Background note: Cost recovery

April 2022

For the thematic workshop on 31 May – 1 June 2022

The background note aims to inform and support discussions at the third thematic workshop, co-convended by the OECD and the European Commission's Directorate-General for Environment.
The workshop is part of a series aimed to facilitate the implementation of the economics of the Water Framework Directive in European Member States. The background note builds on existing literature and experience of EU Member States. It may not reflect the opinion of the OECD, the European Commission or their Member States.

Acknowledgments:
Aude Farnault (OECD) was lead author of this paper. The author team also included Helen Laubenstein (OECD), Gloria Depaoli (Acteon), Marijn Korndewal (OECD) and Xavier Leflaive (OECD). Paul Arnoldus (EC - DG Environment), Pierre Strosser (Acteon) and Delia Sanchez Trancon (OECD) provided valuable input.

Aude Farnault Aude.Farnault@oecd.org
Xavier Leflaive Xavier.Leflaive@oecd.org

Table of contents

FIGURES

TABLES

BOXES

1.Purpose of this note

This background note analyses the stakes and challenges related to the implementation of cost recovery for water services in the context of the Water Framework Directive (WFD). It aims at informing a thematic workshop on cost recovery, which is part of a series on "The economics of implementation of the Water Framework Directive and the Floods Directive", co-convened by the European Commission and the OECD.

Under article 9 of the WFD, Member States are required to implement the principle of the recovery of costs of water services, including financial costs, environmental and resource costs. They are also required to set up water-pricing mechanisms, which provide adequate incentives for water users to use water resources efficiently. Besides, the Directive mandates Member States to report on cost recovery and on the enforcement of adequate incentive pricing. The broad terms of the WFD have led to different interpretations of some concepts linked to the principle, as explained in the note.

More than 20 years after the adoption of the WFD, implementing cost recovery has proven to be a challenge for Member States, especially with regards to financial costs in the irrigation sector, as well as environmental and resource costs. Indeed, Member States are facing operational issues in the implementation of the principle, which are political (trade-offs among different policy objectives), societal (affordability, equity…), and also technical (data availability, methodologies to assess and operationally implement financial, environmental and resource cost recovery). The context of rising costs (as a consequence of demographic trends, climate change, contaminants of emerging concerns, more stringent water and environmental standards, and lack of coherence across policy domains) magnifies the challenge.

Promising models to harness new sources of (private) finance are emerging and could be further promoted, in order to support cost recovery and more broadly the WFD objectives. It could notably help decreasing the number of water bodies for which less stringent environmental objectives are proposed on the basis of disproportionate costs.

To support the workshop discussions, this note examines the following topics:

- The concept of cost recovery, including the different types of costs and cost-recovery mechanisms
- The state of play in the implementation of cost recovery in Member States, for financial, environmental and resource costs
- The political, societal and technical issues affecting cost recovery in Member States
- Emerging options to recover rising costs, including ways to minimise costs and innovative arrangements to supplement existing funding streams.

Proposed discussion questions for the thematic workshop

The following topics are proposed for discussion at the thematic, with the underlying following question: if the WFD was only partially successful to trigger more use of economic policy instruments to recover the costs of water management, what could foster cost recovery in the future?

Member States could exchange views, knowledge and experience on the following topics:

Water pricing mechanisms

- Adequate incentive pricing: what is an ‘efficient’ water-pricing mechanism (triggering efficient water uses), considering political issues related to pricing water and the limited elasticity of water use to price?
- Addressing affordability: what are the pros and cons of social measures vis-à-vis social tariffs?
- Depreciation methods: how depreciation might be ‘flexed’ in order to assist with financeability / cost recovery concerns?

Efficient (innovative) cost-recovery mechanisms

- Charges on other pressures on water (beyond abstraction and pollution): should they be further exploited and how?
- How to unlock untapped sources of revenues to achieve cost recovery? Focus on Land-value capture.

How fit is cost recovery for the future?

- Coherence across sectors: methodological and political economy issues that affect cost-recovery in practice.
- Which implications of the zero pollution strategy on cost recovery for water management?
- Can (or should) increasingly stringent environmental policies be financed through water bills or water-related charges?

2. Cost recovery: concept and state of play in Member States

This section first presents the concept of cost recovery for water services under the Water Framework Directive (including the types of costs and cost-recovery mechanisms). It then exposes the state of play in the implementation of cost recovery in Member States, for financial, environmental and resource costs. Lastly, it focuses on the emerging trends regarding this issue (including the cost drivers and the consequent increasing gap between financing needs and capacities).

2.1. The concept of cost recovery

Member States are required to implement the principle of the recovery of costs of water services, including financial costs, environmental and resource costs. They should also set up water-pricing mechanisms, which provide adequate incentives for water users to use water resources efficiently. Besides, Member States should report on cost recovery and on the enforcement of adequate incentive pricing. The broad terms of the WFD have led to different interpretations of some concepts linked to the principle.

