

There are also a limited number of examples of civil society being involved at the policy monitoring phase. One example is industry and other organisations being involved in the **monitoring and reporting of air pollutant emissions** (e.g. companies in Sweden and the Hydrometeorological Institute in Slovakia). **Volunteers** also sometimes play a role in monitoring of instruments and their impacts, for example in the case of monitoring by volunteers of result-based measures in Germany, voluntary beach clean-ups related to marine litter in Ireland, and the involvement of NGOs (e.g. Stichting de Nordzee) in monitoring of plastic on beaches in the Netherlands. **Surveys of attitudes** can also be a useful tool for engagement at this stage of the policy cycle, as undertaken by Governments in relation to the UK landfill tax (where a survey of waste management companies led to the decision to increase the tax rate in 1998-99 and introduce a duty escalator) and the Irish plastic bag levy (where a survey was undertaken on willingness to pay, revealing that willingness increased from only 8% to 91% one year after its implementation).

During the workshops, some stakeholders expressed a view that often too little is done to **communicate and explain the results of monitoring** (and evaluation) of economic instruments to the beneficiaries of incentives and those affected by taxes, and to the local community and society more widely. Additional efforts in this area could therefore help to explain the rationale for taxes, that they are generally part of a wider policy mix, and that there are beneficial impacts as a result of the use of the instruments.

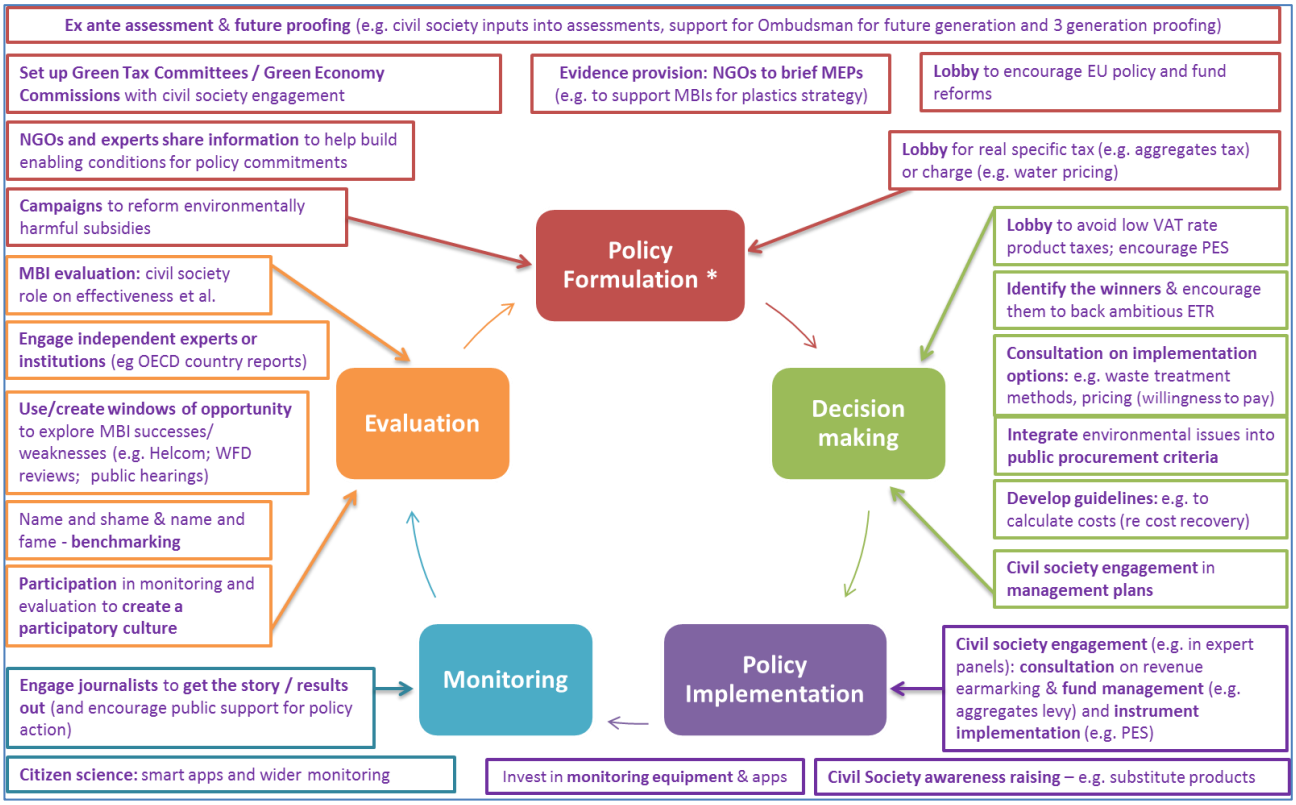
Evaluation

Finally, civil society organisations can usefully be engaged at the policy evaluation stage. This stage is crucial in assessing the outcomes and effectiveness of instruments and potentially leading to changes in design to improve their effectiveness, in terms of economic and environmental impacts and also acceptance by stakeholders. Civil society engagement can be an important way to gather **evidence on the impacts of instruments** to help in evidence-based revision of an instrument. Examples from the case studies undertaken during this study include: evidence provided by the Standing Scientific Committee and the North Atlantic Salmon Conservation Organisation on decreasing salmon stocks which was a strong driver for reform of the Irish salmon fishing licences; inputs from an environmental consultation board of 20 annually elected environmental NGOs to the evaluation of the Latvian packaging tax; the Portuguese Green Tax Reform committee leading to new legislation which included some of the proposed revisions to the Portuguese water resource fee; and an effectiveness analysis by NGOs which helped to bring about a rate increase to improve the effectiveness of the Romanian packaging charge. Academics were closely engaged in the evaluation and revision of Czech air pollution fees over a four year period, and independent researchers were involved in the evaluation of Portuguese EFTs and Slovenian subsidies to private forests. In the Dutch port fees case, civil society has a role at each stage of the policy cycle, including monitoring and evaluation.

Looking to the future – civil society engagement in fiscal reform

During the five thematic workshops, participants were asked to identify where civil society could usefully be engaged to support environmental tax objectives and what type of tools and processes could help with this engagement. Figure 17 below presents some of the examples provided by participants for each part of the policy cycle.

Figure 17 Future options for civil society engagement across the policy cycle



As noted above, there is no single pattern for civil society engagement in past and current cases of environmental tax reform, with the arguable exception that a core civil society group – NGOs – have so far tended to focus mainly on the policy formulation stage. One of the core contributions of NGOs has been to show that there is an environmental (or social) problem so that it receives policy attention and makes its way on to the policy agenda. While this is still expected to be a fruitful area of focus in the future, it was felt that NGOs could play a more significant role than currently in other steps of the policy cycle – notably in implementation (i.e. helping people react to the fiscal incentives), monitoring (e.g. helping supply data and support the evidence-base), and evaluation (e.g. ensuring the society's perceptions are integrated in evaluations). Specific recommendations for civil society engagement are presented below for each step of the policy cycle.

Policy formulation (including problem recognition)

At the core of policy formulation is the **evidence base**. This drives the recognition that there is a problem and helps to inform policy designed to address the problem. At the EU level and in and most Member States there is a commitment to undertake ex-ante assessments (and later ex itinere and ex post assessment); there is a need for civil society to contribute evidence (both scientific and stakeholder perceptions) on which economic signals should be part of the solution to environmental and resource problems, in order to support policy formulation or review. More widely, there is a need for support for longer-term evaluations, e.g. 'three generation future proofing' to provide a longer term 'sustainability check' for instruments. In this context resource and pollution pricing will inevitably need to figure in the policy mix.

Consultation processes that engage all relevant stakeholder groups are needed for the formulation of policy (both new policy and the reform of existing policy). This can support effectiveness, as the design process takes into account different sources of knowledge and provides a wider evidence base. In addition, direct engagement with those who will be worse off due to the introduction of an instrument has the potential to increase their understanding and acceptance. This is helped by a convincing explanation of the reason for introducing a measure and its longer-term benefits, not just providing information on what will happen when the measure is introduced.

There can also be civil society engagement to **develop new institutions**, such as Green Tax Commissions or Green Economy Commissions or expert groups, and actual participation in these bodies to share evidence of problems that need addressing and good (and bad) practice on MBIs.

Lobbying campaigns will of course also remain important tools for civil society engagement. Examples raised during the workshops include encouraging the reform of harmful subsidies, support for plastic bag taxes and deposit refund schemes, for lower VAT for repair activities and opposition to lower VAT for pesticides, which can arguably also fit into the decision making phase of the policy cycle, since VAT rate choices are a Member State decision within a wider EU policy framework.

Decision-making

Civil society can and should play a range of different roles in the decision making phase of the policy cycle. This engagement may vary considerably depending on the issue under discussion and the type of civil society organisation involved. Examples include:

- **Identifying the 'winners' of environmental tax reform** and helping them encourage a move to ambitious ETR (e.g. through higher rates, fast ramping up of

rates, use of indexation, minimal use of exemptions, clear use of reviews and sunset clauses). Some of the winners would themselves be citizens that need civil society representation.

- **Consultation on options for implementation**, whether on the choice of implementation approach (e.g. waste management measures), or design (e.g. pricing level through studies on willingness to pay).

- Encouraging the **integration of environmental measures into green public procurement**, both through encouraging GPP in general and encouraging the use of progressive criteria within GPP. NGO networks, for example, are potentially effective vehicles to share good practice from across their networks and encourage policy-makers, both at the national and local levels, to be more ambitious.

- **Supporting and disseminating guidance**, e.g. on full cost recovery, and helping to facilitate decisions to move towards fuller cost recovery (with due social considerations in design).

- **Taking part in the design of instrument management**, e.g. forest management or river basin management plans. In some cases civil society can also be engaged in the implementation of these management plans too (see next section).

Policy implementation

Civil society can be **active direct players in the implementation of instruments**, for example forestry or river basin management plans and schemes involving payments for ecosystem services (PES). They can also be part of **expert groups**, contribute to **consultation** on the earmarking of revenues, and in some cases **directly contribute to the management of revenues and associate funds** (e.g. aggregates levy).

