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The implementation
of the Polluter Pays principle
in the context of the Water
Framework Directive

**Delia Sanchez Trancon,
Xavier Leflaive**

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ENVIRONMENT DIRECTORATE

The implementation of the Polluter Pays Principle in the context of the Water Framework Directive

Environment Working Paper No. 238

By Delia Sanchez Trancon and Xavier Leflaive (1)

(1) OECD Environment Directorate

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Keywords: water, polluter pays principle, pollution, diffuse pollution, legacy pollution

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Abstract

This paper examines the challenges and policy imperatives involved in implementing the Polluter Pays principle (PPP) in the context of the Water Framework Directive (WFD). It presents the state of play of the Polluter Pays principle in EU Member States. It also analyses the coherence with other policies in EU Member States, such as agriculture, land planning and industry. Furthermore, it examines the practical limitations of the Polluter Pays principle in relation to diffuse and legacy pollution. Finally, it questions how the principle fits into the Green Deal and future water-related challenges in the EU.

This is the second in a sub-set of four working papers within the Environment Working Paper series destined to support the further implementation of the economic pillar of the Water Framework Directive. The four papers are best read in combination and provide lessons which are relevant beyond the European Union.

Keywords: water, polluter pays principle, pollution, diffuse pollution, legacy pollution

JEL Classification: H23, H54, H76, O21, Q21, Q25, Q28, Q53, Q58

Résumé

Ce document examine les défis et les impératifs politiques liés à la mise en œuvre du principe pollueur-payeur (PPP) dans le contexte de la Directive-cadre sur l'eau. Il présente l'état de l'art en ce qui concerne le principe dans les États membres de l'UE. Il analyse également la cohérence avec d'autres politiques dans les États membres, telles que l'agriculture, l'aménagement du territoire et l'industrie. De plus, il examine les limites pratiques du principe pollueur-payeur en relation avec la pollution diffuse et la pollution historique (ou orpheline). Enfin, il s'interroge sur la manière dont le principe s'inscrit dans le Pacte vert pour l'Europe et les défis futurs liés à l'eau dans l'UE.

Il s'agit du deuxième d'un ensemble de quatre documents de travail, conçus pour soutenir la mise en œuvre du volet économique de la Directive Cadre sur l'Eau. Il est préférable de lire les quatre documents ensemble; ceux-ci sont pertinents au-delà des frontières de l'Union Européenne.

Mots-clés : eau, principe du pollueur-payeur, pollution, pollution diffuse, pollution historique

Classification JEL : JEL : H23, H54, H76, O21, Q21, Q25, Q28, Q53, Q58

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This paper is part of a series of four, developed in the context of a joint project by the European Commission - DG Environment and the OECD Environment Directorate. The project included a series of four thematic workshops on various dimensions of the economic pillar of the Water Framework Directive, convened during the first semester of 2022. A Synthesis workshop drew the threads together. Each thematic workshop was informed by a thematic background note, which was then morphed into a paper. Main features of the discussion were captured in discussion highlights. The discussion highlights of the four thematic projects are compiled in the report *Implementing Water Economics in the EU Water Framework Directive* (OECD, 2023^[1]).

The project and this document were produced with the financial assistance of the European Union. The views expressed herein can in no way be taken to reflect the official opinion of the European Union, the OECD, or their member countries.

Acronyms and abbreviations

CECs	Contaminants of emerging concern
CIS	Common Implementation Strategy
EPR	Extended Producer Responsibility
FD	Flood Directive
PES	Payments for Ecosystem Services
LVC	Land Value Capture
PES	Payments for Ecosystem Services
PPP	Polluter-Pays Principle
PoMs	Programme of Measures
NbS	Nature-based solutions
NWRM	Natural Water Retention Measures
RBMPs	River Basin Management Plans
UWWTD	Urban Wastewater Treatment Directive
WFD	Water Framework Directive
WSS	Water Supply and Sanitation

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Executive Summary

Adopted in 2000, the EU Water Framework Directive (WFD) is the core legislative instrument in the European Union for the protection of water resources. The WFD aimed to achieve good status for all surface and groundwater bodies in the EU by 2015. This concerns over 13 000 groundwater bodies and over 111 000 surface water bodies (e.g., rivers, lakes, coastal waters) (European Commission, DG Environment, 2021^[2]). Under Article 9.1 of the Water Framework Directive 2000/60/EC “*Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs [...] and in accordance in particular with the polluter pays principle*”.

It has been increasingly recognised that to reach WFD, there is a need to more thoroughly apply and enforce the Polluter Pays principle (PPP), for example by setting water charges that cover the full costs imposed by the polluters’ release of pollutants directly into the water (European Court of Auditors, 2021, p. 74^[3]) or indirectly through release into the environment. By more fully applying the principle, polluters are incentivised to avoid environmental damage and are held responsible for the pollution that they cause (European Court of Auditors, 2021^[3]). This is critical to achieving good chemical and ecological status for ground- and surface European waters respectively, in a fair way.

This paper delves into the current state of play in Member States, emphasizing the economic policy instruments that align with the PPP. It sheds light on the challenges, particularly those arising from diffuse pollution sources like agriculture and urban run-off. It explores the complexities of legacy pollution where original polluters might no longer be active. The evolution of the PPP, introduced by the OECD in 1972, is also highlighted. Initially centred on pollution prevention and control costs, the principle’s scope has broadened to encompass costs associated with measures taken to combat pollutant emissions and environmental damage. The document underscores the need for a coherent approach to water management, considering both the PPP and other policy considerations.

Furthermore, it may make sense to explore how the Polluter Pays principle can serve the new level of ambition set by the European Commission and the EU Member States. In particular, the European Green Deal’s “Zero Pollution Action Plan aiming to reduce air, water and soil pollution to levels no longer considered harmful to health and natural ecosystems (the zero-pollution vision for 2050) (European Commission, 2021^[2])”. The Commission did not explore this issue in 2019, in the Fitness Check on the WFD, its daughter directives and the Floods Directive, preceding the launch of the Green Deal in 2020.

In conclusion, this paper serves as a foundation for discussions on enhancing the economic dimensions of the WFD in European Member States. It accentuates the significance of the Polluter Pays principle and outlines the multifaceted challenges and considerations that policymakers must navigate to realise the WFD’s objectives.

1 Background

It has been increasingly recognised that to comply with the WFD, there is a need to more thoroughly apply and enforce the Polluter Pays principle, for example by setting water charges that cover the full costs imposed by the polluters' release of pollutants directly into the water (European Court of Auditors, 2021, p. 74^[3]) or indirectly through release into the environment. By more fully applying the Principle, polluters are incentivised to avoid environmental damage and are held responsible for the pollution that they cause (European Court of Auditors, 2021^[3]). This is critical to achieving in a fair way good chemical and ecological status for ground- and surface European waters respectively.

Going beyond implementation, it may make sense to explore how the Polluter Pays principle can serve the new level of ambition set by the European Commission and the EU Member States. In particular, the European Green Deal's "Zero Pollution Action Plan aiming to reduce air, water and soil pollution to levels no longer considered harmful to health and natural ecosystems (the zero-pollution vision for 2050) (European Commission, 2021^[4])". The Commission did not explore this key issue in 2019, in the Fitness Check on the WFD, its daughter directives and the Floods Directive, preceding the launch of the Green Deal in 2020.

Despite ambitious actions from Member States, in 2018, 26 % of groundwater bodies were yet to achieve "good chemical status", and around 60 % of the monitored surface waters were not in good chemical and ecological status. In 2019, the Fitness Check of the WFD identified hydromorphology, diffuse pollution and atmospheric deposition among the most common pressures to surface water bodies (European Commission, 2019^[5]).

Article 9.1 of the Water Framework Directive 2000/60/EC indicates "*Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs [...] and in accordance in particular with the polluter pays principle*". Member States are required to ensure an adequate contribution to the recovery of costs for water services from the different water uses, disaggregated at least into industrial, agricultural and household sectors; next to the requirement that the water prices provide adequate incentives to efficient water use. The cost recovery arrangements are allowed to take account of the environmental and socio-economic impacts of cost recovery as well as of the specific geographic and climatic conditions of the region in question.

The 2019 Fitness Check noted the mixed results of implementing WFD art 9, specifically recalling the wide variation in cost recovery rates for water supply and sanitation across Member States (European Commission, 2019, pp. 62-63^[5]). Some Member States reportedly manage to finance their water supply and waste water sector almost entirely through revenues from water tariffs, which depending on the cost recovery arrangement it may not be aligned with the Polluter Pays principle, while others rely heavily on the public budget, which is not conform to the Polluter Pays principle. In the consultation informing the Fitness Check, the water sector pointed to the increasing costs of treatment, which are passed on to the consumer rather than being paid for by the polluter. In addition, it has turned out to be difficult to apply the Polluter Pays principle to pollution originating from diffuse sources, for example from agriculture, where it is difficult to assign pollution to specific polluters (European Court of Auditors, 2021^[3]), or to legacy pollution where polluters may not be in business anymore.

To support the workshop discussions, this note examines the state of play in Member States, with a special emphasis on issues related to economic policy instruments in line with the Polluter Pays principle, and

exemptions claimed on the basis of disproportionate costs. It then discusses issues related to the coherence between the Polluter Pays principle and other policy considerations. The final two sections focus on specific challenges, namely diffuse and legacy pollution.

1.1. Proposed discussion questions

The following questions have been identified as key query from Member States to implement the Polluter Pays principle in relation to the WFD:

- Practical obstacles to implement the Polluter Pays principle for water resources management in your country
- Fairness to inform policy considerations and the implementation of the Polluter Pays principle for water resources management
- How the Polluter Pays principle applies for diffuse pollution
 - Equity issues and options to address them at farm level
 - Equity issues and options to address them at catchment level
- The Polluter Pays principle in relation to disproportionate costs
 - Strengths and limitations of the current economic analyses and policy responses
- The Polluter Pays principle within the new Zero Pollution ambition
- Is the Polluter Pays principle fit for the new ambition? Challenges and opportunities.

2 Polluter Pays principle: state of play

This section covers Member States' progress implementing the Polluter Pays principle for water and sanitation services as well as other water uses. In addition, it presents Member States' different experience with water charges. Finally, it addresses disproportionate costs and how they have been addressed across Member States.

2.1. The Polluter Pays principle: a concept evolving over time

At a first sight, the Polluter Pays principle looks straightforward: if you pollute, you bear the costs of your pollution. When it comes to practical implementation, however, some challenges have revealed over the years: what is considered as pollution? Who are the polluters and who should pay? In addition, which costs should be paid by polluters?

The following paragraphs go over the key steps in the definition of the Polluter Pays principle in European water policy, to provide an overview of how the concept has evolved over time.

1972 – Introduction of the Polluter Pays principle in environmental policy

The Polluter Pays principle is introduced by the OECD: it states that polluters should bear the expenses of carrying out the pollution prevention and control measures introduced by public authorities in order to ensure that the environment is in an acceptable state.

Policymakers can use this principle to curb pollution and restore the environment. By applying it, polluters are incentivized to avoid environmental damage and are held responsible for the pollution that they cause. It is also the polluter, and not the taxpayer, who covers the costs created by pollution. In economic terms, this constitutes the “Internalization” of “negative environmental externalities”. When the costs of pollution are charged to the polluter, the price of goods and services increases to include these costs. Consumer preference for lower prices will thus be an incentive for producers to market less polluting products (European Court of Auditors, 2021^[3])

In 1992, the United Nations Declaration on Environment and Development (commonly known as the “Rio Declaration”) included the Polluter Pays principle as one of the 27 guiding principles for future sustainable development (European Court of Auditors, 2021^[3]).

The European Community (now European Union) also articulated the application of the Polluter Pays principle progressively: in 1973 with its Program of action on the environment; in 1975 with its Recommendation 75/436, regarding cost allocation and action by public authorities on environmental matters; and in 1986 with the Single European Act (International Institute for Sustainable Development, 2022^[6]).

2000 – Entry into force of the Water Framework Directive

The Polluter Pays principle is a guiding principle in Article 9 of the WFD Directive:

“Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs, having regard to the economic analysis conducted according to Annex III, and in accordance in particular with the polluter pays principle.”

When wanting to define the perimeter of application of the Polluter Pays principle in water policy, water services are thus a key element to take into consideration. Water services are defined in Article 2 of the Directive as:

“All services which provide, for households, public institutions or any economic activity:

1. abstraction, impoundment, storage, treatment and distribution of surface water or groundwater,
2. waste-water collection and treatment facilities which subsequently discharge into surface water.”

Such definition might allow for the so-called “narrow” interpretation of the Polluter Pays principle: in other words, to comply with the WFD, the Polluter Pays principle must be applied to narrowly-defined water services such as water supply, wastewater collection and treatment. However, this narrow interpretation has been expanded over the following decades.

2003 – Publication of the WATECO Guidance, refining the definition of “water services”

The CIS Guidance No. 1 on “Economics and the Environment - The Implementation Challenge of the Water Framework Directive”, also known as WATECO Guidance¹, provides a view on the interpretation of the definition of water services in the WFD. According to this guidance document, a water service can be considered an intermediary between the natural environment and the water use itself. It states that the purpose of a water service is the modification of the key characteristics of natural or discharged water. This suggests a broader definition of water services and, thus, a broader scope for the application of the Polluter Pays principle; however, the European Commission will not shed further light on the definition of water services for some years ahead (Lindhout, 2012^[7]).

The WATECO Guidance also seems to suggest a wider interpretation of the Polluter Pays principle also in terms of the definition of who is a polluter, i.e. including also users of water services, with regards to the calculation of the recovery rate of costs of water services: ‘the Polluter Pays principle requires that users pay according to the costs they generate (Lindhout and Van den Broek, 2014^[8]). At the same time, the authors also note that from the text in Article 9 WFD and the rest of the Water Framework Directive a broad interpretation of the Polluter Pays principle however is not evidently clear. From a further analysis of the wording of Article 9, they conclude that the user-pays principle and the Polluter Pays principle have to be considered as co-existing principles: users should be charged for water use, where extra costs incurred due to pollution must not be retrieved from users in general, but the user who is also the polluter should be identified.