2.1.1. *The principle of recovery of costs for water services*

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 aims 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[1]). Achieving "good status" requires good quantitative and chemical status for ground water bodies and good ecological and chemical status for surface waters. The Directive extended the 2015 deadline up to 2027 (see Annex A - Timetable of implementation of the WFD), in reaction to the operational issues of Member States to achieve the WFD objectives by 2015. On the grounds of natural conditions, technical feasibility or disproportionate costs[1], countries also have the possibility to request time and objective exemptions. In order to achieve the set environmental objectives, Member States must develop and implement Programs of Measures comprising basic and supplementary measures[2] (European

[1] Article 4 of the WFD permits exemptions if the necessary measures for achieving the environmental objectives of the Directive will have disproportionate costs.

[2] According to WFD Article 11.3, **basic measures** are defined as "the minimum requirements to be complied with and shall consist of" the following: "measures required to implement Community legislation for the protection of water" (Article 11.3(a)), such as the Urban Waste-water Treatment Directive, the Nitrates Directive, the Drinking Water Directive et cetera, and other basic measures (Article 11.3(b-l)), such as measures to implement Article 9 (cost recovery), measures to protect drinking water quality et cetera).
According to Article 11.4 and 11.5, **supplementary measures** are defined as "those measures designed and implemented in addition to the basic measures, with the aim to achieve the [environmental] objectives [of the WFD]." Supplementary measures can include additional legislative and administrative instruments, economic or fiscal

Commission, DG Environment, 2021[1]). The Directive requests the application of economic principles (for example the Polluter Pays Principle), economic approaches and tools (such as cost-effectiveness analysis) and economic policy instruments (such as water pricing). Thus, the Water Framework Directive clearly integrates economics into water management and water policy decision-making (European Commission, 2010[2]).

Article 9 of the Water Framework Directive

Article 9 of the Directive (see Annex B – Article 9 of the WFD) sets the requirement to implement the principle of the recovery of the costs of water services, including environmental and resource costs. The key points of article 9 are the following (European Commission, 2004[3]):

- 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."
- Member States are to ensure that by 2010: "water pricing policies provide adequate incentives for users to use water resources efficiently, and thereby contribute to the environmental objectives of [the] Directive".
- Also by 2010, Member States are to ensure: "an adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of the costs of water services, based on the economic analysis conducted according to Annex III and taking account of the Polluter Pays Principle."
- Member States should report in the River Basin Management Plans (RBMPs) on the planned steps towards implementing incentive based water pricing policies and the recovery of the costs of water services.

The WFD and a number of supporting Common Implementation Strategy (CIS) documents and subsequent information sheet set the objectives, scope and specific requirements in relation to cost-recovery.

The request to report on cost recovery

The requirements of Article 5 on river basin characterisation and Annex III (see Annex C – Article 5 and Annex III of the WFD on Cost recovery) of the WFD are establishing the need for Member States to report on cost recovery. Specifically, Annex III indicates that the economic analysis performed as part of the river basin characterisation must be sufficiently detailed to allow for the relevant calculations necessary to take into account the principle of cost recovery for water services. Member States are required to assess their level of cost recovery, along with the identification of information and knowledge gaps (European Commission, 2004[3]).

Annex III also states that Member States must carry out an economic analysis to assess the most cost-effective combination of measures to be included in the Programme of Measures. Such cost-effectiveness analysis encompasses the identification of environmental objectives for each water body, the assessment of possible measures to reach these objectives, with the estimation of their costs and of their impact on the status of water bodies (WATECO, 2003[4]).

instruments, emission and abstraction controls, research projects, educational campaigns, et cetera, that go beyond the basic measures and that are deemed necessary for the achievement of objectives.

Method to assess Cost recovery levels

In the CIS documents, particularly the Cost recovery (European Commission, 2004[3]), the European Commission identified seven tasks for Member States to assess their cost recovery levels:

1. Definition of the water services: Water services are defined in Article 2 of the WFD as "all services which provide, for households, public institutions or any economic activity: (a) abstraction, impoundment, storage, treatment and distribution of surface water or groundwater; (b) waste water collection and treatment facilities which subsequently discharge into surface water." Thus, water services are the intermediaries between the natural environment and actual water use[3]. The CIS documentation suggests that, in each Member State, the competent authorities identify water services in their respective river basin districts (European Commission, 2004[3]). When it comes to the geographical scale, the Directive specifies that the assessment of cost recovery must be performed at the river basin scale for each category of water services that have been identified.
2. Identification of the providers, users and polluters: The providers are the specific organisations in charge of the water services. They can be public bodies (e.g. the local municipality) or private water service companies (European Commission, 2004[3]). Article 9 of the Directive specifies that the water uses must include at least households, agriculture and industry. These three categories need therefore to be reported on by Member States. Water uses are seen as all activities impacting significantly water status, according to the analysis of pressures and impacts[4] (WATECO, 2003[4]). With regard to the identification of the polluters, an important part of the cost recovery assessment concerns the recovery of treatment or pollution control costs incurred by water services. The costs that users pay may not always be proportional to the costs they incur (due to the history of water use, among others) (European Commission, 2004[3]). Therefore, when relevant information and knowledge are available, it is recommended that Member States analyse the sources and historical origin of pollution and related costs.
3. Calculation of the financial costs of the water services (see section 2.1.2).
4. Identification and estimation of the environmental and resource costs (see following section 2.1.2).
5. Identification of the cost recovery mechanisms: According to the CIS (European Commission, 2004[3]), cost recovery mechanisms for water services should take the form of user charges and tariffs, but also subsidies or other transfers. The section 2.1.3 on 'Cost recovery mechanisms' details the financing and economic instruments used to recover the costs of water services.
6. Calculation of the rate of cost recovery: "The overall cost recovery of economic costs is the extent to which the costs of providing the water service is covered by its charges to water users and other cost recovery mechanisms" (European Commission, 2004[3]). Cost recovery can be calculated and reported in different ways, for instance: Cost recovery rate = total revenues - subsidies / total costs x 100; or Cost recovery rate = price per unit - subsidies / cost per unit x 100 (European Commission, 2004[3]).
7. Identification of the allocation of costs to users and polluters: Member States are required to determine which proportion of water service costs are caused by different water uses and polluters. In order to report on cost recovery by water use accurately it is necessary to be able to carefully define what proportion of financial costs are to deal with pollution (both operating & maintenance