The effectiveness of MBIs depends not just on the design, targeting and revenue use of instruments, but also on how those targeted respond to the economic signals. Civil society can support the effectiveness of MBIs by **awareness raising** (e.g. on alternatives to plastic bags or single use plastic bottles), **encouraging good practice** (e.g. waste separation and recycling) or **promoting measures to help offset the MBI price** (e.g. water capture devices to facilitate response to water pricing). This can make it less onerous to reach targets, improve the acceptability of the instruments and promote the replication of instruments where appropriate.

Monitoring

Civil society organisations have the potential to contribute significantly more to the monitoring phase of the policy cycle than at present. To date civil society roles include traditional roles of **providing information** to society as a whole and the press/media on environmental problems (e.g. that can lead to non compliance fees and fines) as well as **in situ monitoring** of the impacts of instruments, such as monitoring the presence of plastic on beaches (that can help to inform plastic bag charges, deposit refund schemes for plastic bottles and/or EPR schemes). They also include use of **smartphone apps** (e.g. identifying farmland bird and butterfly species) that can, in a broad sense, inform pricing policies (e.g. CAP payments). In the future, with the cuts in public budgets for monitoring and increases in technological innovation (and an associated increase in citizen engagement in monitoring), there is arguably a growing role for civil society. The results of **citizen science** can be expected to become a growing evidence base to inform policy that can lead to ETR – e.g. species counts to support CAP and PES, air pollution levels to

inform city air pollution related taxes, or illegal waste tipping to support the implementation of taxes, fees and fines.

Evaluation

Good evaluation is at the heart of better regulation. Better regulation requires due integration of stakeholder perspectives into decision-making, including an appreciation of the winners and losers and reflecting this in policies and their reform. It is therefore essential that **civil society is systematically represented in evaluation** in general, and also specifically as regards MBI evaluations. This understanding is critical if social considerations are to be properly reflected in decision-making.

Civil society can and should be **encouraged to engage in evaluation (and monitoring)** to help ensure that there is a participatory culture than can in turn support due ETR. Duly motivated civil society can then **usefully encourage independent analysis**, either investing in this themselves or encouraging governments, foundations or other bodies to support studies, including on ETR. In some cases, this can help make use of windows of opportunity in existing processes (e.g. Helcom reports, WFD reviews, public hearings). Civil society organisations can also publish their **own reports, using benchmarking, 'name and fame' or 'name and shame'** approaches to encourage city, country and EU level action on ETR.

The above examples focus on inputs by civil society. The other side of the coin is how to design instruments to improve (civil society) acceptance of these instruments. This is explored in the section below.

The way forward

There remains **significant untapped potential for both ETR and for civil society engagement to support ETR**. There are a range of **windows of opportunity** for progress, including regular policy reviews, national reports on subsidies and spending, public hearings and debates, evaluations and reporting, as well as new environmental issues or related crises coming to light, for example resource scarcity, price volatility, eutrophication events, air pollution incidents and biodiversity loss.

Over time is it clear that economic signals should be a core part of the solution to environmental challenges and these windows of opportunity should made use of to progress the broader application of MBI in the field of environmental pollution and natural resource use. To do this there is a need for a better understanding of what these windows of opportunity are, what other opportunities could be created and how civil society supported evidence can input into them. Furthermore, there is a need for greater active engagement of civil society throughout the policy cycle on economic instruments, to help in the transition towards the appropriate resource, product and pollution pricing needed for a transition to a green and circular economy, to protect biodiversity and ecosystems, and to ensure resource availability and the good ecological status of our natural capital for future generations.

ANNEX 1: SUMMARY OF KEY DETAILS OF CASE STUDIES

Table A1 Summary of key details of case studies

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
Austria	Waste, resources & circular economy	**Landfill tax (and ban)**	A tax per tonne of waste deposited (with a higher rate for lower technology standard landfills), linked to a ban on waste with a total organic carbon (TOC) content of over 5% and an incineration tax	**Landfill:** ATS 200 (EUR 14.53) per tonne for hazardous waste, ATS 40 (EUR 2.91) per tonne for all other wastes (1990); additional surcharges added from 1996 for lower standard technology sites (EUR 29 for non-enclosed sites, additional EUR 29 for no landfill gas capture system). **Incineration:** EUR 7 per tonne (2006)	**Landfill:** EUR 9.20 per tonne for construction, inert, soil waste; EUR 20.60 for residual waste; EUR 29.80 per tonne for mass/hazardous waste, including MBT residues; EUR 87 per tonne for untreated MSW to lower standard landfills (since 2012). **Incineration:** EUR 8 per tonne	Around EUR 1.2 billion in total up to 2014. Annual revenues: EUR 10 million in 1990, peaking at EUR 97 million in 2003, falling to around EUR 52 million since 2011	Revenues earmarked exclusively for containment and treatment of contaminated sites (85% for remediation, 15% for data gathering)	Over 60% of waste landfilled in 1989 (prior to tax and ban), reduced to less than 10% since 2009 (after full implementation of ban). Waste incineration more than quadrupled since landfill ban first introduced in 2004. 212 projects to remediate contaminated sites funded from 1993-2013.
Austria	Biodiversity & land use	**Vienna tree protection act**	This instrument legislatively protects private and public trees across the city. In case, a tree is allowed to be removed, a fee needs to be paid for	In 1974 the charge for a replacement tree was 8,000 ATS per tree (~EUR 581). The fines for failure to	In 2013 the charge for a replacement tree was EUR 1,090 and the fines for failure to replace trees between EUR 799 and	An average of EUR 1.3 million per year between 2002 and 2015.	Revenues are earmarked for the preservation of green infrastructure in the city.	Not estimated as such.

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
			a replacement tree and there are fine rates for failure to replace it.	replace trees was between 5,000 – 500,000 ATS (~EUR 363 – 36,310).	EUR 42,000. In addition, those who remove or allow the removal of more than 20 trees without prior authorisation risk up to six months imprisonment or a fine up to EUR 1,800,000.			
Belgium	Waste, resources & circular economy; Marine litter	**Packaging taxes**	A Packaging Charge on beverage containers, plus an Environmental Charge on other products (e.g. single-use plastic bags and disposable cutlery)	**Packaging charge:** BEF 15 (EUR 0.37) per beverage container (1993) **Environmental charge:** single-use carrier bags EUR 3 per kg (biodegradable bags exempt), single-use plastic film EUR 2.70 per kg, single-use aluminium foil EUR 4.50 per kg, disposable plastic cutlery EUR 3.60 per kg	**Packaging charge:** EUR 1.81 per hectolitre for reusable containers, EUR 9.86 per hectolitre for non-reusable containers (2014) **Environmental charge:** abolished in Jan 2015	**Packaging charge:** EUR 318 million (2012), EUR 166 million (2014) **Environmental charge:** EUR 12-15 million per year (2008-2012); Carrier bag levy specifically: EUR 1.2 million (2008), EUR 0.55 million (2010)	No earmarking, revenues retained by the national government	Distribution of single-use plastic bags dropped by 60% (231.3 tonnes of bags, 36 million bags) from 2008-2009. Sale of reusable bags rose from 7.6 million (2003) to 76.6 million (2010)
Belgium, Netherlands, Luxembourg	Waste, resources & circular economy	**PAYT schemes**	Various local schemes to charge for household waste, e.g. differential charging for residual and recyclable waste,	Each PAYT scheme is different, so not possible to summarise. Charges may be based on: differential charging per collection of residual and recyclable waste; variable rates according to weight and		Varies between PAYT schemes, but revenues from variable fees typically cover 30-50%	No formal earmarking, but revenues usually used to help fund waste	Reduction in overall (household) waste generation, in particular for residual waste.

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
			fees based on weight of waste collected, and charges for official refuse sacks	recyclability of collected waste; a fee per sack used for different wastes; charging based on the size of container chosen by the household; or a combination of the above. In many cases, the variable element applies only to residual waste collection; on others, collection of biowaste and or recyclables may also be charged for (usually at a much lower rate than for residual waste).		of scheme running costs; variable costs therefore usually supplemented by additional fixed fees. Revenues from variable rates in Flanders (BE) account for around 50% of funds needed for waste management.	collection services	E.g. in Oostzaan (NL) waste generation dropped by 30% in 1st year of scheme (1993-94), and communes in LU with waste generation-related charges produced 25% less waste than those without (2012).
Bulgaria	Water stress	**Water abstraction charge**	Implemented in 2001 and subsequently reformed a number of times. Charges cover all aspects of abstraction and exclude some emergency situations. Proposal to increase from 2017 to fulfil WFD requirements.	Charges on water abstraction and for water abstraction from mineral water sources. Surface water charges vary by user, e.g. EUR 0.004 for industrial purposes and EUR 0.01 for households	Charges separated into groundwater and surface water. Surface water charges increased in 2012, e.g. EUR 0.023 for industrial purposes	EUR 25,686 (2015)	Yes	Moderate effects on water use. Expect increased effects after reform with higher charges
Croatia	Biodiversity & land use	**Forest Public Benefit Fee**	A fee which is paid by companies and other business associations that carry out economic activities in Croatia. The revenues are used to finance forest management activities.	0.07% of the income of companies that conduct economic activities in Croatia (with the exception of those managing forests) between 1990 and 2010. In	Since 2012, 0.0265% of the total income of companies.	The revenues raised decreased from EUR 63.88 million in 2010 to EUR 24.66 million in 2015.	The revenues of the Forest Public Benefit Fund are used for management and restoration of forests (80% in 2015); demining (10%), firefighters	6,774 ha prepared for natural forest development and 28,973 ha of young forest managed by 2015; 361.66 ha of firebreaks/ firefighting passages by the end of 2016.