¹ To be noted: the WATECO Guidance document reflects an ‘informal consensus position on best practice’ of all participants involved in drafting the document, but does not reflect the formal position of any of them. Furthermore, a guidance document is not legally binding for the Member States.

Box 2.1. Setting the boundaries of the PPP: a legal perspective

Over the years, whether the PPP should be given a “narrow” or “broad” interpretation – of a PPP encompassing all environmental issues – has been debated. However, the formulation in the WFD legal text do not equivocally support such a “broad” interpretation. In 2014, Lindhout and Van den Broek reviewed the legal documents on PPP implementation in the context of the WFD, and concluded the following (2014, pp. 56-57^[8]):

“From the text in Article 9 WFD and the rest of the Water Framework Directive a broad interpretation of the polluter pays principle however is not evidently clear. Insofar as one looks at the definitions of pollutant and pollution (Article 2(31) and 2(33) WFD) it reflects bringing substances ‘into’ the environment and not damage by extracting resources from the environment.

As no relation is made to just environmental or resource damage as a result of use (not necessarily pollution) of water, one should be prudent when stating that a broad interpretation of the polluter pays principle is indeed intended.

Also Article 9 WFD is worded in a way that makes it unlikely that the user pays principle (and damages resulting from (non-polluting) use) is included in the polluter pays principle, as the provision mentions that account should be taken of the principle of recovery of the costs of water services, including environmental and resource costs on the one hand, and in accordance in particular with the polluter pays principle on the other hand. This extra emphasis on the compliance with the polluter pays principle (‘in particular’) makes it clear that as water use should be charged (from users), the polluter pays principle needs to be adhered to, i.e. the extra costs incurred due to pollution may not be retrieved solely from users in general, but a user also being a polluter should be identified and in the water cost retrieval this double cost factor needs to be taken into account. If a broad interpretation of the polluter pays principle were intended, this extra emphasis would not be necessary, nor would the explicit mentioning of environmental and resource costs.”

Source: (Lindhout and Van den Broek, 2014, pp. 56-57^[8])

2021 – Widening the scope of the Polluter Pays principle: the Special Report 12/2021 by the European Court of Auditors

The European Court of Auditors published a Special Report with the title: “The Polluter Pays principle: Inconsistent application across EU environmental policies and actions”, which includes a review of Polluter Pays principle application in water policy. The report illustrates, among others, how the Polluter Pays principle has evolved over time in European environmental policy.

Since 1972, the scope of the Polluter Pays principle has gradually increased – yet it remains within the scope of pollution as conventionally defined. The principle initially focused solely on pollution prevention and control costs but was later extended to include the costs of the measures authorities took to deal with pollutant emissions. A further extension of the principle covered environmental liability: polluters should pay for the environmental damage they caused, irrespective of whether the pollution giving rise to the damage was below legal limits (termed “allowable residual pollution”) or accidental (European Court of Auditors, 2021^[3]).

In short: defining the boundaries of the Polluter Pays principle

Based on the evolution described above, in compliance with Article 9 of the WFD and subsequent, related documents, this background document is based on the following orientation:

- The Polluter Pays principle and the user-pays principle are two distinct concepts, which must be both satisfied to comply with Article 9 of the WFD;
- The Polluter Pays principle covers not only the costs of pollution prevention and control, but also the costs of administrative measures related to pollution prevention and control, as well as the costs of environmental liability.

2.2. Economic instruments to address pollution on water bodies and the application of the PPP in the WFD

As stated in Article 9 of the WFD, the Polluter Pays principle underlies the cost recovery of water services, together with the user-pays principle. Although the latter is not explicitly mentioned in the Article, one could see it as a pragmatic “short-hand” for all the “other” environmental principles from the Treaty recapitulated in WFD recital (11) it is the basis of charging for water services.

The Polluter Pays principle is linked to the concept of broad cost-recovery, in the sense that WFD article 9(1) explicitly requires to include environmental and resource cost, and thus to go beyond recouping the financial costs of supplying water services and managing water resources. Some of these financial costs can concern pollution costs. For instance, diffuse pollution from agriculture and transport may pollute freshwater sources, causing higher treatment cost for drinking water than without the pollution. The water tariffs need to cover these additional financial costs. However, the cost recovery principle application would imply that the polluters rather than the drinking water consumers should pay these extra costs.

Hence, adopting a pragmatic approach, “broad cost recovery” can be considered to be fully applied if the revenues from environmental charges and other economic instruments are able to fully finance, next to the costs of providing the water services, the (additional) costs of remedying, mitigating or preventing (qualitative and quantitative) pressures on water resource, including pollution, hydromorphology and scarcity. The PPP application would give further “instructions” on who should pay, as far as the pollution cost are concerned.

EU and national legislators have various instruments to apply the Polluter Pays principle (European Court of Auditors, 2021^[3]), in the context of the Water Framework Directive, we can distinguish:

- **Regulatory and management measures**, including command and control instruments, environmental management systems, labelling and, to some extent, voluntary agreements, having all in common that the onus is put on the polluter without financial support / compensation; and
- **Measures to achieve cost recovery**, including market-based instruments.

As this paper and related workshop has an economic focus, here we will look in particular at measures linked to cost-recovery – or, in other words, at economic instruments. A non-exhaustive list of instruments is provided in Table 2.1. below, the list includes instruments to apply both the Polluter Pays and the user-pays Principle, to clarify the different roles of commonly used instruments. The rest of this paper will clearly focus only on instruments applying the Polluter Pays principle.

Thus, the Polluter Pays principle is supported by pollution charges or other economic policy instruments. It subsumes charges reflecting the Polluter Pays principle in the provision of Water and Sanitation Services (WSS). However, the Polluter Pays principle application can be more than a part of “broad cost recovery.” For instance, the Polluter Pays principle is also applied when polluters, such as farmers, are charged for the use of pesticides and nitrates with the aim of recovering the additional costs of treating groundwater for drinking purposes (European Commission, 2021^[9]). The separate charge reflects the fact that charging these pollution costs via a component of the water tariffs (for WSS) would target the users and would thus violate the Polluter Pays principle.

Table 2.1. Selected economic instruments in the context of the WFD

Category	Instrument	Principle applied	Comments
Tariffs	Water supply tariffs	User-pays principle	
	Wastewater collection and treatment tariffs	Polluter Pays principle	Untreated wastewater would pollute WBs, so the costs of treatment can be seen as the costs of pollution prevention
Charges and fees	Water abstraction charges and fees	User-pays principle	Although this instrument is supposed to cover the resource costs of water abstraction, they often “merely” reflect the operational and capital costs of abstraction
	Water pollution charges and fees	Polluter Pays principle	Including charges on diffuse pollution (see also below)
	Charges on other significant water uses	User-pays principle or Polluter Pays principle	The principle applied depends on the use targeted by the instrument, i.e. on whether it concerns a “water service” as defined in the previous section. Examples are provided in this document.
Voluntary agreements	Payments for Ecosystem Services (PES)	User-pays principle or Polluter Pays principle	The principle applied depends on the use targeted by the instrument, i.e. on whether it internalizes the costs of pollution through direct payments between polluters and affected water services users.
	Other agreements	User-pays principle or Polluter Pays principle	The principle applied depends on the use targeted by the instrument, i.e. on whether it concerns a “water service” as defined in the previous section

Source: Authors.

2.3. Application of the Polluter Pays principle in Member States

The European Commission identified in 2019 that Member States needed to make further progress integrating environmental and resource costs into water pricing: “*While progress had been made in addressing specific pollutants, for many enterprises the price of water does not cover the full costs imposed by the pollutants they release into the water*” (European Court of Auditors, 2021^[3]).

A first way to look at how the Polluter Pays principle is actually implemented in Member States is to look at the instruments currently in place, as summarized in Table 2.2. below.

Table 2.2. Instruments applying the Polluter Pays principle currently in place in EU MS

Instrument	Member States																		
	BE	BG	CZ	DE	DK	EE	ES	FR	HR	HU	LT	LU	LV	NL	PL	PT	RO	SI	SK
Pollution charge/ fee																			
Charge on diffuse pollution	DK	FR	SE																
Other instruments	BG	DK	FR	NL	SI														

Source: adapted from (European Commission, 2021^[9]).

Tariffs for wastewater collection and treatment are in fact instruments applying the Polluter Pays principle, as shown in Table 2.1. It subsumes charges reflecting the Polluter Pays principle in the provision of Water and Sanitation Services (WSS). However, the Polluter Pays principle application is more than a part of “broad cost recovery.” For instance, the Polluter Pays principle is also applied when polluters, such as farmers, are charged for the use of pesticides and nitrates with the aim of recovering the additional costs of treating groundwater for drinking purposes (European Commission, 2021^[9]). The separate charge reflects the fact that charging these pollution costs via a component of the water tariffs (for WSS) would target the users and would thus violate the Polluter Pays principle.

Tariffs for wastewater collection and treatment these were not included in Table 2.2. – and are not discussed in this section – for two reasons: (i) these instruments are in place in all Member States; and (ii) these instruments are designed to recover the financial costs of water supply and sanitation, and are usually designed and charged by WSS operators – whereas the focus of this document is on the PoM as a whole. Thus, it is more relevant to jointly analyse water and sanitation tariffs in the context of the financial cost recovery of WSS, which will be provided as a basis for the workshop specifically dedicated to this topic organized by the OECD as part of this series of workshops.

Pollution charges are a well-established instrument in European Member States, as they are in place in 19 Member States (70% of Member States). However, available information does not allow for understanding whether unitary rates are set based on some economic estimate of the costs of pollution (European Commission, 2021^[9]).

Box 2.2. Taxes on nitrates and/or pesticides

Taxes on nitrates and/or pesticides exist in Denmark, France and Sweden, and these are aimed at reducing pesticides and/or nitrates use. Raising revenues is not the main objective of these instruments, although it is a positive “collateral” effect. The fee is charged on the quantity of phyto-sanitary products used (rates per kilogram); it can be charged either on producers/ importers or on final consumers (farmers), but in both cases the charge is reflected in the final retail price of products – thus promoting use efficiency.

In **Denmark**, the pesticide tax is part of the Danish Pesticides Strategy adopted for 2017-2021. The strategy is focused on four pillars: an approval system for pesticides, the control of substances, the increase of knowledge through research and information and guidance to be provided. Following the introduction of the Danish pesticide tax, sales of pesticides in Denmark have decreased by 31% between 2011 and 2018. In addition to the pesticide tax, the Danish Pesticides Strategy aims to support research on unintended and undesirable effects of pesticides on the environment and human health, and on the promotion of the development and use of alternatives to chemical pesticides. Finally, the Danish Pesticides Strategy supports specific regulations for greenhouses, sites for filling and washing of spraying equipment, and the establishment of protection zones in the vicinity of wells in order to further minimize the risk of water contamination.

In **France**, the fee for diffuse pollution is primarily payable by distributors and sellers of phytosanitary products or treated seeds, it is the purchasers of these products and seeds treated with them who are liable for the fee collected by the water agencies (Source: article L.213-10-8 of the environmental code). €41 million from the diffuse pollution fee is dedicated to financing actions under the "Ecophyto" plan. In 2022, this amount represented 21.9% of the €187.1 million in revenue from the diffuse pollution fee (French Government, 2024^[10]). However, it should be noted that the diffuse pollution fee varies significantly from one year to the next. On average, for the period 2019-2022, this share is close to 26.8% according to the data available to us (French Government, 2024^[10]).

In **Sweden**, the pesticide tax is also based on the weight of the product. In this case, revenues from the tax go to the general State budget and are not earmarked for specific uses.

Although not yet in place, a fee for diffuse pollution from agricultural sources has been proposed by the Minister of Agriculture and Food in **Bulgaria**.

Source: (European Commission, 2021^[9]).

Charges for diffuse pollution – namely, charges on nitrates and pesticides used by the agricultural sector – also fall under the definition of pollution charges; however, the table makes a distinction from other charges for a good reason. As noted by the European Court of Auditors (European Court of Auditors,

2021^[3]), the cost recovery principle is difficult to apply to pollution originating from diffuse sources, for example from agriculture, where it is difficult to identify the polluters. The agricultural sector is often not charged for wastewater treatment, because the majority of the water it uses is not discharged into sewage (and therefore the water is not treated). In the EU, diffuse agricultural pollution from nitrates and pesticides is the main cause of the failure of groundwater to achieve good chemical status. Nevertheless, more than a few European Member States have implemented – or are implementing – charges on diffuse pollution, as it is shown in the box above.

An alternative to a charge on diffuse pollution comes from the Netherlands, as shown in the box below (reported in Table 2.2. under “other instruments”).

Box 2.3. Tradable phosphate right system in the Netherlands

The Netherlands also the only EU country where a tradable phosphate rights system is in place, to ensure that phosphate production from the agricultural sector remains below the phosphate ceiling. It is not a levy or a charge, and thus it is not a revenue-raising instrument – however, it is worth mentioning as an innovative economic instrument to cap and reduce diffuse pollution from agriculture, which correctly applies the Polluter Pays principle.

Source: (European Commission, 2021^[9])

Other charges include, for example, water quality regulation fees and flow continuity disruption charges (European Commission, 2021^[9]).

A second way to ascertain the application of the Polluter Pays principle would be to compare the revenues from pollution and other charges to the costs of the measures. However, this cannot be done – at least for a sufficiently large number of Member States – because of the type of available data, and in particular (European Commission, 2021^[9]):

- Data on revenues from pollution charges are fairly available across Member States, but often these data are aggregated to the data on revenues from abstraction charges;
- Data on the costs of the PoM are clearly available in all Member States; however: (i) not in all Member States these costs are disaggregated per type of measure; and (ii) when disaggregated data are available, these are often disaggregated by sector, which makes it impossible to extract the costs of (all) measures addressing pollution.

In addition, this allows for avoiding overlaps with the upcoming workshop on cost recovery.

Depending on the country, pollution and other charges are collected at the national, River Basin Districts or regional level, accruing public finances – in principle, the same public funding sources that are contributing to the financing of PoMs. In several Member States, revenues from pollution and other charges are earmarked for (co)-financing measures from the PoM. Earmarking is not required for a full application of the Polluter Pays principle, as long as the costs of pollution are recovered by polluters. However, earmarking ensures that revenues from pollution and other relevant charges are re-invested in water management and protection, and it can thus promote the acceptance of such charges.

With respect to pollution charges (and also abstraction charges, although not analysed here) Member States have experience with a variety of arrangements, as shown in Table 2.3. . The classification below does not account for the effectiveness and cost-efficiency of such programmes, as information is lacking (European Commission, 2021^[9]).

Both water abstraction and pollution charges are the main source of financing for Water Agencies in France. Among the taxes allocated to water agencies, six fees relate to water preemption or pollution: the fee for water pollution of domestic origin, the fee for water pollution of non-domestic origin, the fee for the

modernization of collection networks, the fee for water resource extraction, the fee for water storage during low water periods, and the fee for diffuse pollution. In 2022, they represent, across the six agencies, €2,177 million out of €2,232.1 million in fee revenue excluding surcharges. Out of the total revenue of €2,396.5 million for the agencies in 2022, these six fees account for 90.8% and thus constitute the main source of funding (French Government, 2024_[10]). In Bulgaria, revenues from abstraction and pollution charges are received by the Enterprise for the Management of Environmental Protection Activities, the legal state-owned entity at the Ministry of Environment and Waters, which uses them for water management purposes. Similarly, in Croatia revenues from abstraction and pollution charges (the latter is called water protection fee) are collected by “Croatian Waters”, a national body under the Ministry of Environment and Energy, and used for financing of the River Basin Management Plan measures and related operational costs of Croatian Waters.

In one cases, revenues are partly allocated to water management and partly accrue to the general state budget. In the Czech Republic, revenues from the fee for the discharge of wastewater into surface waters may be used to support the intensification and construction of water management infrastructure and to cover the costs of the authorised laboratory selected by the State Environmental Fund of Czech and professionally qualified persons to conduct measurements. Revenues from the fee for the permitted discharge of wastewater into groundwater go to the budget of the municipality in whose territory the discharge takes place, with no specific requirements on how the fee must be used.

In other cases (Hungary, Lithuania, Denmark and Sweden), however, revenues are directed to the general State, regional, local or municipal budgets without being earmarked for water management purposes.

The Table 2.3. below provides an overview of whether revenues from pollution charges are earmarked in those Member States where charges are in place.

Table 2.3. Allocation of revenues from water pollution charges

Revenues go to		EU Member States														
		BG	EE	DE	FR	LT	LU	PL	PT	SK	CZ	LV	NL	RO	HR	BE
Financing water management (or environment)	SW															
	GW															
General State budget	SW	HU*	LT	DK	LV	NL										
	GW															
Regional, local or municipal budgets	SW															
	GW	CZ														
No information/ unclear/ several uses		ES	SI													

* In specific cases, the charge is collected by the local governments of the municipalities, and revenues collected are used for qualitative and quantitative protection of soil and the sub-surface water and groundwater.

Note: Surface Water (SW), Groundwater (GW)

In several cases, revenues from charges on both SW and GW are allocated to the same recipient: in this case, the table shows the MS covering both lines. In LV and NL, revenues from charges on SW pollution are allocated to two recipients (financing water management and general state budget). In CZ, as also shown in the main text, revenues from charges on SW and GW pollution respectively are allocated to two different recipients (financing water management for charges on SW and municipal budget for GW).

Source: (European Commission, 2021_[9]).

Concerning charges on diffuse pollution, in Denmark, revenues of the pesticide tax are used for compensation to farmers and research on pesticides pollution; in Sweden, revenues from the pesticide tax accrue the general budget (European Commission, 2021_[9]).

In France, this and other charges are all used to finance water management, although in different ways:

- Revenues from the navigation fee are used to maintain facilities such as sewage disposal, water points and electricity charging points
- The Hydraulic Fee is paid by all the managers of a structure that abstracts or discharges water on the public river domain as well as the ones, which use its driving force. Revenues are collected by Voies Navigables de France, the institution in charge of managing fluvial transport, contributing to global land and water management in the country, and make up to 25% of its budget
- The diffuse pollution charge is paid by agro-chemical distributors and sellers and collected by water agencies. Around 70% of the revenues accrue to their budget (financing measures to preserve and protect water resources) and 30% are affected to the French Office for Biodiversity to fund the “plan Ecophyto”²
- The “GEMAPI tax” is a local fee for the management of aquatic environments and flood prevention. It is an optional tax and its revenues can only be used for flood protection purposes (European Commission, 2021^[9]).

Overall, revenues from other relevant charges are also allocated to water management in some cases (see for example the case of Netherlands above), although in many cases information on the allocation of these revenues does not appear (publicly) available (European Commission, 2021^[9]).

2.4. Disproportionate costs

“Disproportionate costs³” can be invoked as reason to lower the environmental ambitions under the WFD for three different cases, laid down consecutively in WFD art 4(3), 4(4) and 4(5).

First, WFD art 4(5) allows for “less stringent environmental objectives” for a specific water body than those reflected in the criteria of “good status” when so affected by natural conditions or human activities that the achievement of “good status” would be infeasible or disproportionately expensive. “Good status” can be any of the two status dimensions for surface water (ecological and chemical) and the two for groundwater bodies (quantitative and chemical). However, any call on this “disproportionately high costs” clause needs to respect the following conditions. All the environmentally superior alternatives to achieve the same environmental and socioeconomic needs as served by the human activity of the water body, are disproportionately costly; the authorities should explicitly strive for the highest ecological and chemical status possible for surface water and the least possible changes to good status for groundwater; and further deterioration in the water body should be avoided.

This reduction of environmental objectives on “disproportionate costs,” as foreseen in WFD art 4(5), should not be confused with the effective reduction in the ecological objectives for surface waters at the hand of the conditions of WFD art (4(3)). This concerns the step-down from “good ecological status” to the necessarily less ambitious “good ecological potential,” that arises from designating a water body “artificial or heavily modified.” This designation is only allowed when any alternative to achieve the benefits that motivated the alterations in the water body can only be achieved at “disproportionate costs” and when hydromorphological changes aimed to achieve good ecological status would be incompatible with inter alia the existing navigation, flood protection, irrigation, hydropower generation and water storage activities (as listed in WFD art 4(3) (a)).

² This plan benefits the agricultural sector, directly or indirectly by supporting the reduction of agro-chemicals inputs in the fields, with the exception of roughly EUR 1M destined to amateur gardeners. It illustrates the recycling mechanisms mentioned above. For example, it can finance technical and financial support to farmers aiming to reduce its inputs.

³ For the sake of simplicity, “disproportionate costs” is taken to mean both “technical feasibility” and “disproportionate costs” proper, and where relevant also “natural conditions.”

In addition, WFD art 4(4) has given Member States' authorities the opportunity to postpone achieving good status for some of their water bodies on the grounds of the disproportionate costs of achieving good status by the original deadline of 2015, and this under conditions similar to those mentioned above, including the required avoidance of further deterioration. As the ultimate deadline is in almost all cases the year 2027, thus the end of the programming period of the 3rd River Basin Management Plans (RBMPs), it is clear this provision has largely become moot.

As set out in the CIS Guidance Document N° 20 (European Commission, 2009^[11]), any definition of “disproportionate high costs” implies a comparison to a benchmark cost level in relation to two dimensions⁴:

- (i) *too low net benefits*, i.e. in a comprehensive cost-benefit analysis that takes account of all impacts, the estimated benefits of the planned measures to improve water status are lower than the corresponding costs; and / or
- (ii) *too high cost burden* (affordability), i.e. the costs by public or private subjects exceed their financial capacity, and this cannot be adequately corrected by shifting costs to others.

The Commission's assessment of the second River Basin Management Plans (RBMPs) (European Commission, 2021, p. 181^[12]) reports how often “disproportionate costs” were called upon in this programming period (2015-2021), based on the Member States' reporting in WISE. Reflecting the heterogeneity in hydrological, geographic and economic conditions, there is a wide variation across Member States and status dimension as regards invoking “disproportionate costs” as exemption justification, either for postponement or permanent lower ambition level.

“Disproportionate costs” as argument for a permanent lower ambition level (WFD art 4(5)) appears hardly invoked, with the notable exception of chemical status for surface waters (namely almost 20% of the total), presumably on the account of a few widespread, toxic “forever” chemicals and metals (European Commission, 2021, pp. 9-10^[12]). The contrasts with the higher frequencies with which this argument has been invoked to justify a time extension (WFD art 4(4)), in particular for the ecological status for surface waters (and to a much lesser extent for the other status dimensions). About one third of surface water bodies is claiming a postponement due to technical infeasibility; about one sixth due to disproportionate costs proper and about one ninth due to natural conditions. Notably, for groundwater bodies, these exemptions have played a less important role.

Based on the hypothesis that time extensions would not be provided beyond 2027 and in view of the climate change related stress on water bodies, it is not unreasonable to expect more calls for less stringent ambitions for surface and groundwater bodies and for all status dimensions.

The distribution of exemptions has a lopsided distribution over member states [as well]. Most Member States reported that the share of surface bodies with a time extension to attaining ecological status, varies very widely, namely from over 90% of these water bodies in the Netherlands, Luxembourg, Hungary and Germany to less than 20% for Finland and even below 10% for Latvia (European Commission, 2021, pp. 9-10^[12]). The across-country distribution of the share of surface water with a postponement of achieving good chemical status is even more skewed: for five Member States (Austria, Germany, Luxemburg, Slovenia and Belgium) this share is above 95% and for the other ones below 50%; for over half of the Member States, this share is even below 10%. The share of surface waters with less stringent (permanent) objectives is also quite uneven, despite generally lower share levels: for chemical status it concerns mostly Sweden (and to lesser degree the Czech republic), and for ecological status, the Czech republic, United Kingdom and Italy stand out (European Commission, 2021^[12]).

According to the Commission's assessment of the set of second RBMPs, the justifications for exemptions have remained generic, despite the progress has been made vis-a-vis the corresponding first RBMPs. In particular, the corroboration of “technical infeasibility” claims needs to be better articulated, and

⁴ The authors have not found information on how this benchmarking has been taken up in practice.

“disproportionate costs” arguments underpinning less stringent objectives should be better distinguished from those underlying a delay in reaching good status. The lack of a well-established methodology for determining when costs are disproportionate seems one of the main barriers to produce a solid justification for exemptions.

3 The Polluter Pays principle under the WFD: coherence with other policy considerations

This section explores how coherently the Polluter Pays principle has been applied in the range of Community policies relevant for sustainable water management, and discusses several options aimed at better aligning policy objectives and practices.

3.1. The Polluter Pays principle vis-à-vis policies that potentially affect water quality

European waters remain under significant pressure from both diffuse pollution and point source pollution, as well as from over-abstraction and hydromorphological changes (European Environment Agency, 2018^[13]), Box 3.2 summarizes the key pressures reported in the 2nd River Basin Management Plans.

Box 3.1. Key pressure on European waters

In the 2nd river basin management planning cycle, 40% of surface waters were in good ecological status or potential and 33% in good chemical status. It should be noted that in most Member States, only a few priority substances (e.g. mercury) account for poor chemical status.

Overall, surface water bodies were affected by pressures from hydro-morphological changes (39%), diffuse sources (39%), point sources (17%) and abstraction pressures (7%). The main impacts on surface water bodies include chemical pollution (50%), altered habitats due to morphological changes (37%) and nutrient pollution (27%).

In comparison, 92% of groundwater bodies were in good quantitative status and 82% in good chemical status. Similarly to the surface waters, groundwater bodies were affected by pressures from diffuse sources (25%), point sources (12%) and abstraction (10%). In particular, in the EU, agriculture is the main cause of groundwater's failure to achieve good chemical status, as it leads to diffuse pollution from nitrates and pesticides. The main impacts on groundwater bodies are chemical pollution (13%) and nutrient pollution (9%).

Source: (European Commission, 2021^[9]).

Pressures presented in Box 3.1 result from economic activities as well as households water use and overall behaviour. Sectoral policies can affect these pressures. Therefore, it matters to better integrate the EU's environmental objectives for water into sectoral policies, as concluded in the 2019 Fitness Check (European Commission, 2019^[5]). Policy coherence is essential in ensuring that initiatives taken by different

agencies (e.g. water, agriculture, urban planning and climate) do not have harmful consequences on the status of water bodies and can capitalise on potential co-benefits from improved status.

The Fitness check assessed the coherence of the Commission's water and flood protection policies, in terms of both internal cohesion and in relation with climate and sectoral policies. The main conclusion is that the assessed parts of the water, namely the WFD, the Groundwater Directive (GWD), Environmental Quality Standards Directive and Floods Directive, "form for the most part an internally coherent package." This internal coherence is important as pollution issues tend to fall into the scope of multiple regulations within the water acquis. For instance, sewage overflows caused by flood rains and flooding are an important cause of water pollution. The Fitness check identified one important issue, though, namely that national policy responses to chemicals polluting water varies more than can be explained by national circumstances (European Commission, 2019^[5]).

Another conclusion of the Fitness check is that the cohesion with other policies can be improved. The assessed water directives "are largely coherent with and complementary to the EU's wider climate and environmental policy, even though there is still room to increase synergies and streamline implementation." The major area for improvement appears to be the interaction with the EU chemicals legislation. Notwithstanding improvement over time, the Fitness check concluded that cohesion issues between water and sectoral policies still hinder the achievement of the water acquis objectives, specifically in the areas of agriculture, energy and transport. The mainstreaming of water policy objectives into many of these policies has remained incomplete (European Commission, 2019^[5]).

The European Court of Auditors has come to similar conclusions (European Court of Auditors, 2021^[3]): "that Member States [need] to make further progress integrating environmental and resource costs into water pricing." The ECA pinpoints three major challenges:

- (i) water tariffs for many economic activities do "not cover the full costs imposed by the pollutants they release into the water (European Court of Auditors, 2021^[3]);"
- (ii) diffuse agricultural pollution from nitrates and pesticides significantly contributes to the failure of groundwater to achieve good chemical status (European Court of Auditors, 2021^[3]).
- (iii) there is no policy framework on soil protection and remediation at EU level, while the national policy response vary strongly across Member States. This compounds the fact that the Polluter Pays principle is "difficult to apply in cases of diffuse soil contamination because of the inherent difficulty to attribute liability to specific polluters"; this leads to soil pollution leaking into water bodies (European Court of Auditors, 2021^[3]).