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
				2010 the rate was decreased to 0.0525%.			(5%) and scientific work (5%).	
Cyprus	Water stress	**Water pricing**	Due to its semi-arid climate, Cyprus has a long tradition of domestic and irrigation water pricing. However, existing prices only reflect the financial cost of water supply. The WFD has been the main driver for reforming the water pricing schemes, full implementation has not yet been achieved.	Rates applied since 2004: Domestic: EUR 0.50 to 1 per m^3 depending on location and quantity (block pricing) Irrigation: EUR 0.15-0.34 per m^3 depending on location and type of water supplier	Proposed rates for full cost recovery (not yet implemented) Domestic and industrial users: EUR 0.60 to 1.1 per m^3, depending on location and quantity (block pricing) Irrigation: EUR 0.3-0.49 per m^3, depending on location and type of water supplier	If full cost recovery water pricing is implemented, revenues expected to reach around EUR10 million per year	No	Full implementation not yet achieved. Potential water savings with implementation of full cost recovery water pricing, which would improve the quality of water aquifers and reduce the need for energy-intensive water desalination.
Czech Republic	Air pollution	**Air pollution fee**	Air pollution fees have been in place since the late 1960s. Despite changes in the early 1990s, the environmental impact and incentive effect remained limited. The fees were seen primarily as a means to raise revenues. The reform in 2012 led to a substantial increase in rates.	2002-2012: **PM_{10}**: CZK 3,000/t; **SO_2:** CZK 1,000/t; **NOx:** CZK 800/t; CZK 0-40,000/year for small sources depending on fuel type and installed power	2013-2016: **PM_{10}**: CZK 4,200/t (EUR 155/t); **SO_2:** CZK 1,350/t (EUR50/t); **NOx**: CZK 1100/t (EUR 41/t) Annual increases to 2021:	CZK 287.5 million in 2014 (EUR 10.6 million)	Yes	Limited by low level of fees. Too early to assess impact of higher fees.

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
					PM_{10}: CZK 14,700/t (EUR 544/t); **SO_2:** CZK 4,900/t (EUR 181/t); **NOx:** CZK 3,900 /t (EUR 144/t)			
Denmark	Water quality; Biodiversity & land use	**Pesticide tax**	An innovative pesticide tax calculated individually for each approved pesticide, based on human health risks, environmental load (toxicity to non-target individuals) and environmental fate (bioaccumulation, degradation, leaching to groundwater).	3% of the wholesale price of pesticides (1972); 20% of the wholesale price (1982); between 15 and 37% of the retail price (1996); between 33 and 54% of retail price (1998)	Since 2013, tax level is calculated for each pesticide based on human health risks, toxicity to non-target organisms and degradation/ bioaccumulation/ leaching to groundwater	DKK 49 million (EUR 6m) per year (1972 fee and 1982 tax); DKK 500 million (EUR 67m) per year (1998 tax); DKK 650 million (EUR 87m) per year (estimated in ex-ante assessment of new tax system)	The revenues from the pesticide tax are used for the agricultural sector, mainly through a reduction in land value taxes (83% in 2003)	The pesticide taxes before 2013 only have small effects. The objective of the new tax system is to reduce the pesticide load by 50% by the end of 2016; results will be evaluated in 2017
Denmark	Water quality; Biodiversity & land use	**Animal feed mineral phosphorus tax**	A tax based on the weight of mineral phosphorus in animal feed phosphates, introduced on commercial animal feed in order to reduce the saturation of soils and leaching to surface waters.	4 DKK (EUR 0.53) per kg P (2004)	4 DKK (EUR 0.53) per kg P	50 million DKK per year	No earmarking, but the rate of the land value tax for farmland has been reduced, providing a net relief of 36 million DKK (EUR 4.8m)	Limited impact: estimated reduction of 2,000 tonnes P from 2004-2015 (compared with ex-ante assessment of 4,500-5,000). Revenues remain about three times higher than expected.
Estonia	Waste, resources & circular economy	**Mineral resource extraction charge**	Charges imposed since 1991 on various construction rocks, energy	1999: Rates ranged from EUR 0.07 (for clay for	2015: Rates range from EUR 0.33 (for sand for filling) to	Revenues have increased from EUR 19.1 million (2008)	Larger share of revenues from locally important	Increases in the resource charges do not appear to have reduced the

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
			minerals and minerals used in agriculture, based on the quantity of the extracted resource (m^3 or tonnes)	ceramics) to EUR 0.93 (for dolomite for technological use) per m^3 or per tonne	EUR 3.34 (for dolomite for technological use) per m^3 or per tonne	to EUR 33.2 million (2012). The largest proportion of revenues come from oil shale	resources (e.g. aggregates) go to municipal budgets; oil shale revenues go to state budget. State revenues not specifically earmarked, but Environmental Investment Centre (EIC) is main beneficiary	quantity of mineral resources extracted or increased resource productivity
Estonia	Biodiversity & land use	**Hunting and fishing fees**	Hunting and fishing fees, whose revenues are partly earmarked for research, conservation actions and awareness raising.	n.a.	Tax rates depend on type of fishing, fishing gear, location and species (e.g. Baltic herring: EUR 3.19 per tonne; cod: EUR 31.95 per tonne; flounder: EUR 9.58 per tonne; salmon: EUR 0.31 per individual fish; shrimps in the district of Spitzbergen: EUR 191.73 per day; sprat: EUR 3.19 per tonne; unregulated species at NEAFC district: EUR 4.47 per tonne).	EUR 1.57 million from the fishing fee; EUR 130,000 from the hunting fee (2015)	Part of the revenues (77% in 2015) is transferred to the Environmental Investment Centre, which use them to finance grants for research, conservation actions and awareness raising projects	Not estimated as such.

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
					Recreational fishing fees based on fishing time period: 24 h – EUR 1; 7 days – EUR 3; 6 months – EUR 13; 12 months – EUR 20. Recreational fishing permits needed to fish in protected areas (EUR 3-6 per day, EUR 7 for a limited period). Annual hunting right fee: EUR 10.			
Finland	Waste, resources & circular economy; Marine litter	**Beverage container deposit refund scheme (DRS) (and packaging tax)**	Refundable deposits on refillable glass and plastic bottles, and one-way cans, plastic and glass bottles. Accompanied by a beverage container packaging tax (at a lower rate for members of a deposit refund scheme)	**Packaging tax:** FIM 4 (EUR 0.67) per litre for packaging not in a DRS, FIM 1 (EUR 0.17) per litre for one-way packaging in a DRS, refillable containers in a DRS exempt (1994).	**DRS:** Deposits of EUR 0.10 (small plastic bottle, all glass bottles), EUR 0.15 (metal can), EUR 0.20 (medium plastic bottle), EUR 0.40 (large plastic bottle) per container (2016). **Packaging tax:** EUR 0.51 per litre for all drinks packaging not in a DRS, EUR 0 for one-way packaging in a DRS	**DRS:** EUR 284 million paid to PALPA (largest DRS operator) in deposit fees in 2015. **Packaging tax:** FIM 103 million (EUR 17.3 million) (1995), FIM 59 million (EUR 9.9 million) (1997, after introduction of PALPA DRS), EUR 14 million (2014)	**DRS:** Fees paid by PALPA producers finance reverse vending machines, administration costs, transport and sorting of materials.	PALPA has achieved 89-95% return rates for one-way packaging (2015).

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
Finland	Waste, resources & circular economy; Biodiversity & land use	**Tax on the use of peat for energy**	Peat used for energy (heat) is taxed within the national taxation framework for energy sources, but enjoys a special rate that fails to fully internalise the environmental externalities (energy content and CO_2 emissions)	Introduced in 1994: EUR 0.35/MWh	2012: EUR 1.9/MWh; 2013: EUR 4.9/MWh; 2016: EUR 1.9/MWh. (An increase to EUR 5.9/MWh planned for 2015 was cancelled and the rate was lowered back to EUR 1.9/MWh in 2016.)	EUR 36 million in 2013; EUR 40 million in 2014	No earmarking, revenues go to the State general budget	Tax has not effectively addressed environmental impacts: peat production increased from 1.5 Mt (1981) to 6.9 million tonnes of oil equivalent (Mtoe) (2001). In 2013 13.5% of national emissions (8.2m tonnes of CO_2 equivalent) associated with peat production/ burning.
France	Water stress	**Water abstraction charges**	Charges have been levied by Water Agencies for more than 50 years. The charge has to be paid by all those who abstract water (with some exemptions) and reflects the 'water pays for water' principle.	Rates differentiated by usage type, source and zone.	Maximum rates in water scarce areas range from EUR 1.5 per 1,000 m^3 for gravity irrigation to EUR 100 per 1,000 m^3 for drinking water Maximum rates vary in other areas range from EUR 0.15 per 1,000 m^3 for canal filling to EUR 90 per 1,000 m^3 for drinking water	EUR 354 million in 2011	Yes	Charges together with the water pollution levy and the fact that a substantial part of the water bill is charged at a variable (per m^3) rate provides an incentive for efficient water use
Germany	Biodiversity & land use	**Baden-Wurttemberg result-based agri-**	A result-based agri-environment measure financed through the Common Agriculture Policy in	Payment to farmers: EUR 50/ha (2000-2009) and EUR	EUR 230-260/ha (but the payment cannot be added to other agri-	EUR 2.6 million per year (average 2009-15).	n.a. (the instrument is an agro-environment	After an initial increasing trend, the land covered by the RB-AEM decreased from

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
		environment measure	Baden-Württemberg, Germany (RB-AEMs remunerate farmers to achieve a specific environmental outcome and not for adopting prescribed management activities).	60/ha (2009-2014)	environment measures as in the previous versions, thereby representing only an additional EUR 80-110/ha for most farmers).		measure and not a tax)	66,112 ha in 2003 to 47,133 ha in 2007, then increased again to more than 49,000 ha between 2009 and 2011, and subsequently decreased to 41,006 ha in 2013 and 38,603 ha in 2015.
Germany	Biodiversity & land use	**Biodiversity offsetting**	Biodiversity offsets are measurable conservation outcomes of actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention/mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net biodiversity loss and preferably a net gain of biodiversity. They include habitat banking, where offsetting projects are carried out without ex ante links to specific development impacts, thereby enabling the storing and trading offsetting credits.	n.a.	Payments for offsets largely depend on the type and objectives of the projects. For example, the costs related to standard one-off per hectare forest creation vary between 17,015 EUR and 155,742 EUR; grassland creation costs between 1,231 EUR and 168,129 EUR; wetland creation between 36,398 EUR and 172,021 EUR.	Not much information is available on the revenues related to biodiversity offsetting, but a recent study estimates the overall costs (i.e. revenues for compensation, excluding transaction costs) of offsets per year in the federal state of Hesse at 150 million EUR (between 70 and 210 million EUR). Assuming that Hesse represents an average of the 16 German federal states, by simple extrapolation calculated a	The offsetting projects are used to compensate unavoidable environmental impacts by definition.	Recent studies have revealed that a substantial proportion of offset failed to achieve their objectives.

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
						total annual costs of offsetting in Germany at 2.5 billion EUR (between 1.1 and 3.4 billion EUR).		
Greece	Waste, resources & circular economy	**Landfill tax**	A proposed tax per tonne of waste deposited (yet to be implemented due to financial concerns)	EUR 35 per tonne (2014) rising by EUR 5 per year to a maximum of EUR 60 per tonne	n/a (not yet implemented)	None yet, but estimates of EUR 140 to 250 million per year. If paid by final consumers the additional cost per household could be EUR 50-150 per year.	All revenues to go to the National Green Fund to finance waste recovery and disposal projects	No ex-ante assessment yet carried out
Hungary	Air pollution	**Air pollution load charges**	Charges on air pollution were introduced in 2003 as part of a package of environmental load charges that sought to reduce pressures on the environment and raise revenues for environmental protection. Civil society played a key role in the introduction of the instrument.	**SO_2:** HUF 50/kg (EUR 0.16/kg); **NOx**: HUF 120/kg (EUR 0.38/kg); **Non-toxic dust:** HUF 30/kg (EUR 0.09/kg)	Same since introduction	HUF 5.56 billion (EUR 17.7 million) in 2015 from the environmental load charge (air pollution, water pollution and soil pollution)	No	Limited information available and no evaluations on effectiveness
Iceland	Biodiversity & land use	**Fisheries instruments**	Fishery management system largely based on market measures. It includes Total Allowable Catch (TAC) limits, set annually for different species based on	General Resource Tax: 6% (2004), gradually increasing to 9.5% (2009). Calculated as a % of total catch	In 2015 the fee was fixed for a period of three years as 33% of a sum calculated as: all EBT (Earnings Before Taxes) in the	About ISK 8 billion for 2014-5 and ISK 5 billion for 2015-16.	The revenues are used by the Government to help finance the fisheries management system.	Since the introduction of Individual Transferable Quota (ITQs) in Iceland, most stocks have slowly increased, in

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
			scientific advice, and Individual Transferable Quota (ITQ).	value of preceding year, after deducting fuel, wages and operating costs. Tax then divided by landed volume (in cod equivalents, c.e.) to give a tax per c.e. kg levied for the next fishing year. Special Tax on Profits: 65% of resource rent calculated in c.e. The two taxes merged into one fee in 2015.	fisheries sector, 25% of EBT in processing of pelagic fish stocks and 5% of EBT in processing of other stocks.			particular the valuable cod stock. The scheme resulted in a more efficient industry, technological development, lower emissions, newer ships and an overall lower cost of fishing.
Ireland	Waste, resources & circular economy; Marine litter	**Plastic bag levy**	An environmental levy on plastic bags, applied at the point of sale	EUR 0.15 per disposable bag (2002)	EUR 0.22 per disposable bag (since 2007); potential future increase to EUR 0.25 (not yet implemented)	EUR 10.4 million (2002) – 26.7 million (2008, after rate increase) per year; EUR 203 million total (2002-2013)	Revenues go to the Environmental Fund, to finance environmental projects and cover levy administration cost	Plastic bag consumption fell from 328 bags per capita before the levy to 14 in 2014; plastic bags accounted for 5% of litter in 2001 and 0.13% in 2015
Ireland	Biodiversity & land use	**Fishing fees**	A licencing scheme for salmon fishing that builds on maximum annual quotas. The revenues are used to support the development of the Salmon	In 2006 the price of recreational and commercial salmon fishing licences was doubled.	The licence fee ranges from tens of euros to over hundred euros, depending on the number of river basin regions and time	Between over EUR 0.5 ad 0.7 million per year.	50% of the revenues are earmarked to the Salmon Conservation Fund, which supports conservation	The adoption of annual quota resulted in a significant reduction of salmon fishing (from over 250,000 salmon in

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
			Conservation Fund, which supports projects aiming at improving the conservation status of salmon.		period they cover		projects aiming at supporting the conservation and sustainable management of salmon stocks and habitats they depend on.	2001, the year when the fee was introduced, to over 20,000 in 2015).
Italy	Water quality; Biodiversity & land use	**Phytosanitary product tax**	A tax on phytosanitary products (including pesticides and herbicides) that pose particular hazards (although synthetic fertilizers are in practice outside the scope of the tax). It was intended as the first step in a wider strategy to support organic agriculture (revenues are used for this purpose).	From 1999, 0.5% of the sale price of all phytosanitary products manufactured and sold that have specific risks (e.g. cumulative, carcinogenic and fertility-related) and 1% of the final price for imported products	Increased to a 2% flat tax (2000)	Around EUR 3 million per year	Revenues currently earmarked to projects supporting organic agriculture. There is a proposal to end this earmarking	Unclear, although total tonnage of phytosanitary product sold declined by 25% from 2000-2013; land in organic cultivation (as a % of total agricultural land use) increased from 6.7% to 11.5% from 2000-2014.
Latvia	Waste, resources & circular economy; Marine litter	**Packaging tax**	A packaging tax as part of an all-inclusive natural resource tax. Tax breaks given to producers who join a producer responsibility organisation (PRO)	Tax for paper, plastic, glass and metal packaging calculated per item, per weight of packaging, per weight of product and according to customs tax	Glass EUR 0.44 per kg, plastic EUR 1.22 per kg (oxy-biodegradable plastic EUR 0.70, polystyrene EUR 1.56 per kg, Metal EUR 1.10 per kg, wood/ paper/card/ natural fibre/ bioplastic EUR 0.24, lightweight plastic bags EUR 3.70 per kg	EUR 2 million (2009), EUR 0.96 million (2014); reduction due to tax exemption for companies that have joined a producer responsibility organisation	Revenues earmarked for environmental protection activities until 2006; since then revenues go to the state budget	'Rapid reduction' in plastic bag use following introduction of plastic bag tax in 2008

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
					(heavier bags EUR 1.14 per kg)			
Lithuania	Waste, resources & circular economy; Marine litter	**Environmental pollution tax**	An environmental tax on 7 products including tyres, accumulators and batteries. Producers/importers (P/I) choose between 3 alternatives: I) pay the tax, II) organise individual collection/ treatment of waste products to be exempt from the tax, or III) participate in a collective producer responsibility scheme. For II and III, if P/I meets recovery/ recycling target, tax is waived, if half of target is met, half of the tax is paid.	From 2002: New/restored tyres EUR 86.89/t; Used tyres EUR 104.26/t; Accumulators EUR 144.81/t; Batteries 4% of wholesale price (EUR 144.81/t from 2007)	Since 2015: New/restored tyres EUR 86/t; Used tyres EUR 104/t; Accumulators EUR 144/t; Since 2012: Batteries EUR 2,896/t	Based on product sales, annual revenue could be EUR 2.6 million (tyres: EUR 1.59m, accumulators: EUR 0.81m, batteries: EUR 0.08m), but revenues depend on whether P/I chooses alternative I, II or III, and on their recycling performance.	Since 2016 revenues go to the State budget and are used to fulfil Waste management program objectives (from 2004-2015, 70% of revenues went to local municipalities to finance environmental measures and 30% to the state budget to administer the Environmental Investment Fund (LAAIF) and finance environmental investment projects).	Recovery/ recycling targets for tyres and accumulators generally met; those for batteries not met 2004-2011, met in 2012.
Malta	Water stress	**Water pricing**	A 'rising block' tariff for water supply fees for domestic, residential and non-residential water use. Self-abstraction of groundwater for agricultural use is a significant issue; it is frequently metered but not subject to water supply tariffs or extraction quotas.	Before 1994, the first 27 m^3 of household water consumption was free of charge. In addition lower tariffs were charged to vulnerable consumers, such as	Flat-rate annual service charge plus 'rising block' tariff: water use to a certain volume charged at one rate, and water use exceeding that volume charged at a higher rate (the highest non-	Revenue from the sale of water and related services around EUR 58 million in 2014 and 2015		Water supply and metering fees have not had significant impact on the amount of water provided through the public water supply. In fact, total groundwater abstraction has increased over time, and self-

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
			Water metering fees are also in place (with some exemptions).	pensioners and people receiving social assistance	residential water users benefit from reduced tariff for water consumption over 40,000 m^3 / year). Reduced rates for non-potable water for agricultural and industrial use (EUR 0.093/m^3) and for building or other purposes (EUR 0.932/m^3). Water used for agricultural purposes is exempt from water abstraction fees Water metering fees in place since 2000			abstraction from groundwater sources by the agricultural sector for irrigation purposes (for which no price is charged) doubled between 2004 and 2014.
Netherlands	Water quality; Marine litter	**Rotterdam & Amsterdam port fee reductions**	Sea-going vessels visiting the ports can dispose of their plastic waste without paying a fee, if the amount of waste exceeds 6 m^3	EUR 0/t above 6t; for smaller amounts the disposal fee is already included in port dues (2016)	EUR 0/t above 6t; for smaller amounts the disposal fee is already included in port dues (2016)	Reduced revenue	n.a.	Too early to estimate
Netherlands	Water stress	**Taxes and fees of regional water authorities**	An elaborate financing structure established to fund the unique Dutch water management system. The existing	Before 2009, separate levies were in place for maintenance of water barriers, water	From 2009, three levies have been applied by RWAs with	EUR 2.6 million* (2016 estimate)	Yes	Dutch water and waste charges are often praised for their effectiveness and inducement of technological