Agricultural policy is a clear illustration of the difficulty of implementing the Polluter Pays principle in relation to diffuse water pollution. The EEA (European Environment Agency, 2021^[14]) has found that the control of diffuse pollution requires action under the [common] agricultural policy, but that regrettably full policy coherence is still a distant objective, despite some progress (European Court of Auditors, 2021^[3]). The issue is revisited in Section 4.

Other domains where coherence with the WFD would ensure more thorough implementation of the Polluter Pays principle for water management include:

- Environmental liability. The Commission's actions to support Member States' implementation of the Environmental Liability Directive did not solve key weaknesses, such as unclear key concepts⁵, definitions and the absence of financial security in cases of insolvency. The EU budget is

⁵ In 2021, the Commission adopted guidelines that clarify the scope of the term 'environmental damage' in the Environmental Liability Directive. These guidelines aim to help Member States to better assess whether damage to water, land and protected species and natural habitats must be prevented or restored by explaining the scope of each of these categories in detail. It provides greater legal clarity and harmonisation of its interpretation and application (European Parliament and Council, 2021^[51]).

sometimes used to fund clean-up actions, that - under Polluter Pays principle - should be borne by polluters (European Court of Auditors, 2021^[3]).

- The Drinking Water and Urban Wastewater Treatment Directives (DWD and UWWTD). The number of treatments is increasing, and their costs are borne by customers through water bills (European Commission, 2019^[5]). On one hand, additional treatments are required to cope with contaminants of emerging concern. On the other hand, small settlements (below 2,000-population equivalent) are not covered by the UWWTD; compliance with the WFD is the way to urge these settlements to invest in wastewater collection and treatment, in relation to the pollution they release and the receiving environment. According to the Fitness Check, while there is no legal incoherence between the WFD and the DWD and UWWTD, (i) the lax implementation of WFD stands in the way of achieving the objectives of the DWD, and (ii) the insufficient implementation of the UWWTD limits how effectively it can contribute to achieving the WFD (European Commission, 2019^[5]).
- The Nitrates Directive. The nitrates directive requires Member States to monitor surface and ground waters and to designate and adopt compulsory action programmes in nitrate vulnerable zones. It refers to water quality goals but focuses on rules only, which are not implemented effectively (Kirschke et al., 2019^[15]). Member States can in theory adopt compulsory measures outside the nitrate vulnerable zones to meet the WFD objective; in practice, this is not often done. Furthermore, there is also some inconsistency between the designation of nitrate vulnerable zones (and sensitive areas under the UWWTD) and the assessment of ecological status. This is because not all Member States link the assessment of 'eutrophication' required by the Nitrates Directive with WFD ecological status (European Commission, 2019^[5]).
- The Common Agricultural Policy relates to environmental questions, but it mainly refers to the existing rules of good practice (cross-compliance for direct payments, additional greening payments and Rural Development Funds) rather than providing the means to further reduce nitrogen application (Kirschke et al., 2019^[15]) and sanctioning. The Commission considers that the Polluter Pays principle is implemented in the Common Agricultural Policy through the sanction system of cross-compliance (European Court of Auditors, 2021^[3]). In addition, the Commission indicates other CAP instruments promoting sustainable agriculture that are beneficial for water quality: (i) the mandatory greening component of the direct payments mechanism applicable under the 2014-2020 financial period, (ii) the farm advisory system and (iii) the Sustainable Use of Pesticides Directive as compulsory scope and the agri-environmental payments (European Court of Auditors, 2015^[16]).

Many other sector policies such as climate change, agriculture, water security need to be considered to fully apply the Polluter Pays principle to achieve good water status, as highlighted by the latest assessment of the state of EU waters (European Environment Agency, 2018^[13]). However, appraisal methods to prioritise across sectors when evaluating the Programmes of Measures are lacking (European Commission, 2021^[9]); so are methods to assess recovery of environmental costs.

3.2. How the Polluter Pays principle fits into the new context regarding water pollution control

The application of the Polluter Pays principle merits a new reflection with the current introduction of more ambitious objectives for pollution control, embodied in the zero-pollution ambition, announced in the European Green Deal. In 2021, the Commission adopted a Zero Pollution Action Plan, aiming “*to reduce air, water and soil pollution to levels no longer considered harmful to health and natural ecosystems by 2050, respecting the boundaries with which our planet can cope, thereby creating a toxic-free environment*”. The main objective of the action plan is to provide a compass for including pollution prevention in all relevant EU policies, giving priority to pollution prevention over pollution remediation

(European Commission, 2021^[4]). This is reflected in the so-called “zero pollution hierarchy” reversed pyramid of policy action on pollution. Interestingly, this hierarchy / reversed pyramid remains informed by the Treaty principles on environmental policy, also stated in WFD recital. The Polluter Pays principle has not become redundant or even less important; rather (potential) polluters should incur the costs of preventing pollution rather than the costs of pollution abatement and remediation.

The Zero Pollution ambitions are translated into key 2030 targets for water such as improving water quality by reducing waste, plastic litter at sea (by 50%) and microplastics released into the environment (by 30%) and improving soil quality by reducing nutrient losses and chemical pesticides’ use by 50% (European Commission, 2021^[4]). These targets should be seen as milestones towards the vision of realising a net-zero carbon, clean, circular EU economy by 2050.

In addition, the action plan highlights that the Polluter Pays principle amounts to “assigning the right price to pollution and creating incentives for alternatives,” as they constitute key drivers to stimulate cleaner production and consumption (European Commission, 2021^[17]). Stronger policy integration across sectors as regards in relation to pollution prevention can be reached through numerous initiatives and strategies such as supporting agroecology, organic farming and nature-based solutions (European Environment Agency, 2021^[14]). For example, wetlands can protect communities from floods through increasing water retention, while simultaneously providing additional co-benefits, such as an increase in biodiversity and removal of pollution by microorganisms (OECD, 2021^[18]).

The prevailing context is also characterised by contaminants of emerging concern (chemicals, microplastics, pharmaceuticals, etc.). Emerging concerns can relate to fully new issues, or issues where knowledge and awareness have increased as a result of better monitoring and reporting, or issues related to better understood effects of existing pollutions, such as increased toxicity from the mixture substances, (e.g. endocrine disruption or anti-microbial resistance). Following the logic of the Zero Pollution, the most sustainable solution remains to prevent contaminants of emerging concern from entering the water cycle, in view of: (i) their risk to water resources (EurEau, 2020^[19]) and the ecosystems relying on them and (ii) the potentially high costs of additional treatments to tackle these contaminants to render abstracted water suitable for human consumption. According to the WFD and the Polluter Pays principle, polluters should bear all costs for Contaminants of Emerging Concerns pollution. However, in practice this is not the case. Contaminants of Emerging Concerns test both traditional policy regulations and existing wastewater treatment infrastructure that are not designed to remove them. There are high uncertainties due the diversity of contaminants, their sources and inputs, the impact of combinations of chemicals, and the constant engineering of new chemicals (OECD, 2019^[20]). These practical limitations beg the question of who should pay the extra costs triggered by contaminants of emerging concern, if WFD goals need to be achieved by 2027 and maintained. The European Commission, water utilities and several industries (in particular the chemical industry) explore the benefit and feasibility of financing instruments that target polluters and go beyond water users (such as extended producer responsibility; see below).

Box 3.2. Setting acceptable levels of water risks

By identifying water-related risks, and helping stakeholders agree on acceptable levels for these risks, a risk-based approach can facilitate the process of spreading water risks between uses. For example, there are many regions where available water resources have been over-allocated (from a sustainability perspective) and a more complete understanding of the risks and trade-offs around alternative water uses can help to identify policy options for improving the allocation of water between agriculture, urban, industrial and ecosystem users. In addition, water pollution complicates the allocation of water of alternative uses, as it reduces available water volume and it raises operation and maintenance costs. Of course, this raises significant political economy issues.

Once set, the acceptable levels of water risks should be achieved at least possible cost. Economic instruments, such as charging appropriately for water use and pollution, can help achieve this.

Setting acceptable levels of water risk should be the result of well-informed policy choices taking account of spill-overs into and trade-offs with other related (sometimes conflicting) security objectives – notably food, energy, climate, biodiversity. Efforts to increase energy security and reduce greenhouse gas emissions through biofuel production, for example, can result in reduced water or food security, while objectives to enhance food security can lead to overuse of pesticides and fertilizers, contributing to water pollution. More coherent policy approaches are increasingly being applied in a growing number of countries. For example, shifting agricultural support from direct production and input support to payments that are decoupled from production volumes or support environmental objectives has reduced the incentives to intensify and extend production unsustainably, thereby helping to improve water resource use efficiency and lower water pollution from agriculture.

Water security is about learning to live with an acceptable level of water risk. This requires a better understanding of the risks, ensuring that the level of risk that is used for planning and policy purposes reflects social preferences, and managing risks and trade-offs between risks and across water and other policy objectives at least cost to society.

For example, in France, increasing priority is given to preventive actions over curative actions in addressing the risk of inadequate water quality. This is the case of drinking water, where the protection of water catchments is seen as more cost-effective than end-of-pipe treatment.

Since 1996, the municipality of Lons-le-Saunier (a town of 20 000 inhabitants) identifies water quality risks for each sector (agriculture, industry and households) and sets water quality objectives and measures in the area. The municipality gradually introduced financial aid packages for farmers within a perimeter of 270 hectares (667 acres) of drinking water abstraction points. The aim was to discourage growing maize, make less use of plant protection products, stop using certain products, leave grassed strips, and cover the soil. The cost of such support was EUR 0.01 per m³ of water distributed.

Beyond such local contractual arrangements to encourage farm inputs reduction, farmers are subject to a pesticide tax. The tax, though, does not apply to fertilisers. Pollution charges apply to direct discharges to water from large industrial plants (including large-scale livestock units) based on actual amount discharged. When connected to public sewerage, industry must comply with quality standards for wastewater discharges into sewerage networks.

For households, as it would be very costly to monitor (meter) individuals' emissions, pollution charges are based on estimates.

Source: OECD (2013), *Water Security for Better Lives*, OECD Studies on Water, OECD Publishing, Paris, <https://doi.org/10.1787/9789264202405-en>.

3.3. Extended producer responsibility

Extended producer responsibility (EPR) is a regulatory approach whereby a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle. It aims to make producers responsible for the environmental impacts of their products throughout the product chain. It has a positive track record in the domain of solid waste, where it has relieved the burden on municipalities and taxpayers for managing end-of-life products, reducing the amount of waste destined for final disposal, and increasing rates of recycling (OECD, 2016^[21]). In relation to the Polluter Pays principle, depending on the context, it may be hard to disentangle the respective responsibility of consumers (as they actually dispose of the product) and producers. Policy makers can shift the balance between producers and consumers responsibility for reason of transaction costs, as incentive to promote the circular economy (which is not a pollution argument), and for political economy considerations. Note that EPR is more than a financing instrument: its ambition is to address the source of pollution by promoting innovation in an industry. It endeavours to stimulate an industrial eco-system to minimise pollution and the costs of its control.

In the context of water pollution control, this policy provides an opportunity to abate and prevent the pressures on water quality and ecosystems such as from pharmaceutical residues. In the context of solid waste management, EPR schemes have urged pharmaceutical companies to arrange and finance collection schemes for unused pharmaceuticals. This EPR arrangement can be interpreted as applying the Polluter Pays principle, through assuming that producer and consumer are jointly polluters: the producers carry the cost of the collection scheme, whereas consumers the "costs" of the effort of bringing the unused medication to the pharmacy. The allocation of costs between the two if not based on Polluter Pays principle, but rather related to setting the right incentives to collect waste. In some countries where the schemes are in place, collection is free of charge for discarded pharmaceuticals, but has a fixed fee for electronic durables (fridges, TVs, etc.).

The example shows the intricacies of attributing the responsibility for pollution, effectively deciding who the polluters are, and how to target and design incentives. Clearly, policy makers have some discretion in making such attributions, allowing to take into account the precise context. EPR needs to be considered with regulatory instruments such as bans, permits and product requirement regulations.

The advantage of EPR is that it takes some of the burden off public authorities (national and local) and requires industry to figure out - and finance - cost-effective solutions to address harmful consequences of their product, or activity during or after its use. Depending on market conditions, companies can internalise the costs, pass them in the price of the product or service, or compensate through efficiency gains (OECD, 2019^[20]) or increase efforts to find environmental-friendly alternatives.

EPR schemes may also be a policy option to contribute to financing the upgrade of wastewater treatment plants to remove Contaminants of Emerging Concerns. In relation to the Polluter Pays principle and the WFD, producers of Contaminants of Emerging Concerns could be required via an EPR scheme to pay or contribute to the capital costs of upgrading wastewater treatment. In that case, there is still the choice whether or not the capital costs of the upgrade should be included in the wastewater discharge fees (for companies and for consumers). According to WFD article 9 (1), EPR should not cover operation costs. As illustrated in Box 3.3 Lessons can be learned from on-going discussions in Germany to inform an EU-wide reflection on the relevance and feasibility of EPR schemes to address pharmaceutical residues in freshwater systems. A range of options may be considered, including ones based on a simplified approach, inspired by the EPR schemes developed for solid waste management (OECD, 2020^[22]).

As mentioned above, an EPR goes beyond financing the investments of upgrading wastewater treatment. It can encourage an industry to come up with preventive source-directed and use-orientated measures, all along the life cycle of the industry and product. Such measures may include incentives for the design of green pharmaceuticals, sustainable public procurement with environmental criteria to limit pollution, and improved diagnostics and restrictions on the inappropriate or excessive consumption of pharmaceuticals

with high environmental risks (OECD, 2020^[23]). In addition, the chain approach to pharmaceutical residues in water in the Netherlands (Box 3.4), where EPR was applied, illustrates how social and environmental justice can be conveyed through this approach.

Box 3.3. Towards an EPR scheme to recover costs of advanced wastewater treatment in Germany

In Germany, the central government initiated a national dialogue on emerging pollutants (including pharmaceuticals) in water in 2017. In the face of increasing use of pharmaceuticals causing a rise in pharmaceutical residues in waters, the introduction of advanced (fourth stage) wastewater treatment for agglomerations above 5000 people is being discussed, amongst other possible policy solutions.

The cost of upgrading wastewater treatment plants serving a population over 5000 persons in Germany with an advanced (fourth level) treatment has been estimated to cost €1.2 billion per year or €15.20 per person per year. This would result in a wastewater tariff increase of, on average, 14-17%, and come at a total cost of €36 billion over 30 years. One financing option proposed is an EPR scheme. Under the proposed EPR scheme, pharmaceutical manufacturing companies operating in a river basin would be obliged to contribute to the cost of wastewater treatment according to their share of pollution (following the Polluter Pays principle under the WFD). The EPR scheme is proposed to operate as follows:

- Establishment of a national water fund and coordination unit to manage the scheme
- Wastewater utilities install advanced (fourth treatment) stage at wastewater treatment plants if the following two conditions are realised: i) environmental quality standards (EQS) are exceeded for one or more substances in a water body receiving wastewater discharge (the list of substances with an EQS is expanding, as is water quality monitoring); ii) the polluting companies responsible for the pollution can be identified
- The total costs (capital and O&M costs) of a wastewater treatment plant upgrade are reported to the national water fund coordination unit.
- Each polluting company is obliged to pay for their share of the cost of the wastewater treatment plant upgrades per the units of pollution emitted each year (determined by a pollution coefficient (an indicator of the environmental harm of the polluting substance) and the volume of pollution emitted each year).
- Funds received from polluting companies in the EPR scheme will be distributed to wastewater utilities to refund the cost of advanced treatment.

The EPR financing option has the following advantages:

- It prioritises wastewater treatment plants for upgrades, based on environmental impacts of harmful polluting substances
- It specifies the costs of treatment due to the large polluters allowing to present them with a charge reflecting much more closely their actual pollution (rather than have it pooled with that of smaller polluters) and is therefore in alignment with the Polluter Pays principle and the WFD
- It provides a financial incentive for polluters to invest in less polluting production processes or more sustainable substances/products (i.e. green pharmacy)
- It is less difficult and has a lower administrative cost than financing by way of a levy (tax) on pharmaceutical products.

However, the proposed EPR scheme would require a legally binding obligation from the government for polluting companies to pay.

Source: (German Environment Agency, 2018^[24]).

Going beyond the case of contaminants of emerging concern, EPR could be explored for a range of water pressures that undermine achievement of good status, as a complement to measures required preventing waste generation under Article 9 (1) of the WFD. As stated above, in addition to a fiscal instrument, it is designed to create a momentum and stimulate innovation at industry level.

3.4. Mitigation hierarchy

Mitigation hierarchy is an approach designed to limit, as far as possible, the negative impacts of projects on biodiversity and ecosystem services, which can be used to reach WFD's goals by reducing pollution. It is complementary to the Polluter Pays principle. It involves a sequence of four key actions - avoid, minimize, restore and offset - using the life cycle approach. It contributes to the sustainable management of natural resources by establishing a mechanism to balance conservation needs with development priorities. It focuses on avoiding pollution, instead of creating a new instrument for pollution remediation. This can be achieved by the following order of priority (Cross Sector Biodiversity Initiative, 2015^[25]):

- Avoidance: measures to identify and completely avoid detrimental impacts from the outset, such as careful spatial placement of infrastructure.
- Minimisation: measures to reduce the duration, intensity and/or extent of detrimental impacts (including direct, indirect and cumulative impacts) that cannot be completely avoided.
- Rehabilitation/restoration: measures to rehabilitate degraded ecosystems or restore cleared ecosystems following impacts that could not be completely avoided and/or minimised.
- Offsetting: measures to compensate for residual, significant, adverse impacts that could not be avoided, minimised or restored. Measures to over-compensate for losses can also lead to net societal gains by their contribution to well-being and prosperity.

Mitigation hierarchy provides an opportunity for better implementing and integrating WFD objectives on pollution into sectoral policies. Box 3.4 illustrates a practical case of the chain approach to pharmaceutical residues in water in the Netherlands. In practice, it can be a flexible tool to address the difficult boundaries between regulating polluting acts, requiring the polluter to pay and paying not to pollute. However, in France, the implementation of the hierarchy shows that the first step is neither correctly applied nor well-documented, even if the principles of the mitigation hierarchy have been reaffirmed by the legislation "Reconquest of biodiversity, nature and landscapes" of 2016 by the French Agency for Biodiversity (Eklipse, 2020^[26]).

The life cycle approach provides an opportunity to address distribution costs outside other policies than water and environment sphere. Given the impact of social policies (e.g. retaining rural communities, avoiding land abandonment) on environmental policies, the issue of distribution of costs can be shared across several sectors and stakeholders at different points of the life cycle.

Box 3.4. The Netherlands' "Chain approach" to pharmaceutical residues in water

In the Netherlands, a holistic "chain approach" is being used to address the issue of pharmaceutical residues (both human and veterinarian) in water. The programme started in 2016 and considers the entire supply chain cycle, from the source to the end of the pipe, and supports various stakeholders in their voluntary efforts to reduce pharmaceutical pollution in water. When initiating the programme, four 'rules of the game' were established and agreed upon:

1. patients must keep access to the medicines they need (i.e. medicines shall not be banned),
2. all actions taken in the pharmaceutical chain should have a pragmatic approach and should be aimed at solving problems (measures for the sake of appearances to be avoided),
3. all stakeholders act where they can, within acceptable costs, and
4. stakeholders should not wait for other stakeholders to take the first step

The two main drivers behind the programme were improved water quality and protection of drinking water. It is estimated that 140 tonnes of pharmaceuticals are discharged from wastewater treatment plants each year into Dutch waters. The programme links together the health care and water sectors in the Netherlands. Although striving for the same goals, it quickly became clear that stakeholders were unfamiliar with each other's worlds, pinpointing the importance of cross-sector collaboration. An ongoing discussion is being held about the costs of potential measures and who should pay. This has raised questions regarding the applicability of the Polluter Pays principle and who should be considered the polluter. Is it the patient who excretes the pharmaceutical residues, is it the doctor who prescribed the pharmaceuticals, the pharmacist that delivered them, or the industry that designs and produces them?

A total of 17 possible measures to reduce or mitigate the impacts of human pharmaceutical residues in water has been identified for further investigation. The challenge will be to take measures at all relevant stages of the pharmaceutical chain and to keep the enthusiasm that all stakeholders have shown to date.

Source: (OECD, 2019^[20]).

4 The practical limitations of the Polluter Pays principle: Diffuse pollution

Since the introduction of the WFD, the European Union (EU) has been able to reduce nutrient loads from point sources from industry and urban wastewater treatment, due to the ability to control pollution at source and set emission limits for the industry. Diffuse sources of pollution remain one of the greatest obstacles to achieving “good” status in EU waters. Agriculture remains the predominant source of reactive nitrogen discharged into the environment and a significant source of phosphorus⁶. Other significant sources are wastewater discharges that are not connected to a sewerage treatment system (typically streams from small settlements not covered by the Urban Waste Water Treatment Directive), contaminated soils or abandoned industrial sites (see the next section) (European Environment Agency, 2018^[13]). Surface runoff not connected to treatment systems, atmospheric deposition and rural dwellings can also be important sources. Think of nutrient runoff and leaching from the use of fertilisers in agriculture, atmospheric deposition of nitrogen oxides from energy and transport emissions, and runoff of petroleum hydrocarbons and heavy metals from urban surfaces not serviced by stormwater collection and treatment. The most severe water quality impacts from diffuse sources of pollution occur during storm periods (particularly after a dry spell) when rainfall induces hillslope hydrological processes and runoff of pollutants from the land surface (OECD, 2017^[27]).

In the Commission’s assessment of the set of the second River Basin Management Plans, Member States identified that diffuse pollution affects 38 % of surface water bodies and 27 % of the area of groundwater bodies (European Commission, 2021^[12]).

Monitoring and regulating diffuse pollution is complex because of

- (i) Difficulty measuring the discharge of various pollutants at the level of each polluter⁷. For effective regulation, measurements should factor in the characteristics of the polluter, effluents, soil characteristics and the recipient water body;
- (ii) High variability, both spatially and temporally, making the attribution of pollution sources complex. Changes in the natural geomorphology and flow of water bodies can also have some effects on water quality and the ability of ecosystems to process and retain pollutants (OECD, 2017^[27]);

⁶ The European Court of Auditors published a special report on sustainable water use in agriculture in September 2021. It looks at WFD and how its principles of sustainable water use are applied in agriculture. The audit did not cover diffuse pollution of water due to agriculture. However, it addressed the following questions which are relevant for this background note: does the water price in Member States provide an incentive for agricultural users to use water efficiently? Or, do Member States apply water abstraction controls on farmers? (European Court of Auditors, 2021^[52]).

⁷ Pollution is diffused in a solvent (usually soil) where physico-chemical interactions are location specific and depending on others pollutants concentration.

- (iii) High transaction costs associated with dealing with large numbers of heterogeneous polluters (e.g. farmers, homeowners) (OECD, 2017^[24]);
- (iv) Required co-operation and agreement within and between catchments, and across sub-national jurisdictions and countries (OECD, 2017^[24]).

This has implications for the type of measures that decision-makers can put in place to address diffuse pollution of water resources.

Regardless of the difficulty to track and regulate a large number of polluters, the Polluter Pays principle should be applied when agricultural activities impose environmental harm that affects the quality of the water used by other private and public economic agents, as highlighted by the Court of Auditors (European Court of Auditors, 2021^[3]). Mechanisms to enforce the Polluter Pays principle exist (such as fines by national authorities), but they do not influence the payments that CAP beneficiaries receive (European Court of Auditors, 2014^[28]). The EU legislation stipulates that where a farmer does not comply with the rules on cross-compliance, an administrative penalty should be imposed, based on the principle of proportionality (graded according to the seriousness of the non-compliance committed and calculated as a percentage on the CAP payment) and only be applied where the non-compliance is attributable to the farmer's actions, committed either negligently or intentionally (European Court of Auditors, 2016^[29]). However, the penalties currently applied to farmers for not meeting the cross-compliance requirements⁸ are not calculated based on the cost of the excessive damage caused, for example through exceeding an acceptable regulatory level of pollution. In many cases, they are not proportionate to the seriousness of the farmer's breach of cross-compliance obligations (European Court of Auditors, 2014^[28])⁹.

Under the 2023-2027 CAP, payments will need to comply with statutory management requirements, such as the Nitrate Directive. This supports the WFD's goals and reduces perverse incentives conflicting with the Polluter Pays principle, at least for nitrates, by including environmental goals relevant for sustainable water management with the CAP strategic plans and national measures (European Commission, 2021^[30]).

The WFD faces difficulties at the interface with agricultural policy, especially as regards source-targeted measures (e.g., the efficient use of fertilizer), as these measures affect the 'business model' of farmers. They can produce tensions with farmers, whereas end-of-pipe measures (e.g., wastewater treatment) tend to be more acceptable for polluters, in particular when these measures are publicly subsidised. Note that subsidies comply with the Polluter Pays principle when they are financed from the revenues of the relevant pollution charges; this however is difficult to evaluate in practice. Across countries, source-targeted measures tend to be voluntary and compensated by regional, national or European programmes, which make them politically even more attractive (Wiering, Boezeman and Crabbé, 2020^[31]).

Source-targeted measures tackling diffuse pollution have not been prioritised in the Programmes of Measures, arguably a gap in the WFD's intended response to pressures hindering achieving good status. The European Commission sometimes promotes source-targeted measures, but mostly when these are either conditions for derogation or voluntary measures in a subsidised programme (Wiering, Boezeman and Crabbé, 2020^[31]). This is partly due to a division of labour among environmental regulations: the WFD

⁸ In order to receive EU income support, farmers must respect a set of basic rules. The interplay between this respect for rules and the support provided to farmers is called cross-compliance. Rules farmers are expected to comply with include: (i) statutory management requirements, these apply to all farmers whether or not they receive support under the common agricultural policy (CAP) and (ii) good agricultural and environmental conditions, these apply only to farmers receiving support under the CAP (European Court of Auditors, 2016^[29]).

⁹ No updated information is available on this issue impacting directly the Polluter Pays principle implementation,⁹ the latest information on penalties application only indicates a significant variation between Member States (European Court of Auditors, 2016^[29]).

refers to other Directives, which offer tools and standards for diffuse pollution of nutrients, such as the Nitrate Directive.

An additional difficulty is the absence of an EU legislative framework or specific Directive¹⁰ to protect soil against pollution. Nitrate pollution poses a great risk for the future of groundwater bodies. Vast quantities of nitrates are currently stored in the rocky layers between soils and groundwater bodies. As nitrates slowly travel through the rock, it can take a century or more for the pollutants to reach the groundwater (European Court of Auditors, 2021^[3]).

4.1. Issues with economic instruments to recover the costs of diffuse water pollution

For diffuse pollution abatement and prevention, economic instruments appear a prime candidate under the WFD to cover costs while applying the Polluter Pays principle, but the diffuse pollution's specific features pose distinctive challenges. On the one hand, water pollution charges are difficult to design and implement due to the challenges to monitor pollution contributions from individual farmers; on the other hand, other economic policy instruments (such as charges of inputs) fail to deliver expected results.

In addition, for the agriculture sector, limited assessment of agricultural pressure in order to identify the efforts needed to reach the WFD targets (European Commission, 2021^[12]) may be limiting the implementation of adapted economic instruments. The second River Basin Management Plans include measures aiming to address pressures caused by pollution from agriculture. Measures aiming to reduce diffuse agricultural pollution trigger up to half of the total costs of Programmes of Measures (European Commission, 2021^[9]). However, the 2019 Fitness check (European Commission, 2019^[5]) reports that no exhaustive data are available on the extent of cost recovery for measures targeting diffuse pollution. The Commission assessment report of the set of second River Basin Management Plans notes that only half of the Member States have performed a gap analysis in terms of load reductions for nutrients and pesticides. In addition, the high dependency on voluntary action by the agriculture sector might not lead to an adequate [...] improvement to WFD objectives (European Commission, 2021^[12]). Furthermore, inventories for Priority Substances in the second River Basin Management Plans addressed insufficiently diffuse sources (European Commission, 2019^[5]) which limits the potential development of pollution taxes, users fees and product charges for these substances.