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
			levy system is based on cost recovery.	quantity management, waterways, road management, water quality and water pollution levy	variation in rates across regions: Water systems levy: levy for households varies between EUR 32 and EUR 120 between regions Waste water treatment levy: varies from below EUR 125 to over EUR 255 across districts Pollution levy: depending on amount of pollution households or businesses discharge into surface waters Provincial authorities impose a levy on groundwater and municipalities apply a sewage levy In 2012, the average water bill for households amounted to EUR 533 (waste water levy,			innovation in the waste water treatment sector

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
					drinking water levy, drinking water, water system levy)			
Poland	Water quality	**Wastewater fee**	A fee applied to discharge sewage sludge to water or soil, based on the amount and type of pollutant present, the category of sewage (urban, household or industrial) and in some cases also the temperature and receiving water body.	Upper threshold of PLN 175/kg (EUR 43.75/kg) of substances introduced in sludge to water or soil (2002)	In 2017 upper threshold will reach PLN 249.17/kg (EUR 62.29). Rates per kg per pollutant will range from PLN 0.05 (EUR 0.0125) (chlorines and sulphates) to PLN 124.56 (EUR 31.14) (the most hazardous substances e.g. mercury, cadmium, lead)	PLN 459.8 million (EUR 115m) in total from water management and water protection fees in 2014	Revenues go to National (and Regional) Funds of Environmental Protection & Water Management and local governments. Funds are earmarked for environmental protection investments	Wastewater treatment and water protection have greatly improved in past 40 years; wastewater fee has contributed, but infrastructure investments have also played a role; impact of fee hard to quantify
Portugal	Water stress	**Water Resources Fee**	Established in 2008 and subsequently reformed. The TRH covers different economic sectors under various components. It has been criticised for its design and lack of transparency.	Base value varies by economic sector and component	Higher base values applied following 2014 reform	EUR 30 million (2012)	Yes	Not clear, limited impact due to low price
Portugal	Biodiversity & land use	**Ecological fiscal transfers**	EFTs are transferral of funds from the national government to municipalities with Natura 2000 and protected areas, to compensate them for the associated management and opportunity costs.	n.a.	5% of the General Municipal Fund is transferred to municipalities in proportion to the presence of Natura 2000 or protected areas in their territory.	EUR 53 million in 2008.	Not earmarked (the municipalities can decide how to use the EFT).	Not estimated yet. In general, the instrument lacks visibility and therefore it does not represent a strong motivation towards conservation.

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
Romania	Waste, resources & circular economy; Marine litter	**Packaging charge**	A charge to make producers responsible for the packaging waste they generate, included in the law on the Environmental Fund	RON 5,000 (EUR 0.11) per kg of any packaging material (2000)	RON 1 (EUR 0.22) per kg of non-recovered packaging material (2005); RON 2 (EUR 0.45) per kg (2009 to present)	Around EUR 5-7 million per year (2011-2015); over EUR 50 million in 2016 to correct inaccurate reporting in 2014 and 2015	All revenues to Environmental Fund. Not earmarked, but EUR 333 million spent on waste management projects (2005-2016)	Packaging waste generation fell from 1.14 million tonnes (2005) to low of 0.97 million tonnes (2010), 1.06 million tonnes in 2012; recovery rate increased from 25% (2005) to 57% (2012)
Slovakia	Air pollution	**Air pollution fees**	Air pollution fees have been in place since the late 1960s. Despite changes in the early 1990s, the environmental impact and incentive effect remained limited. Industry is a powerful stakeholder which has influenced the legislation process on several occasions	1998: **PM_{10}:** SKK 5,000/t; **SO_2:** SKK 2,000/t; **NOx**: SKK 1200/t	2008: **PM_{10}**: EUR 165.96/t; **SO_2:** EUR 66.38/t; **NOx**: EUR 49.79/t	EUR 11.6 million in 2015	Partially (fees from large and medium sized sources to Environment Fund, fees from small sources to municipal budgets)	Limited by low level of fees.
Slovenia	Biodiversity & land use	**Payments for private forest management**	Public subsidies to private forest owners to support sustainable forest management.	Full cost of plants for artificial regeneration; 30-50% of the costs of plants and work for natural regeneration; 20-50% of the cost of plants and work for forest tending; 20-90% of the extra costs of preventative measures for	20-40% of the cost of plants and work for artificial regeneration; 30-50% of the costs of plants and work for natural regeneration; 30-50% of the cost of plants and work for forest tending; 30-90% of the extra costs of preventative	In 2014 the programme paid EUR 0.16 million from tending in private forests (only 9% of the needed budget).	n.a. (the instrument is a subsidy and not a tax)	Silviculture work has been decreasing after 2006.

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
				forest protection; 30-90% of the cost of work and material for other preventative measures.	measures for forest protection; 30-90% of the cost of work and material for other preventative measures; 50-70% of the cost of work and material for maintenance of wildlife habitats.			
Spain	Air pollution	**Tax on fluorinated greenhouse gases**	The tax on F-gases was adopted in 2014 to address the limited efficiency of previous charges applied on F-gases in industrial processes. The high costs of Spain's GHG emissions and pressures from EU and domestic stakeholders for a green tax reform supported the adoption of the tax.	Tax rates set on a weight basis (per kg of gas) in proportion to global warming potential 150 and 4300. For F-gases with warming potential above 4300, a constant tax rate of EUR 100/kg applied Reduced rates applied during transitory phase (2014-2016)	Tax rates can be modified yearly through Annual Budget Law	EUR 66 million (2015)	No	Difficult to isolate impact given recent adoption. Tax may have helped consolidate existing declining trends in emissions
Spain	Biodiversity & land use	**Mature forest payments in Girona province**	A programme that finances conservation of mature forests in Girona province, Spain. It was established as a public forestry aid call complemented	n.a.	n.a.	EUR 18,495 for stumpage acquisition (EUR 6,930 for public forests and EUR 11,565 for private owners) +	n.a. (the instrument is a subsidy and not a tax)	The land covered increased by 82% in 2015 (from a little more than 1,000 ha to 4,475 ha), thanks to the fact that Selvans was established as

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
			by sponsorship from private donors aimed at financing the stumpage acquisition of public and private mature forests. This initial programme was split in 2013 into a public subsidy to mature forest and the Selvans programme, financed by private donors and managed by the NGO Acciónatura.			estimated additional investments of EUR 17,356.		a stand-alone project, managed by the NGO Acciónatura.
Sweden	Air pollution	**NOx fee and SO_2 tax**	As part of a wider tax shift programme, an ETR package was adopted in early 1990s, which included taxes on SO_2 and NOx. Both taxes have reimbursement mechanisms to regulated entities and have contributed to a substantial decline in emissions.	**SO_2 tax:** SEK 30/kg sulphur for solid fuels; SEK 27/kg for each thousandth of sulphur content by weight in oils **NOx fee:** SEK 40/kg NOx emitted for all types of fuel	**SO_2 tax:** Same rates since introduction **NOx fee:** 50 SEK/kg NOx emitted for all types of fuel	SO_2 tax: decreased from SEK 187 million (1993) to approx. SEK 10 million (2014) NOx fee: revenues increased from SEK 501 million (1995) to SEK 794 million (2011)	Not earmarked but recycled to affected industries	Taxes and regulations have contributed to a substantial decline in emissions of NOx and sulphur.
Sweden	Water quality; Biodiversity & land use	**Fertilizer tax**	A tax on mineral fertilizers from 1984-2009, based on nitrogen and phosphorus content, with cadmium present in phosphorus replacing the latter from 1994. The tax is no longer in place.	SEK 0.30 (EUR 0.03) per kg of nitrogen (N) (1984), SEK 1.20 (EUR 0.12)per kg of phosphorus (P) (1993), SEK 30 (EUR 3) per gram of cadmium	Abolished in 2009 (rates at that time were SEK 1.80 (EUR 0.18) per kg N (since 1994), SEK 1.20 per kg P (since 1993), SEK 30 (EUR 3) per gram cadmium)	Around SEK 350 million (EUR 30m) from 1994 to 2009; annual revenues relating to cadmium did not exceed SEK 3.7 million (EUR 0.37m)	No formal earmarking; most revenues from 1984-1994 used by National Board of Agriculture for research and environmentally orientated	Some reduction in excessive fertilizer applications; increased substitution (e.g. organic fertilizer). Tax estimated to have lowered optimal fertilizer dose. Estimated net reduction in N

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
							projects; from 1995, revenues to national treasury	leaching of 6% (10,000 tonnes per year). Cadmium content per tonne of P fell from 25g to less than 10g from 1995-2000.
UK	Waste, resources & circular economy	**Landfill tax**	A tax per tonne of waste deposited, with two rates (lower for inert waste, higher for non-inert waste)	GBP 2 per tonne for inert wastes ('lower rate'), GBP 7 per tonne for non-inert wastes ('standard rate') (1996); standard rate GBP 10 per tonne and annual GBP 1 increase announced (1999); standard rate annual increase raised to GBP 3 (2005); standard rate annual increase raised to GBP 8 (2007)	Lower rate GBP 2.65 per tonne, standard rate GBP 84.40 per tonne (2016); rates from 2015 to increase in line with inflation; minimum 'floor' standard rate of GBP 80 until (at least) 2020	Around GBP 400 million in 1997-98, peaking at GBP 1.2 billion in 2013-14, around GBP 900 million in 2013-14	Most revenues go to the general budget; some (around 10%) earmarked for investment in related environmental bodies through Landfill Tax Credit Scheme and more recently the Landfill Communities Fund. The landfill tax enabled a tax shift: a reduction in employers' National Insurance Contributions.	'Standard rate' waste landfilling has fallen from around 50 million tonnes in 2001-02 to around 12 million tonnes in 2015-16
UK	Waste, resources & circular economy	**Aggregates levy**	A tax per tonne of sand, gravel and rock, applied at the point of first sale or commercial use of the material	GBP 1.60 (EUR 2.63) per tonne of aggregate (sand, gravel and rock) (2002)	GBP 1.95 (EUR 2.45) per tonne (2008); GBP 2 (EUR 2.76) per tonne (since 2009)	Annual revenues GBP 250 – 350 million (EUR 410-430 million); GBP 356 million (EUR 490 million)	From 2002-2011, GBP 35 million (EUR 57 million) per year earmarked to a fund for projects to mitigate environmental impacts of	Intensity of primary aggregate use in construction sector has declined dramatically, but unclear how much of this attributable to the levy

Country	Env. theme(s)	Instrument	Overview	Rate		Revenues		Impacts
				Year of introduction	Current	Amount	Ear-marking	Env. effectiveness
						expected in 2015-16	quarrying. No earmarking since	

ANNEX 2: ADDITIONAL INFORMATION ON MODELLING EXERCISE

As part of the study, Cambridge Econometrics undertook a modelling exercise on six instruments across the five project themes. The aim was to assess the macroeconomic impacts of each of the six instruments if applied across the 28 EU Member States. This annex provides additional detail on the modelling of each instrument, to support the summaries presented in each thematic chapter.