The two sub-sections below discuss these challenges in some further detail.

4.1.1. Practical limits of water pollution charges

A portion of the diffuse pollution cost is covered by water bills when utilities charge for the costs of the treatment necessary to bring abstracted water up to the standard of drinking water, due to its degraded quality caused by diffuse pollution. For example, in France, The costs of decontamination of agricultural nitrates borne by the Public Water and Sanitation Services (SPEA) are estimated to be between €280 million and €610 million [...] the costs related to water pollution by phytosanitary products range from €260 to €360 million per year, which is an order of magnitude equivalent to that of water pollution by nitrogen (The French Ministry of Ecological Transition and solidarity, 2015^[32]). This is not in line with the Polluter Pays principle, as the costs of remediation are covered by domestic water users downstream and not the

¹⁰ Various EU directives and regulations contribute to preventing and mitigating soil pollution, covering the sectors that most pressure soil, such as industry and agriculture. In 2006, the Commission proposed a "Soil Framework Directive" which covered the prevention of soil contamination and degradation and the identification, registration and remediation of contaminated sites. The European Parliament adopted a positive opinion on the proposal, but not the Council. The Commission withdrew the proposal in May 2014 (European Court of Auditors, 2021^[3])

upstream water users who cause the pollution. Therefore, there is an urgent need for policies that promote a better management and efficient use of contaminants so as to minimise the negative impacts and costs of the pollution on ecosystems as well as human health.

The agricultural sector is usually not charged for effluents, because i) the majority of the water it releases is not discharged into sewage (and therefore the water is not treated), but it either runs off into the soil; ii) run-offs from farmland and associated toxicity cannot be measured with sufficient accuracy to serve as basis for emission and pollution charges; and iii) harmful consequences cannot be traced back to individual polluters (European Court of Auditors, 2021^[3]). These three arguments illustrate the difficulty of applying the Polluter Pays principle in practice through pollution charges for diffuse pollution. Only three countries have specific charges in place to address the problem, and another one is planning to implement it. Some options exist, though, to remedy these difficulties, as illustrated in the next sub-section.

4.1.2. Charging inputs of pollutants

Water pollution charges are not the only way to make polluters pay for the environmental cost of water services. Taxing an input rather than pollution itself can lower the costs of tax collection, monitoring and enforcement. Taxes aimed at tackling diffuse pollution at the input rather than at the output side are effective revenue-raising instruments, able to reflect part of the environmental and resource costs. However, due to the taxes indifference to the on-site actual pollution, taxes on agricultural inputs being not volumetric to its application, farmers who try to avoid generating pollution are taxed as much as those who do not, leading to fairness issues, e.g. when spreading slurry on fields.

In addition, the effectiveness of taxation in controlling pollution can be limited because of low price elasticity of input demand. In the short term, high taxes rate are required to achieve reductions. For example, a Danish study calculated that reducing nitrogen use by 30 per cent (which was the Danish Government target to improve water quality) would require a fertiliser tax of 150 per cent of the then-current nitrogen fertiliser tax (OECD, 2020^[33]).

A differentiated tax that takes into account the environmental damage caused by different types of contaminants would be more economically effective. However, given the high administration and monitoring costs involved, a simple uniform tax is often preferred in practice in OECD countries. There are also trade-offs to be considered between a more cost-effective tax targeting environmental damage incurred and a tax levied upstream in the product chain targeting consumption and sale of pesticides and fertilisers that incurs lower overall costs. While governments may be inclined to design the tax to reduce administration and monitoring costs, the costs to society need also be taken into account (OECD, 2020^[33]).

4.2. Options to prevent and recover the costs of diffuse water pollution from the polluters

This sub-section presents a few regulatory, economic and other instruments¹¹ that address diffuse pollution, mainly focusing on the agriculture sector being a key source of diffuse pollution in Member States¹² (European Environment Agency, 2021^[14]). Most of them would target activities outside of the water

¹¹The following section does not aim to be comprehensive as regards the origin of diffuse pollution. Moreover, it does not cover all instruments available. For example, information measures have not been included since they neither imply prevention costs or abatement costs incurred by farmers, such as information campaigns (government or industry associations), training in environmental management, information from suppliers, namely chemical companies producing pesticides and fertilizers and soil, manure and water monitoring.

¹² Instruments for diffuse pollution sources for industry and transport sector are not covered in this document. In many cases, they will require similar instruments than those presented for agriculture: regulatory instruments (banning or

sector, which highlights the need for coherence between water and sectorial policies as indicated in the previous section. A major challenge is to strike a balance between taking source-targeted measures and accommodating for the ensuing economic difficulties for farmers when these measures increase their costs and reduce agricultural inputs.

4.2.1. Regulatory instruments

The following section presents regulatory instruments which have been put in place in some Member States and could inspire actions in others.

Banning environmentally risky farm practices

Regulators can set strict rules to reduce diffuse pollution, for example, imposing buffer zones to waterways. In Norway, regulation forbids fertilizer storage located in areas with a risk of flooding or close to rivers and streams; it also demands enough capacity for manure storing and sufficient area for spreading; it forbids manure spreading in wintertime and on frozen fields (Hovik, 2019^[34]). This instrument is aligned with the Polluter Pays principle, the polluters bear the costs of measures required to prevent and control pollution (or in this case the opportunity costs losses).

Farming inputs and outputs regulation

Farming inputs and outputs can be regulated under a specific set of rules to reduce diffuse pollution. These measures aim to regulate the processing, storage, and use of fertilizers, pesticides and manure as well as soil cover and crops management. Such measures focus on the process of decreasing the use of capital, inputs and outputs pollution relative to land area. This instrument is aligned with the Polluter Pays principle, the polluters bear the costs of measures required to prevent and control pollution (or in this case the opportunity costs lost). For example, having a phosphates-cap on animal production or compulsory disposal methods of farm waste can be required, particularly for manure (European Environment Agency, 2021^[14]). Other measures can include using less than the Nitrates Directive standard and the regular application standards¹³ for organic fertilisers or reducing cattle to prevent nutrients pollution of surface water (Wiering, Boezeman and Crabbé, 2020^[31]).

In Norway, the regulation of fertilizing programme requests each farm an optimal fertiliser use each season in order to avoid nutrient leakages to water and air. This regulation also demands regular soil samples to monitor the level of phosphorus and other relevant substances in the soil (Hovik, 2019^[34]).

The Netherlands introduced requirements for management practices, limiting the use of plant protection products for catch crops which went beyond the minimum required under EU rules (farmers with more than 15 hectares of arable land must devote an equivalent of 5 % of that land to ecological focus areas) (European Court of Auditors, 2017^[35]).

Land planning and management

In specific areas affected by diffuse pollution or with a particular environmental or social value, regulators can put in place land retirement contracts/agreements, land management contracts/agreements or even

limiting pollution emissions from vehicles and industries, increasing stormwater collection rates in urban areas) and economic instruments (pollution taxes on inputs, pollution charges on outputs). However, due to the complexity and diversity of instruments available to address diffuse pollution in the agriculture sector, the authors decided to focus only on this topic.

¹³ Using less than the Nitrates Directive standard of 50 mg/l nitrates or less than the regular application standards for organic fertilisers of 170 kg N/ha (Wiering, Boezeman and Crabbé, 2020^[31]).

rezoning land to exclude agriculture. This instrument is aligned with the Polluter Pays principle, the polluters bear the costs of measures required to prevent and control pollution (or in this case, the opportunity costs lost).

4.2.2. Economic instruments

The following section presents economic instruments which have been put in place by Member States and could inspire further actions in other Members.

Water quality trading

Water quality trading, also known as nutrient credit trading, can be introduced in different forms and guises. Here, it refers to farmers who voluntarily install nutrient-removal practices, which generate nutrient reduction “credits.” A credit is a unit of pollutant reduction usually measured in tonnes equivalent. Credits can be generated by a point source reducing its discharge below the levels required by the regulations in place, or by a nonpoint (i.e. diffuse) source installing best management practices that are different than or in addition to its given baseline. These credits are sold to municipal or industrial facilities like wastewater treatment plants who must meet regulatory obligations to reduce their nutrient discharges. Trading takes place on a watershed level under a pollutant cap (the total pollutant load that can be assimilated by a waterbody without exceeding water quality standards) developed through the Total Maximum Load Process (named Total Maximum Daily Load process in the US system) or a similar type of water quality analysis that produces information on pollutant loadings and resulting water quality conditions.

Water quality trading is aligned with the Polluter Pays principle under the assumption that a total maximum load (daily, weekly or any other time unit) is in place and applies to all trading partners. In this case, load allocations under the total maximum load represents the baseline for trading. To generate tradable credits, a source would need to reduce loadings below the allocation set by the total maximum load. A source buying credits would be able to increase its discharge over what would otherwise be allowed, but only by the amount of the credits purchased from another source (or sources) and subject to other conditions specified in the permit and trading program (EPA, 2021^[36]). Such system is meant to ensure that diffuse pollution is controlled at the least cost. However, compliance and monitoring challenges remain. In addition, not all pollutants are necessarily suitable for trading, this should be considered case by case. For example, in the US, pollutants that cause adverse water quality effects primarily as a result of cumulative loadings that are high relative to the contributions of any individual source are more suitable for trading such as nitrogen and phosphorus than those that exert acute effects over small areas and in relatively low concentrations such as persistent bioaccumulative toxics (EPA, 2009^[37]).

In the United States, several trading and offset programmes have been developed specifically to assist in nutrient reductions. For example, in 2015, the Great Miami River Watershed programme in Ohio for nitrogen and phosphorus contracted 467 agricultural projects generating more than 1.14 million credits over the life of the projects. 1.76 million dollars were paid to farmers for these credits, leading to 626 ton reduction in nutrient discharges to rivers. The programme had estimated costs of more than USD 2.4 million across 3 years (EPA, 2015^[38]).

Financial compensation for good practices

Payment for ecosystems services (PES) can incentivise polluters to change their behaviour. For example, downstream beneficiaries of improved water quality (such as water utilities, industry, city councils and recreational users) pay upstream farmers in return for land management practices that enhance ecosystems. PES are consistent with the PPP when compensating measures support activities to not only reduce pollution but to support ecosystems services. This is the case where dwellers upstream are encouraged to preserve forests or wetlands, to treat water, or mitigate risks of floods or droughts. In the

absence of enhanced ecosystem service, PES can be considered as not in line with PPP, beneficiaries – not polluters – bear the cost of pollution control. PES can raise equity concerns as well, when payments in effect reward polluters while early adopters of good practices do not benefit.

When properly designed, PES can be an efficient and pragmatic mechanism to improve water quality (and quantity) in line with the WFD goals. It distributes costs across several stakeholders, in particular those having economic interest in improving water quality, who tend to be wealthier in the Basin and therefore can finance the measures (individual farmers vs an utility). Payments to reduce diffuse water pollution from agriculture in OECD countries are most common for a reduction or cease in the use of fertilisers and pesticides such as in Germany, for the retirement of arable land, and the establishment of riparian buffer strips like in the United Kingdom. The negative aspect of implementing such mechanisms is the potentially high transaction costs (European Environment Agency, 2013^[39]), to define the ecosystem services, monitor and track progress.

Water utilities (for example in Paris and Munich) compensate farmers who transition towards greener, less water-harmful farming techniques, thereby saving treatment costs before water can be supplied to domestic users. Such programmes can be more environmentally effective and cost-efficient than upgrades in water treatment to remove nutrients and pesticides (OECD, 2017^[27]) and charging the users for the cost increase in the water service.

A conditional grant can be an alternative to PES. It consists of a programme that provides grants aiming to motivate farmers to take environmentally-friendly action. However, this grant is removed, if the farmers do not follow the requirements of a fertilizing programme and pesticide logbook. This instrument is not aligned with the Polluter Pays principle, because polluters do not bear the costs of their pollution. However, it is efficient and pragmatic system to improve water quality which supports the WFD goals. In addition, its conditionally can address, at least partially, concerns of using public funding for funding polluters by supporting their transition to less polluting activities. In Scotland, any farmer can apply for these grants, and anyone that meets the requirements is awarded a grant, see Box 4.1. As an illustration, farmers are required to establish a vegetation zone along rivers and streams (Hovik, 2019^[34]).

Governments can support ‘physical architecture’ investment to reduce diffuse pollution, by providing financial or technical support to farmers installing them. This instrument is not aligned with the Polluter Pays principle, because polluters do not bear the costs preventing or controlling their pollution. However, it is efficient and pragmatic system to improve water quality, which supports the WFD goals. From an economic perspective, this instrument helps institutions to address market failures such as lack of internalisation of environmental costs. Any individual going alone with such investments will lose market share compared to those who do not invest, because farming outputs price will be higher. A wide range of infrastructures can be considered to reduce diffuse pollution at the plot level such as sewage systems for greenhouses or washing places for pesticide sprayers, changing water supply routes in canals and installations to remove phosphate from the water.

Under the 2023-2027 CAP, eco-schemes will be introduced. They are a voluntary payment schemes aiming to incentivise more sustainable farm and land management using direct payments, embedded in the direct payments granted under CAP pillar 1. Direct payment constitutes the largest proportion of EU spending fully financed by EU funds, and there are no limits on how much can be spent. Therefore, eco-schemes could become an ambitious way to address diffuse pollution from agriculture, one of key pressures on environment coming from agriculture, the main origin sector of this environmental problem. To start the process of setting up eco-schemes, Member States must establish a ‘list of agricultural practices beneficial for the climate change and the environment’ based on the needs and priorities they have identified at national and/or regional level. The voluntary commitments can only pay for schemes that go beyond the mandatory basic requirements and standards, according to the conditionality criteria (European Commission, 2021^[40]). Therefore, eco-schemes address the equity concerns about financial support to tackle environmental problems through channelling funding to the (more) “environmental”

farmers, a topic also addressed by the economic instrument discussed in the next section. According to the Commission, the Polluter Pays principle is implemented in the Common Agricultural Policy through; inter alia, the sanction system of cross-compliance. In addition, the CAP can directly support practices, investments, in the service of the environment and climate that compensates only for action going beyond relevant legal obligations. However, eco-schemes level of ambition must to go beyond the requirements and obligations established under the baseline (including conditionality) to be able to tackle diffuse pollution (European Court of Auditors, 2021^[3])

Subsidies for sustainable farming practices

Wider uptake of sustainable management practices¹⁴ based on a systematic approach involving agro-ecological principles, organic farming and nature-based solutions is key for reducing diffuse water pollution. Such practices have multiple sustainability benefits, contributing to reducing the magnitudes of the four groups of pressures on water limiting the WFD's goals achievement (European Environment Agency, 2021^[14]). This instrument is not aligned with the Polluter Pays principle, because polluters do not bear the costs preventing or controlling their pollution. However, it is efficient and pragmatic system to improve water quality, which supports the WFD goals. From an economic perspective, this instrument helps to address market failures such as lack of internalisation of environmental costs. Any individual going alone with such investments will lose market share compared to those who do not invest, because farming outputs price will be higher.

Adopting organic production and agro-ecology in farming systems can have a wide range of benefits for water management. For instance, the use of animal manure and nitrogen-fixing crops and the enhancement of soil structure can reduce the consumption of synthetic fertilisers, which in turn reduces the risk of nitrates leaching into surface water and groundwater bodies. Integrated pest management which reduces pesticides inputs, promotes diversification of plant, grassland and animal species at the farm and regional levels. In addition, it reduces the risks of pest and disease transmission and vulnerabilities arising from monoculture practices and farm specialisation (European Environment Agency, 2021^[14]).

For example, in 2018, the French government set up a sector fund, Avenir Bio. It receives an annual budget of €13 million in 2021 and 2022. This fund, covering all elements of the organic value chain, contributes to reducing diffuse pollution from nutrient and chemicals in French water resources. The fund supports partnership approaches on a contractual basis, undertaken over three years, between producer groups and packaging, processing companies or distribution to develop and promote quality in organic production and job creation. It helps support economic players involved in these initiatives, by reducing the tangible/intangible investments costs made within the framework of action programmes.

Box 4.1. Tackling diffuse pollution from agriculture, lessons from Scotland

The WFD was transposed in Scottish national legislation through the Water Environment and Water Services Act 2003. The Scottish Environment Protection Agency (SEPA, a non-departmental public body and environmental regulator) is responsible for enforcing the 203 Act, and, in this capacity, the production and implementation of the river basin management plans.

The Scottish strategy to tackle diffuse pollution builds on three key orientations: (i) the need for a meaningful engagement of stakeholders; (ii) the use of evidence and data in compliance monitoring enforcement; and (iii) the widely shared sense from the sector that shifting to sustainable farming practices is the only way to ensure farmers' livelihood in the longer run.

¹⁴ Sustainable agriculture management practices can reduce agro-chemicals inputs leakage in the environment for example through higher crop rotation, nitrogen fixing plants and crops combination.

A Diffuse Pollution Management Advisory Group (DPMAG) was set up to include a wide range of interest groups. It developed a strategy to reduce diffuse pollution focusing on 14 priority catchments and focus areas. DPMAG responsibilities are clear: SEPA and Scotland's Rural College are in charge of carrying out the national campaign, National Farmers' Union of Scotland and Scottish Land & Estates support them on how to best engage with the agricultural sector, while Scottish Natural Heritage carries out inspections where appropriate.

After the 2003 Act came into force, the Controlled Activities Regulations was established based on three tiers of controls: (i) general binding rules to cover small risks to the water environment; (ii) registrations to control activities for which the environmental impact is predictable and likely to have cumulative impacts; and (iii) licenses to control greater risks to the water environment. This integrated regulatory framework ensures that all activities that can harm water are considered and regulated.

In the first cycle (2009–2015) the two river basin districts in Scotland expected an increase of 6.5 percentage points (pp) and 4.4pp in the number of water bodies with good (ecological and chemical) status from 63.5% and 32.5% respectively. The good performance of the Scotland RBD has continued throughout the second cycle and now SEPA expects a further increase of 6 pp and 16 pp by 2021 and 2027 respectively.

The Scottish approach has been highly cooperative more generally. Since 2001, the engagement with interest groups in public participation was established and maintained throughout the implementation process. SEPA also organised meetings, during two years, with representatives of each policy sector to discuss new regulatory decisions and licenses, where stakeholders were able to bring arguments and evidence to have SEPA proposals modified. These discussions have created support for the adoption of the regulatory framework and reduced conflicts over binding measures through the development of trust between interest groups. SEPA also established a National Advisory Group engaging all key interest groups and providing a mechanism to resolve conflicts arising throughout the implementation process. In collaboration with professional organisations and farmers unions, the Scottish Government and SEPA worked with individual farmers to gain their trust and drive acceptability. Stakeholder cooperation was further enhanced during the second cycle of RBMPs. Consultations have started for the third cycle and participants have confirmed support towards a partnership approach and more integrated approach.

SEPA has developed interactive maps and tools to make the collected data on pressures and water quality more accessible. SEPA has used data and evidence to establish a common understanding of the status of the environment and on the level of commitment required to reduce water pollution. Scientific and photographic evidence of breaches and polluting practices has been presented to the farming sector representatives in dedicated meetings to convince the farming sector that diffuse pollution from agriculture is the main polluting source.

SEPA and the Scottish government have been clear from the outset that they would adopt a strict regulatory approach. Based on the results of the individual farmers' audits, SEPA requires farmers and land managers to adopt measures to reduce polluting activities. In some cases, land managers would have received further support for example through nutrient budgeting. Any issue of non-compliance identified during an initial visit would be addressed through subsequent revisits, followed by fixed monetary penalties if the non-compliance persisted. For the first cycle, the initial visits revealed a compliance rate of 34%. At the end of several rounds of visits, 98% of farmers carried out the required actions.

Source: (De Vito, Fairbrother and Russel, 2020^[41])

5 The practical limitations of the Polluter Pays principle: legacy pollution

Progress towards WFD objectives has been hindered because good status depends not only on mitigation measures to address current pressures but also on restoration measures to address pressures from the past, such as hydromorphological changes¹⁵ and chemical pollution (European Commission, 2019^[5]).

By 2027, WFD's objective of good status has to be achieved in all waters, unless less stringent objectives have been defined (conform WFD art 4(5)). An extension of the deadline for achieving good status is only limited to cases where the "natural conditions" are such that they cannot be achieved by this date, for example, because of legacy pollution¹⁶ in soils, sediments and groundwater. In both cases, further deterioration should be avoided. In addition, the use of this extension still requires that measures aiming to contribute to achieve good status by the end of explicitly defined extension have been included in the third River Basin Management Plans (Carvalho et al., 2019^[42]).

5.1. Issues with legacy pollution

Under the Polluter Pays principle, public funding is permitted when the polluter has not been identified or cannot be held legally liable for financing the remediation (European Court of Auditors, 2021^[3]). For this reason, the Polluter Pays principle is rarely applicable to legacy pollution. Many polluting activities took place a long time ago so that very often polluters either no longer exist, cannot be identified, or are insolvent (European Court of Auditors, 2021^[3]). Under the latter, the party responsible for the pollution still exist, however, declaring itself bankrupt (in many cases because it has to take remediation actions), limits the Polluter Pays principle application and costs fall under the public purse.

Member States have underestimated the scale of the efforts needed to reach good status because restoration measures to address pressures from the past were not always duly considered, and time schedule for remediation was overambitious (European Commission, 2019^[5]). For example, the decontamination of polluted soils (which directly affects water resources) is expensive. In 2006, the

¹⁵ Hydromorphology is the geomorphological and hydrological characteristic of a water body, which is also a condition for its ecosystem. Hydromorphological pressures are changes in the natural water body due to the human need to control flow, erosion and floods, as well as to drainage, river straightening and harbour construction. Good hydromorphological status is a quality element supporting good ecological status. In fact, good ecological status can be defined as the expression of the quality of the structure and functioning of the aquatic ecosystem including: biological, hydromorphological and chemical elements (European Commission, 2006^[53]). Hydromorphological pressures are considered in this note as a pollution.

¹⁶ Legacy pollution refers to contaminants, hydro-morphological modifications, including assets that have been left in the environment by sources that do not longer operate or discharge them, such as a mining industry.

Commission estimated the total cost of cleaning up contaminated soil at €119 billion. The planned expenditure of 12 Member States on groundwater remediation of contaminated sites was €32 billion for a 25 years' period (Commission of the European Communities, 2006^[43]). Public budgets, including EU funds, funded more than 42 % of remediation activities in the EU (European Commission, 2018^[44]).

The EU legislation does not request mandatory financial security for businesses for environmental liabilities such as insurance, bank guarantees, escrow account and bonds which secure in the event of the operator's insolvency, sufficient funds to cover all of the operator's environmental liabilities and available when required. This is a major challenge for the application of the Polluter Pays principle, limiting the degree or eliminating future pollution and current legacy pollution.

The requirements are limited to environmental responsibilities usually in the form of obligations under an environmental permit or other authorisation. Only, two legislation include financial security requirements being the Landfill Directive (1999/31/EC), which requires an operator to have financial security for the closure and post closure (aftercare) of a landfill, and the Extractive Waste Directive (2016/21/EC), which requires an operator to have financial security for closure, including rehabilitation, and post closure of facilities that store extractive waste (Fogleman and LLP, 2020^[45]). Moreover, the Polluter Pays principle is difficult to apply in cases of diffuse soil contamination because of the inherent difficulty to attribute liability to specific polluters (European Court of Auditors, 2021^[3]).

The next section focuses on the issue of financial security (and the lack thereof) as it affects the relevance of the Polluter Pays principle for legacy pollution.

5.2. Issues with corporate financial security

5.2.1. Financial security to address legacy pollution

Lack of financial security to cover environmental liability increases the risk that costs of legacy pollution are borne by taxpayers. Where parties causing the damage do not have sufficient financial security, they might not be able to cover the cost of remediating the pollution they caused. The European Court of Auditors identified remediation projects, worth €33 million, where an operator, identified as the party responsible for the pollution, went bankrupt. As a result, public money had to be used to decontaminate soil and water (European Court of Auditors, 2021^[3]).

The problem of (potential ensuing) insolvency can be addressed through mandatory financial security. Financial security can take the form of an environmental insurance policy, a contribution to an environmental fund, a bank guarantee, parent company and affiliated company guarantees, a bond or an own fund/reserve. In the EU, Member States are not obliged to make this financial security mandatory, however, seventeen Member States¹⁷ require financial security for some or all environmental liabilities beyond requirements in EU legislation for activities associated with waste (Fogleman and LLP, 2020^[45]).

¹⁷ Belgium, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, the Netherlands, Poland and Spain.

Note by Turkey: The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue".

Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Financial security also applies to environmental responsibilities such as the closure and post-closure of a landfill as required by the conditions of a permit¹⁸ (Fogleman and LLP, 2020_[45]). Appropriate financial security instruments, which again are not obtained unless they are mandatory, in this case, include bank guarantees, reserves and bonds. Insurance is not appropriate because it covers fortuities, not certainties (as the expression says: “one cannot get fire insurance for a burning house”). Insurance is only for risks such as closure costs exceeding the estimate for them. Mandatory financial security for environmental responsibilities is less controversial than for environmental liabilities because environmental responsibilities inevitably occur whereas environmental liabilities may never occur (Fogleman and LLP, 2020_[45]).

Under mandatory financial security mechanisms, insurances are predominant within the EU, followed by bank guarantees. For example, Portugal imposes mandatory financial security for all environmentally risky activities identified in the Environmental Liability Directive (ELD)¹⁹. Portugal accepts a wide range of financial security instruments, including insurance policies, bank guarantees, environmental funds and own funds. Portugal did not report any cases of insolvency that prevented the application of environmental liability (European Court of Auditors, 2021_[3]).

Under voluntary financial security (which is the case for most Member States), insurance is the most popular and feasible type of measure (actually, it would prejudice an operator to set aside money in bank accounts, trust funds or similar instruments unless it is required to do so). The main forms are (i) stand-alone environmental insurance policies and (ii) environmental extensions to general liability policies. However, insurance policies for ELD liabilities are not widely available across the EU and appear fully absent in some Member States. Insurances are not generally available to most small and medium-sized as well as many large operators. Actually, their availability does not necessarily correspond to demand, as in some countries availability is high, but demand is low. However, in Member States where financial security for ELD liabilities is mandatory, the obligation of having an insurance drove the development of the insurance market (Fogleman and LLP, 2020_[45]).

The following section presents mechanisms aiming to reduce legacy pollution costs borne by taxpayers, which can inform Member States policy as regards corporate laws, funds and risk sharing mechanisms. As indicated previously, the best strategy to reduce legacy pollution costs remains to avoid future pollution. Therefore, increasing the focus on prevention instead of polluters compensating the cost of remediation will limit future legacy costs. This can be achieved by putting in place mandatory financial security for potential polluters, especially when bankruptcy is an option for industries generating waste, the presence of a financial security can reduce the polluters' waste. For example, compulsory bonds²⁰ for mining companies, covering the full cost of remediation and updated according to waste generated based on

¹⁸ Article 8(a)(iv) of the Directive directs Member States to take measures so that competent authorities do not issue a permit for a landfill unless they are satisfied, among other things, that: adequate provisions, by way of a financial security or any other equivalent, on the basis of modalities to be decided by Member States, has been or will be made by the applicant prior to the commencement of disposal operations to ensure that the obligations (including after-care provisions) arising under the permit [...] are discharged and that the closure procedures required by the Directive are followed. This security or its equivalent shall be kept as long as required by maintenance and after-care operation of the site in accordance with the Directive (European Commission, 2020_[50]);

¹⁹ The Environmental Liability Directive aims at ensuring that the financial consequences of certain types of harm caused to the environment will be borne by the economic operator who caused this harm, to prevent and remedy environmental damage. It provides the financial responsibility of an operator and lays down a framework, based on the Polluter Pays principle. In 2021, the European Commission developed guidelines for the common understanding of environmental damage, with a section focusing on waters concerned under the Water Framework Directive.