The modelling exercise used the E3ME model[51]. This is a computer-based model of the world's economic and energy systems and the environment. Its key features include:

- The close integration of the economy, energy (and raw materials) systems and the environment, with two-way linkages between each component;
- The detailed sectoral disaggregation in the model's classifications, allowing for the analysis of similarly detailed scenarios;
- Its global coverage (59 regions), while still allowing for analysis at the national level for large economies;
- The econometric approach, which provides a strong empirical basis for the model and means it is not reliant on some of the restrictive assumptions common to CGE models; and
- The econometric specification of the model, making it suitable for short and medium-term assessment, as well as longer-term trends.

The instruments modelled were:

- An **air pollution tax**, based on existing air pollution fees in Sweden;
- A **landfill tax** of EUR 80 per tonne, introduced in 2017 and growing in line with inflation over the period to 2030;
- An **aggregates tax**, based on an existing aggregate levy in the UK (EUR 2.76 per tonne of aggregates); and
- A **wastewater fee**, based on an existing wastewater fee in Poland;
- A **water abstraction charge**, based on an existing water abstraction charge in France; and
- A **fishing sector tax**.

[51] For more information on the E3ME model please visit www.e3me.com.

Air pollution tax

Scenario description

This scenario is based on existing air pollution fees in Sweden. A general tax rate of around EUR 1 per kg is applied to SO_2 and NOx emissions from fuel combustion (coal, oil and gas) that come mainly from power generation, road transport and some small amount from combustion in industries.

The air pollutant tax is introduced from 2017 onwards in all EU Member States. The rate is assumed to increase with inflation up to 2030. An additional scenario is included to show macroeconomic impacts if all revenues from this tax are used ('recycled') to reduce labour costs to industries through lowering employers' social security contributions.

The E3ME baseline is consistent with the future trends published by the European Commission[52]. Our scenarios results are presented as differences from the baseline.

Modelling results

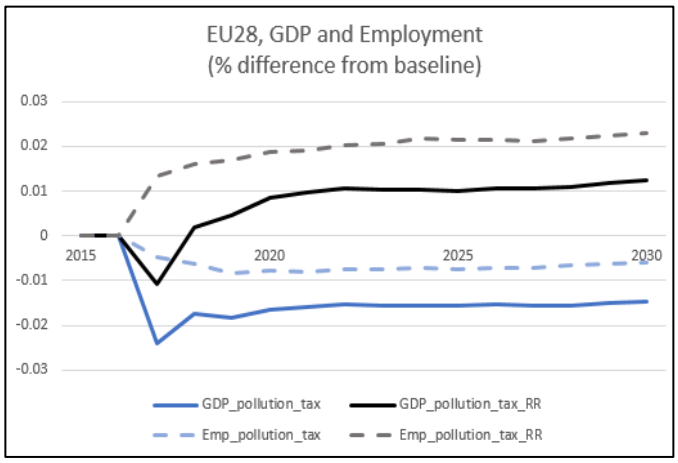
The E3ME results show small negative GDP impacts from the air pollution tax (without revenue recycling). The SO_2 and NOx tax has the same effects as a tax on fuel consumption since these emissions are associated with fuel combustion. In the power sector, higher costs are passed on to electricity prices (although the increase is estimated to be very small, around 0.5% or 0.1 cent per kWh on average). Households and industries also face marginally higher costs when using fuel for road transport and other purposes.

The negative GDP impacts come mostly from reductions in consumer spending and export loss. At the same time, the trade balance is helped by reduction in fossil fuel imports from outside the EU. When revenues are recycled, the model shows a double dividend from the air pollution tax: positive GDP and employment while reducing emissions. The reductions in emissions are, however, small. This could partly be explained by the low rate of the tax in the scenario (compare to the overall costs of fossil fuels). The E3ME model captures price effects and does not include any awareness effects from the air pollution tax. History shows that signalling effects and other measures such as regulations to shut down coal power plants or the imposed limits for exhaust emissions in the European emission standards can be more effective at tackling air pollution.

At sectoral level, utilities, cars and fuel extraction sectors experience the biggest loss in their output while labour-intensive services sectors experience the most gains when revenues are recycled.

[52] *EU Reference Scenario 2016: Energy, transport and GHG emissions Trends to 2050*, European Commission and *The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060)*, European Commission.

The measure is expected to raise around EUR 4.6bn in 2017 and EUR 7.5bn in 2030 (2016 prices).



EU28 sectoral output in 2030, % difference from baseline	
Electricity	-0.18
Gas, steam & air con	-0.09
Manufactured fuels	-0.03
Sale of cars	-0.02
Oil and Gas	-0.02
Textiles & leather	0.02
Arts & entertainment	0.03
Hotels & catering	0.03
Food, drink & tobacco	0.03
Other retail	0.04

Source(s): E3ME, Cambridge Econometrics

EU28 Summary of results in 2030, % difference from baseline		
	With revenue recycling	Tax only
GDP	0.01	-0.01
Consumer spending	0.02	-0.03
Imports (extra-EU)	0.00	-0.02
Exports (extra-EU)	0.00	-0.01
Investment	0.00	-0.01
Consumer price index	0.00	0.04
Employment	0.02	-0.01
SO_2 emissions	-0.18	-0.18
NOx emissions	-0.14	-0.15
GHG emissions	-0.16	-0.17
Revenues from pollution tax (m EUR 2016)	7,502	7,499
Source(s): E3ME, Cambridge Econometrics		

Landfill tax

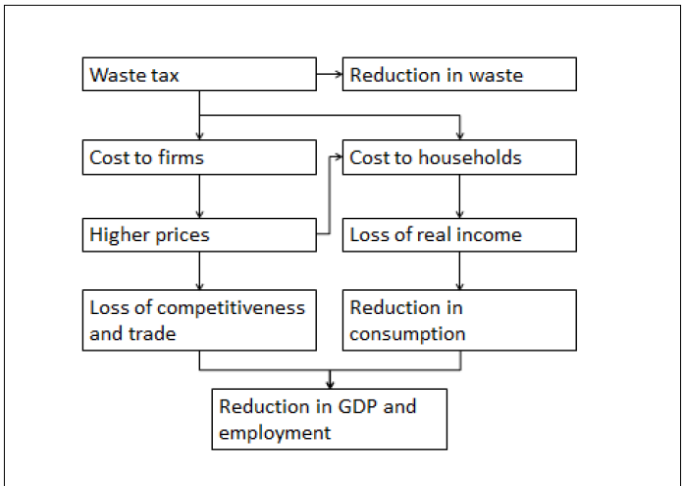
Scenario description

This scenario assumes that a landfill tax of EUR 80/tonne is introduced in 2017 and grows in line with inflation over the period to 2030. The tax is applied to all EU Member States and to all types of waste, including: animal & vegetal and waste; chemical waste; and mixed ordinary waste.

We tested two versions of the scenario. In one version, we assume that the revenues from the landfill tax are recycled back into the economy: 15% of the revenues are assumed to be invested in the waste management sector and the remaining 85% of revenues are assumed to be used to reduce employers' social security contributions. In the alternative version, we assume that the revenues from the landfill tax are not used to reduce other tax rates or to increase current government spending. The baseline scenario for comparison is consistent with the future trends published by the European Commission[53] and assumes that existing taxes are continued.

Figure 18 shows the expected economic feedbacks following the introduction of a landfill tax (without recycling of the tax revenues). The tax leads to a reduction in waste generation, as it becomes more costly for firms and households to dispose of their waste in landfill. The cost of the tax is borne by both firms and households, leading to higher prices. Higher prices for firms lead to a loss of international competitiveness and a worsening of the balance of trade. For households, higher prices lead to a reduction in real incomes and consumption. Both effects would lead to a reduction in gross output and GDP. However, if revenues generated from the landfill tax were used to reduce tax rates (or increase government expenditures) in other parts of the economy, then these negative economic impacts could be negated (not shown in diagram).

Figure 18 Key economic impacts following introduction of a landfill tax



Modelling results

The model results show that the introduction of a new EUR 80/tonne tax on landfill waste across the EU28, would lead to a 35% reduction in waste disposed of in landfill (equivalent to around 50-70 million tonne reduction per annum at the EU28 level). The implied elasticity is based on a review of published literature given in Chapter 4 of OECD (2004)[54]. The large reduction in waste disposed of in landfill is explained by: (i) an increase in recycling and other recovery (accounting for 25% of the reduction in landfill waste), (ii) an increase in waste incineration (also accounting for around 25% of the

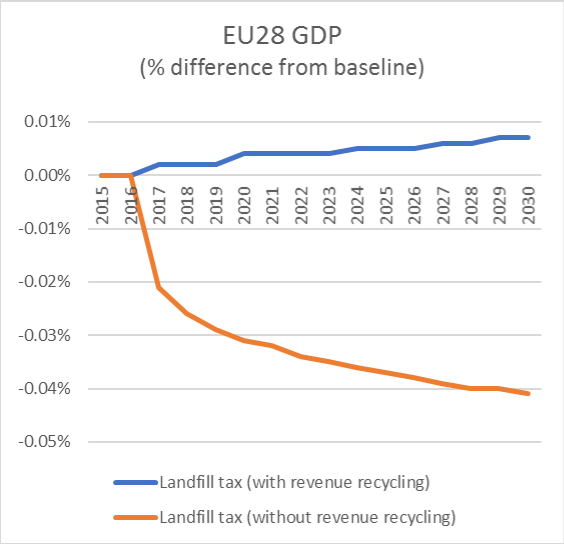
[53] *EU Reference Scenario 2016: Energy, transport and GHG emissions Trends to 2050*, European Commission and *The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060*, European Commission.