²⁰ A firm may pay a cash deposit to government which is released once the firm has met its obligation.

independent verification, can protect governments from remediation liability and ensure efficient waste abatement (European Commission, 2022^[46]).

5.3. Options in line with Polluter Pays principle for legacy pollution

5.3.1. Corporate law as a financial security mechanism

Some Member States have provisions in their corporate law to impose secondary liability²¹ on various persons, such as directors and officers if a company becomes insolvent or otherwise cannot pay to remediate environmental damage caused by it. This mechanism is aligned with the Polluter Pays principle by incentivising businesses with potential polluting activities to avoid environmental damage decisions and holding them responsible for the pollution that they caused by their decisions directly or indirectly. It is also the polluter, and not the taxpayer, who covers the cost of remediation.

Australia and Canada have introduced legislation to ensure that the public does not pay the costs of remediating or preventing further environmental damage when the operator that caused the damage becomes insolvent or otherwise cannot pay the costs (Fogleman and LLP, 2020^[45]), see Box 5.1.

Box 5.1. Extend liability to directors and officers: lessons from Canada.

Ontario, Canada, imposes liability on directors and officers if their company cannot or does not pay to remediate the pollution. Therefore, officers and directors of a company may be liable under the law of Ontario for remediating environmental damage caused by the company if it becomes bankrupt or does not otherwise have funding to pay for it. This was illustrated in the following case involving groundwater pollution.

In 2004, a manufacturing company discovered that groundwater that was migrating from the facility and polluting a nearby residential area. After notifying the pollution to the Ontario Ministry of Environment, the company voluntarily carried out investigatory, mitigation and remedial measures, including monitoring air in the residences. In addition, it created an accounting reserve for the measures, over €15 million. However, in 2012, the Ministry became concerned that the company would not have sufficient funds to continue remediating and monitoring the pollution. The Ministry, therefore, issued an order that required the company and its parent company, to continue carrying out the measures and to provide more than € 6million in financial security to the Ministry to ensure funding of future measures. Following various court proceedings, the company was declared bankrupt and ceased remediating and monitoring the pollution. The Ministry continued to carry out the measures at its cost.

The Ministry issued a further order against 12 former directors and officers that required them to carry out measures that the Ministry had previously required the company to carry out at an estimated annual cost of almost €1 million. The Ministry also claimed against the directors and officers for about € 10 million for its past and future remedial costs, stating that the directors and officers knew about the pollution and had managed and controlled the site between 2003 and 2012.

The Ministry and the directors and officers eventually settled the dispute in 2013, being substantially less than the amount sought by the Ministry. In 2017, remedial works were continuing at the site. Research showed that they would be long-term to remedy the groundwater pollution and to stop trichloroethylene vaporising in the air inside the nearby homes affected by the groundwater pollution.

²¹ Secondary liability is when the responsibility falls on a party when the party with the primary liability is unable to fulfil their legal obligations.

The Ministry has continued to oversee out the long-term remedial and monitoring measures including the extraction of vapours from nearby residences.

This example illustrates the limits of the mechanism, as well as the challenges of implementing the Polluter Pays principle when confronted with prosecution procedures.

Source: (Fogleman and LLP, 2020^[45])

5.3.2. Funds and risk-sharing facilities

A variety of funds (tiered fund, revolving fund, and fund specifically for set up to deal with disasters) and risk-sharing facilities (often in the form of mutual) can be put in place to avoid taxpayers paying for legacy pollution remediation. Portugal and Spain (see Box 5.2) have established funds to remediate and prevent further environmental damage, both of which were linked to mandatory financial security systems for ELD liabilities. This mechanism focuses on ensuring, regardless of the financial capacity of the polluter, that the costs of remediation are covered. This fund is aligned with the Polluter Pays principle. It should be combined with policy and regulatory tools which incentivise avoiding environmental damage.

A major difference between funds and risk sharing is that the latter has membership. Risk-sharing facilities for environmental liabilities can therefore limit membership to leave out specified persons that are, in the view of the secretariat of the facility and its members, unlikely to cause environmental damage. Risk-sharing facilities, often in the form of mutual, provide financial security for unforeseen environmental damage. They range from large companies to those with small companies as members. Mutual, and other risk-sharing facilities, are established by an agreement between the members. A primary purpose is to share the risk of funding for specified incidents or events between the members instead of a single member bearing the risk. A mutual may cede risks to a reinsurer or it may make an additional call on its members if claims exceed the funding reserve(s) in the mutual (Fogleman and LLP, 2020^[45]).

Box 5.2. Funds for ELD liabilities: lessons from Spain

The legislation that implements the ELD in Spain established two funds; the Compensation Fund for Environmental Damage, and the State Fund, both apply to water resources.

Compensation Fund for Environmental Damage

The purpose of the Compensation Fund for Environmental Damage is to extend cover by insurance policies used to provide evidence of financial security for ELD liabilities beyond the policy period when environmental damage or a claim for remediating such damage occurs after the policy period. Funding is limited to the remediation of environmental damage under the provisions of that a financial security instrument is in place, as required under the mandatory financial security system and also depending on the amount of money in the fund when the claim for funding is made.

Payments by the fund are subject to exclusions for, among other things, uninsured activities, and damage generated after activity ceased due to abandonment of the facilities that had the potential to pollute if mandatory measures to avoid the risk have not been carried out. The deadline for the fund to cover a claim is a period equal to the number of years during which the relevant insurance policy was in force, beginning three years after the expiration date of the policy, with a long-stop deadline of 27 years to cover the maximum period in which liability exists under the ELD and the Spanish legislation that implements it. The source of funding for the Compensation Fund is contributions from a surcharge on the premiums of insurance policies used to provide evidence of financial security. The Compensation Fund for Environmental Damage is part of the Spanish Insurance Compensation Consortium.

Source: (Fogleman and LLP, 2020^[45]).

In 2002, the Prestige ship sank in front of the Spanish coast, spilling 63 000 tonnes of fuel oil, reaching the north coast of Spain and part of the Atlantic coast of France. The Spanish government requested the Compensation Fund to assess the direct damage, including assets and losses in economic activity. The Prestige spill directly affected public property (seas and coasts) and caused material damage to private property such as seawater intakes from sewage treatment plants and hotels with seawater thermal treatments.

Those affected had the possibility to claim from those potentially responsible for the incident, from the International Oil Pollution Compensation Funds (IOPC Funds) or from the relevant Spanish Ministry. IOPC is an intergovernmental organisation, which provides compensation for pollution damage resulting from oil spills from tankers in Member States, including Spain. At the time of the sinking of the Prestige, the amount of compensation payable by the IOPC Funds was limited to some 135 million SDR (Special Drawing Rights, equivalent to some \$179 million), which it was already clear insufficient to compensate for all the damage.

In 2017, the total damages cost were estimated to 1616 million euros by the Compensation Fund. Through the Compensation Fund for Environmental damage, the Spanish government advanced the compensation that individuals could claim to the polluter or the IOPC Fund. The Provincial Court and the Spanish Supreme Court stated the compensation to be paid by the responsible parties to those affected (public and private) according to their liability: the ship's captain, the ship insurer up to a limit of USD 1 billion, the ship-owner subsidiarity, ship-owner and shipping company and the IOPC Fund to the limits established in the agreement (which did not include environmental and moral damages).

Source: (Ruiz, 2019^[47]).

State fund

The State Fund provides funding to pay the costs of preventing or remediating environmental damage at State-owned property when the operator is required to carry out preventive or remedial measures and the operator proves that it followed the compulsory order of a public authority, or the state-of-the-art defence²² applies.

As with the Compensation Fund, funding is limited to the remediation of environmental damage under the provisions of a financial security instrument that is required under the mandatory financial security system. The State Fund is funded by the General State Budget. The Fund is managed by the Ministry for the Ecological Transition and the Demographic Challenge. The Autonomous Communities may participate in the funding and management of the State fund, in which case its scope is extended.

Source: (Fogleman and LLP, 2020^[45]).

Revolving funds are another type of fund limiting public remediation costs. These funds are typically established by a government to provide funding, in the case of environmental liabilities, to a competent authority to investigate environmental damage, carry out emergency measures to prevent or remediate it, and then to carry out long-term measures if the responsible operator(s) does not or cannot do so, as well as implementing and enforcing the regime. In principle, under a revolving fund, the actors that cause damage or are otherwise liable for the damage must reimburse the State, which makes the "revolving" element of the fund. The fund is funded by levies (Fogleman and LLP, 2020^[45]). This mechanism focuses

²² A strategy used by those defending against liability. By using "state of the art" argument, the defence is based on the product relying on totally new technology that wasn't completely understood at the time of its creation. A operator isn't completely immune from liability just because its products were advanced and modern, but it may enjoy certain relaxed standards. It argues that operator could not possibly have foreseen many of the safety issues associated with the product or activity. The activity or technology were too new and too advanced to reasonably understand the potential impacts on the public (Fogleman and LLP, 2020^[45]).

on ensuring that the polluter covers the costs of remediation, by recovering the public money spent, aligned with the Polluter Pays principle.

For example, Finland established the Oil Pollution Compensation Fund, which deviates from the model presented, due to the incapacity to make the polluter pays. The Fund provides funding for remediating soil and groundwater contaminated by oil spills when the polluter that caused the damage is unknown, cannot be located or is unable to reimburse costs incurred by the Ministry of the Environment. The fund is funded by levies on oil that is imported to or transported through, Finland, with the levy being doubled if the vessel transporting the oil is not completely double-skinned. In practice, this means that it is funded by three companies. The fund is also funded by transfers from the national budget (Fogleman and LLP, 2020^[45]). This fund may not be fully aligned with the Polluter Pays principle, because the polluter does not bear the costs of the pollution, but the polluting sector does. However, it is a solution to avoiding taxpayers bearing the costs of remediation.

Annex A. Water Framework Directive and its daughter Directives

The Water Framework Directive is complemented by more specific legislation, such as the Groundwater Directive, the Drinking Water Directive and the Bathing Water Directive, the Nitrates Directive, the Urban Waste Water Treatment Directive, the Environmental Quality Standards Directive and the Floods Directive.

The Ground Water Directive (GWD) provides for specific criteria for the assessment of good chemical status, the identification of significant and sustained upward trends and the definition of starting points for trend reversals. All threshold values for pollutants (except for nitrates and pesticides, for which the limits are set by specific EU legislation) are set by the Member States (European Parliament, 2021^[48]).

Drinking-Water Directive (DWD) of 2020 defines essential quality standards for water intended for human consumption. It requires Member States to regularly monitor the quality of water intended for human consumption by using a 'sampling points' method. Member States can include additional requirements specific to their territory but only if this leads to setting higher standards. The directive also requires the provision of regular information to consumers. Furthermore, the quality of drinking water has to be reported to the Commission every three years. The revised directive, adopted by Parliament on 16 December 2020, entered in force on 12 January 2021, updated existing safety standards and improved access to safe drinking water along the lines of the latest recommendations of the World Health Organization. It furthermore increases transparency for consumers on the quality and supply of drinking water. The Member States have two years to transpose it into their national laws (European Parliament, 2021^[48]).

The Bathing Water Directive aims to enhance public health and environmental protection by laying down provisions for the monitoring and classification (in four categories) of bathing water and informing the public about it. During bathing season, Member States have to take samples of bathing water and assess the concentration of at least two specific bacteria once a month at each bathing water site. They have to inform the public through 'bathing water profiles' containing for instance information on the kind of pollution and sources that affect the quality of the bathing water. There is a standard symbol for informing the public about the bathing water classification and any bathing prohibition. A summary report on the quality of bathing water is published annually by the Commission and the European Environment Agency (European Parliament, 2021^[48]).

The Environmental Quality Standards Directive establishes limits on concentrations of 33 priority substances presenting a significant risk to, or via, the aquatic environment at the EU level and eight other pollutants in surface waters. During a review, 12 new substances were added to the existing list and an obligation was introduced for the Commission to establish an additional list of substances to be monitored in all Member States to support future reviews of the priority substances list (European Parliament, 2021^[48]).

The Urban Waste Water Treatment Directive aims to protect the environment from the adverse effects of urban wastewater discharges and discharges from the industry. The directive sets minimum standards and timetables for the collection, treatment and discharge of urban wastewater, introduces controls on the disposal of sewage sludge, and requires the dumping of sewage sludge at sea to be phased out. The Commission is intending to update this directive, to better counter water scarcity by facilitating the reuse

of treated wastewater for agricultural irrigation. The Commission intends to adopt its proposal for a revised directive in the first quarter of 2022 (European Parliament, 2021^[48]).

The Nitrates Directive aims to protect waters from nitrates from agricultural sources. A complementary regulation requires Member States to send a report to the Commission every four years, providing details of codes of good agricultural practice, designated nitrate vulnerable zones, water monitoring and a summary of action programmes. Both the directive and the regulation aim to safeguard drinking water and prevent damage from eutrophication. In May 2018, the Commission published its latest implementation report, in which it stressed that water pollution caused by nitrates from agriculture has decreased in Europe in the last two decades, but worrying hotspots remain and need stronger action (European Parliament, 2021^[48]). The Nitrates Directive targets water affected by pollution or which could be affected if action is not taken. Member States must designate as vulnerable zones all known areas of land for which the corresponding

- surface freshwater contains or could contain more than 50 mg nitrates per litre;
- groundwater contains more than 50 mg/l nitrates;
- natural freshwater lakes, other freshwater bodies, estuaries, coastal waters and marine waters are found to be eutrophic or soon may become eutrophic.

The EU Floods Directive aims to reduce and manage the risks posed by floods to human health, the environment, infrastructure and property. It requires Member States to carry out preliminary assessments to identify the river basins and associated coastal areas at risk and then prepare flood risk maps and management plans focused on prevention, protection and preparedness. All of these tasks are to be carried out following the WFD and the river basin management plans set out therein (European Parliament, 2021^[48]).

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