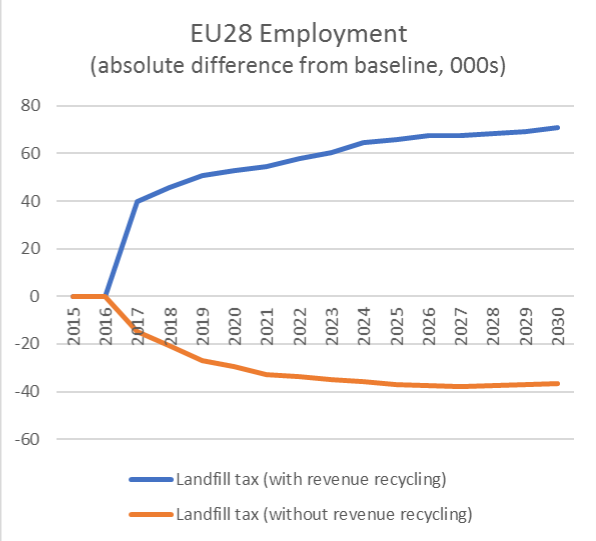
[54] OECD (2004) 'Addressing the Economics of Waste', OECD, Paris.

reduction in landfill waste) and (iii) a reduction in overall waste generated (accounting for 50% of the reduction in landfill waste).

The E3ME modelling results show a small negative impact on GDP and employment in the case where the landfill tax revenues are not used to reduce taxes elsewhere in the economy. At the EU28 level, GDP is around 0.04% lower by 2030 and employment is slightly reduced. This negative economic effect is driven by the higher prices faced by businesses and consumers, leading to a worsening of the balance of trade and a reduction in real incomes and consumption.

In the scenario where the landfill tax revenues are used to increase investment in the waste sector and to reduce employers' social security payments, there are small positive GDP and employment benefits, following a boost to investment in waste services and a reduction in the cost of employing additional workers.





Source(s): E3ME, Cambridge Econometrics.

EU28 Summary of results in 2030, % difference from baseline		
	With revenue recycling	Tax only
GDP	0.01	-0.04
Consumer spending	0.00	-0.07
Imports (extra-EU)	0.01	-0.03
Exports (extra-EU)	0.00	-0.01
Investment	0.05	-0.02
Consumer price index	-0.01	0.02
Employment	0.03	-0.02
Revenues from landfill tax (m EUR 2016)	8,836	8,836
Source(s): E3ME, Cambridge Econometrics		

Aggregates tax

Scenario description

This scenario is based on an existing aggregate levy in the UK (EUR 2.76 per tonne of aggregates, raising approximately EUR 350m or around 0.014% of UK GDP[55]).

A tax of EUR 3/tonne of construction minerals is introduced from 2017 onward to all EU Member States. The rate is assumed to increase with inflation to 2030. An additional scenario is included to show macroeconomic impacts if revenues from this taxation are used ('recycled') to reduce employers' social security contributions at Member State level.

The baseline is consistent with the future trends published by the European Commission[56]. Our scenarios results are presented as differences from the baseline.

Modelling results

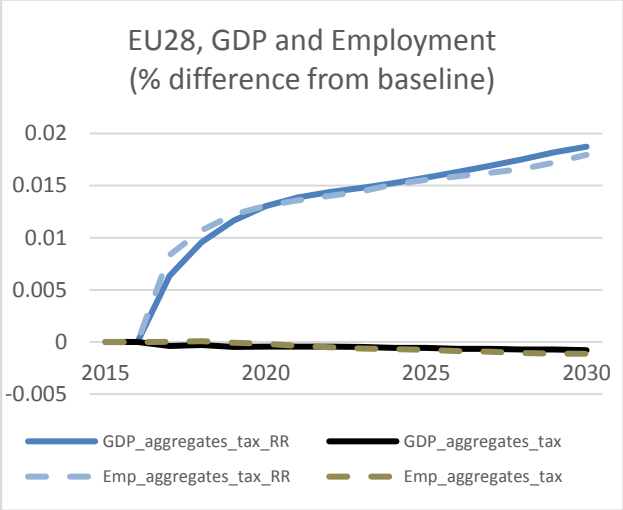
The results show small GDP impacts from the aggregates tax. In the case of no revenue recycling, GDP decrease by a very small amount. The negative impacts come from higher prices of aggregates that the construction sector has to pay, resulting in reductions in demand. The negative impacts are limited because aggregates account for a relatively small share of the construction sector's costs (compared to e.g. labour). At least in the short run, not all the cost increase is passed on. With revenue recycling, the model shows positive GDP and employment results, showing evidence of a double dividend from the environmental tax reform. Domestic Material Input of construction minerals is expected to fall by almost 7% by 2030, compared to the baseline.

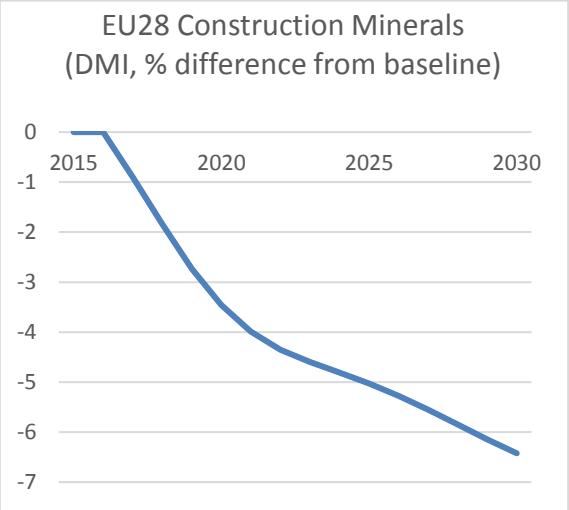
At the sectoral level, the industries that lose out are those that produce aggregates and the extraction sectors. Output in construction itself also falls slightly in response to higher prices. Many other sectors gain by small amounts from higher levels of consumer expenditure; examples include retail, food and drink and hotels and catering.

There is zero net impact on government balances in the case of revenue recycling, because the revenues raised from the Aggregates tax are used to reduce employers' social contributions. The measure is expected to raise around EUR 2bn in 2017 and EUR 4.7bn in 2030.

[55] 2015 figure, Taxes in Europe Database V3, European Commission.

[56] *EU Reference Scenario 2016: Energy, transport and GHG emissions Trends to 2050*, European Commission and *The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060*, European Commission.





Source(s): E3ME, Cambridge Econometrics.

EU28 Summary of results in 2030, % difference from baseline		
	With revenue recycling	Tax only
GDP	0.019	-0.001
Consumer spending	0.031	-0.003
Imports (extra-EU)	0.004	-0.009
Exports (extra-EU)	0.004	-0.001
Investment	-0.001	-0.006
Consumer price index	-0.020	0.004
Employment	0.018	-0.001
Construction minerals raw material	-6.423	-6.425
Revenues from aggregates tax (m EUR 2010)	4,779	4,778
Source(s): E3ME, Cambridge Econometrics		

Waste water fee

Scenario description

This scenario is based on an existing wastewater fee in Poland. The rate varies by pollutant, from PLN 0.05 (EUR 0.0125) to PLN 124.56 (EUR 31.14), raising approximately EUR 115m in 2014 or around 0.03% of GDP.

An average rate of EUR 7.50 per kilogram of pollutants discharged is introduced from 2017 onwards in all EU Member States. The rate is assumed to increase with inflation up to 2030. An additional scenario is included to show macroeconomic impacts if 97% of revenues from this charge are used ('recycled') to invest back into water and waste infrastructure. The remaining 3% of revenues are assumed to cover the administrative costs of the scheme.

The E3ME baseline is consistent with the future trends published by the European Commission[57]. Our scenarios results are presented as differences from the baseline.

Modelling results

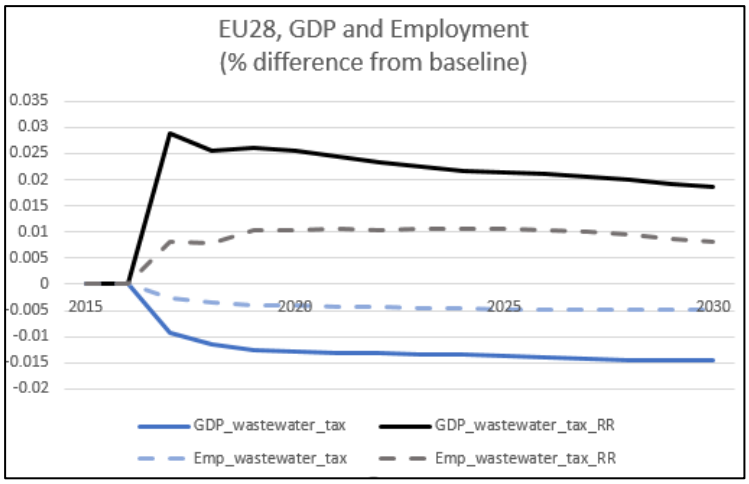
The results show small GDP impacts from the wastewater fee. In the case of no revenue recycling, GDP decreases by a very small amount. The negative impacts come from higher costs to industries that discharge effluents, mainly chemicals and electricity. At least in the short run, not all the cost increase is passed on, but it can still lead to a small inflationary effect for the whole economy, which erodes real incomes and harms competitiveness. Households also lose out from the charges that they must pay directly, so there is a reduction in overall consumer spending.

With revenue recycling through investment in water and waste infrastructure, the model shows positive GDP and employment results, and evidence of a double dividend from the environmental tax reform.

At the sectoral level, output for sewerage and the waste sector falls as demand decreases. The chemicals and electricity sector is directly affected by the charges, which can also adversely affect energy-intensive sectors. Other sectors that are dependent on household expenditure (e.g. retail, hotels and catering) are also likely to lose out slightly. In the revenue recycling case, sectors that are associated with investment, e.g. construction and engineering, benefit from water infrastructure investment.

[57] *EU Reference Scenario 2016: Energy, transport and GHG emissions Trends to 2050*, European Commission and *The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060)*, European Commission.

The measure is expected to raise around EUR 3.9bn in 2017 and EUR 6.1bn in 2030 at EU level (constant 2016 price).



EU28 sectoral output in 2030, % difference from baseline	
Sewerage & waste	-0.03
Other retail	-0.03
Chemicals nes	-0.02
Food, drink & tobacco	-0.02
Electricity	-0.01
Machinery, equipment	0.24
Repair & installation	0.23
Metal products	0.15
Electrical equipment	0.12
Construction	0.07

Source(s): E3ME, Cambridge Econometrics

EU28 Summary of results in 2030, % difference from baseline		
	With revenue recycling	Tax only
GDP	-0.015%	0.019%
Consumer spending	-0.024%	-0.009%
Imports (extra-EU)	-0.01%	0.053%
Exports (extra-EU)	-0.003%	-0.008%
Investment	-0.01%	0.151%
Consumer price index	0.002%	-0.005%
Employment	-0.005%	0.008%
Revenues from wastewater fee (m EUR 2016)	6,086	6,086
Source(s): E3ME, Cambridge Econometrics		

Water abstraction charge

Scenario description

This scenario is based on an existing water abstraction charge in France (rate varies significantly on usage and area, ranging from EUR 0.15 to EUR 100 per thousand m^3). The charge raised approximately EUR 350m in 2011 or around 0.019% of GDP in France.

In the scenario, an average water abstraction charge of EUR 30 per thousand m^3 is introduced from 2017 onwards in all EU Member States. The rate is assumed to increase in line with inflation up to 2030. An additional scenario is included to show the macroeconomic impacts if revenues from this charge are used ('recycled') to invest back into water infrastructure (water pays for water principle).

The baseline is consistent with the future trends published by the European Commission[58]. Our scenario results are presented as differences from the baseline.

Modelling results

The results show small GDP impacts from the water abstraction charge. The negative GDP impacts come from the higher water prices that consumers and industries must pay. The sparsity of the available data meant that it is not possible to estimate econometric equations on water consumption in E3ME. Based on the available applied econometric literature, Cambridge Econometrics has assumed an industrial water demand price elasticity of -0.25[59] and a household water demand price elasticity of between -0.5 and -0.1[60]. The water abstraction charge of EUR 30/thousand m^3 increases water prices by approximately 3%, resulting in a demand reduction of 0.75% for industry and reduction between 0.3 and 1.5% for households.

The water abstraction charge gets applied directly to consumers and businesses, resulting in loss of real income and higher costs to industries. With revenue recycling, these negative GDP and employment results can be minimised from the boost to investment in the water supply industry. At the sectoral level, the industries that lose out are water supply and intensive users of water. In the revenue recycling case, sectors that are associated with investment, e.g. construction and engineering, benefit from investment in water infrastructure.

The measure is expected to raise around EUR 1.9bn in 2017 and EUR 2.8bn in 2030 (2016 prices).

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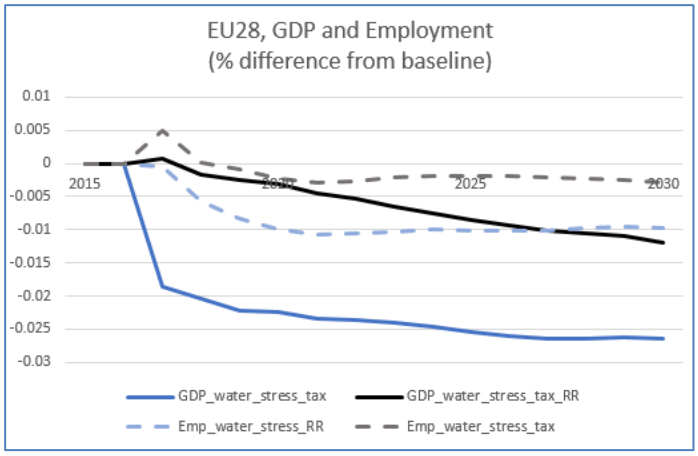
[58] *EU Reference Scenario 2016: Energy, transport and GHG emissions Trends to 2050*, European Commission and *The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060)*, European Commission.

[59] *"Potential for stimulating sustainable growth in the water industry sector in the EU and the marine sector - input to the European Semester"*, Water Industry Final REPORT (2014), European Commission.

[60] *Modelling Household Water Demand in Europe,* JRC Technical Report*(*2015) *,* European Commission.



EU28 sectoral output in 2030, % difference from baseline	
Water supply	-2.21
Sewerage & waste	-0.15
Electricity	-0.03
Textiles & leather	-0.03
Chemicals nes	-0.03
Machinery, equipment.	0.10
Repair & installation	0.09
Electrical equipment	0.05
Manufacturing nes	0.03
Construction	0.02

Source(s): E3ME, Cambridge Econometrics

EU28 Summary of results in 2030, % difference from baseline		
	With revenue recycling	Tax only
GDP	-0.026	-0.012
Consumer spending	-0.043	-0.038
Imports (extra-EU)	-0.016	0.012
Exports (extra-EU)	-0.008	-0.017
Investment	-0.015	0.063
Consumer price index	0.06	0.059
Employment	-0.010	-0.003
Revenues from water abstraction charge (m EUR 2016)	2,821	2,821
Source(s): E3ME, Cambridge Econometrics		

Fishing tax

Scenario description

This scenario was designed to model the macroeconomic impact of a tax on fish catches. A tax on the fishing industry is applied to all EU Member States. The E3ME model does not incorporate livestock data; therefore it is not possible to directly model a tax on fish catches (such as the taxes applied in Iceland's fisheries management system, or Estonia's system of differentiated fishing fees). Instead, a tax on the monetary value of industry output of the fishing sector is used as a proxy for a volume-based fishing tax.

Taxes on fishing industry output were increased by 5% for all EU Member States from 2017 onward. The central scenario assumes that all increases in government revenues are absorbed as an improvement in the government balance; an additional scenario is included to show the macroeconomic impacts of recycling 100% of revenues from this tax increase into reducing employer's social security contributions.

The E3ME baseline is consistent with the most recent future trends published by the European Commission[61]. Our scenarios results are presented as differences from this baseline.

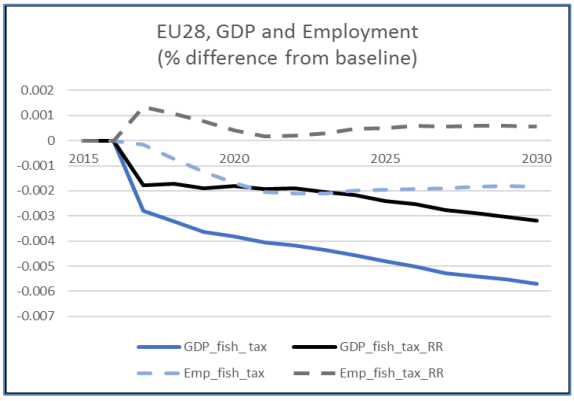
Modelling results

The scenario results show a small negative GDP impact from the fisheries tax, driven primarily by lower consumer expenditure. Employment is also lower in the scenario than the baseline. In the central scenario, a tax on the fishing sector is partially passed through to prices, and ultimately borne by consumers. The increased price of fishing sector inputs to the food sector increases the price of food overall. The price faced by consumers for food products is higher (due to the pass through of the tax); and, since demand for food is relatively inelastic, some household expenditure in other areas is foregone. This decrease in demand for other consumer goods and services causes output (and employment) in these sectors to be lower, reducing overall economic activity.

When revenues are recycled, the negative impact on GDP is smaller than in the central scenario, while employment increases relative to the baseline. Revenues are recycled in the form of reductions to employer's social security contributions. This reduces the cost of labour and therefore increases employment. Increased employment leads to increased demand for consumer goods and services, leading to positive multiplier effects. This dampens the negative effects of the 5% tax on the fishing industry; including the impact on consumer expenditure. In addition, relative to the tax only scenario, output improves slightly for most sectors.

[61] *EU Reference Scenario 2016: Energy, transport and GHG emissions Trends to 2050*, European Commission and *The 2012 Ageing Report: Economic and budgetary projections for the 27 EU Member States (2010-2060)*, European Commission.

The measure is expected to raise around EUR 678m in 2017 and EUR 877m in 2030 (2016 prices).



Source(s): E3ME, Cambridge Econometrics

EU28 sectoral output in 2030, % difference from baseline	
Fishing	-0.17
Food Drink and Tobacco	-0.02
Hotels and Catering	-0.03
Other Retail	-0.01
Other Wholesale	-0.01

EU28 Summary of results in 2030, % difference from baseline		
	With revenue recycling	Tax only
GDP	-0.003	-0.006
Consumer spending	-0.006	-0.01
Imports (extra-EU)	-0.002	-0.004
Exports (extra-EU)	0.00	-0.001
Investment	0.001	0.00
Consumer price index	0.012	0.015
Employment	0.001	-0.002
Revenues from fishing tax (m EUR 2016)	877	877
Source(s): E3ME, Cambridge Econometrics		

Note that the model does not have a feedback loop to estimate the positive impact on stock levels over time from eventual reduced take. This could be expected to lead to increased stock levels and hence future values, which would in turn affect the economic indicators. Evidence for practice in other countries shows fish stock gains over time and hence potential growth in production and earnings. Similarly, as regards sectoral outputs: these also do not take into account expected fish stock gains and hence growth in earnings and/or downward pressure on prices. Other sectors could see improved security of supply of fish with due positive implications on activities.

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