[3] Interpretations vary on the scope of water services under article 9 among Member States, as explained in the section below on the 'broad scope of interpretation'.

[4] According to Annex VII of the WFD, the River Basin Management Plans should include "a summary of significant pressures and impact of human activity on the status of surface water and groundwater, including:
— estimation of point source pollution,
— estimation of diffuse source pollution, including a summary of land use,
— estimation of pressures on the quantitative status of water including abstractions,
— analysis of other impacts of human activity on the status of water"

costs and capital costs) and also the generation of environmental and resource costs. The pressures and impacts study is the foundation for allocating the costs of water services to users and polluters. This study should highlight what proportion of total pollution is generated by different sources. This data can be used to adjust and/or allocate the total costs of water services (European Commission, 2004[3]).

2.1.2. *Types of costs of water services*

Water management activities and water supply and sanitation (WSS) service provision and use come at a cost, which comprise a variety of elements. Ignoring some of these elements will eventually result in unsustainable water resource use and water services, with consequent losses in societal welfare (OECD, 2010[5]). According to article 9, Member States should seek to recover financial, environmental and resource costs. The WFD does not provide definitions of environmental and resource costs. A number of different definitions are proposed in the CIS documents and in the literature.

Financial costs are those associated with supplying water services to users without considering either the externalities of water consumption (positive or negative) or alternate uses of water (opportunity costs) (OECD, 2010[6]). These costs consist of:

- Operating costs, which are "all costs incurred to keep an environmental facility running (e.g. material and staff costs)" (WATECO, 2003[4]).
- Maintenance costs, i.e. the "costs for maintaining existing (or new) assets in good functioning order until the end of their useful life" (WATECO, 2003[4]).
- Capital costs, which themselves include, notably, new investments[5], depreciation[6] and cost of capital[7].

Resource costs (also referred to as 'opportunity costs') reflect the scarcity value of the resource. They refer to the cost of depriving the next possible user: if that user has a higher value for the water, then there are some opportunity costs experienced by society due to this misallocation of resources (OECD, 2010[6]). Indeed, according to the CIS guidance document No.1, they represent "the costs of foregone opportunities that other uses suffer due to the depletion of the resource beyond its natural rate of recharge or recovery (e.g. costs related to groundwater over-abstraction). These users can be either those of today, or those of tomorrow, who will also suffer if water resources are depleted in the future" (WATECO, 2003[4]). Opportunity costs of resources are not reflected in the financial costs, therefore, the scarcity value of under-priced environmental resources, should be accounted for when estimating economic costs (WATECO, 2003[4]).

Environmental costs "represent the costs of damage that water uses impose on the environment and ecosystems and those who use the environment (for example, a reduction in the ecological quality of aquatic ecosystems or the salinisation and degradation of productive soils). This loss in welfare may encompass lost production or consumption opportunities as well as non-use values (such as the value produced by contemplating a clean lake at dusk), which are harder to quantify." (WATECO, 2003[4]). Thus, the environmental costs are related to the externalities generated by the current resource use. Environmental costs consist of pollution costs and costs of ecosystem services: the former in particular

[5] "Cost of new investment expenditures and associated costs, e.g. site preparation costs, legal fees." (WATECO, 2003[4])

[6] "The depreciation allowance represents an annualised cost of replacing existing assets in future. Estimating depreciation requires defining the value of existing assets and a depreciation methodology." (WATECO, 2003[4])

[7] "It is the opportunity cost of capital, i.e. an estimate of the rate of return that can be earned on alternative investment. The cost of capital applied to the asset base (new and existing) gives you the returns that investors are expecting to earn on their investments." (WATECO, 2003[4])

has some overlap with the financial costs (cf. nutrient of agricultural run-offs lead to higher treatment costs to arrive at drinking water supply). The "other" pollution costs can be damage costs or mitigating / abatement / avoidance costs.

Key differences in the interpretation of environmental and resource costs by Members States were identified in relation to whether the impacts are limited to (aquatic) ecosystems only and whether environmental costs are interpreted in relation to the failure to achieve good water status (European Commission, 2010[2]).

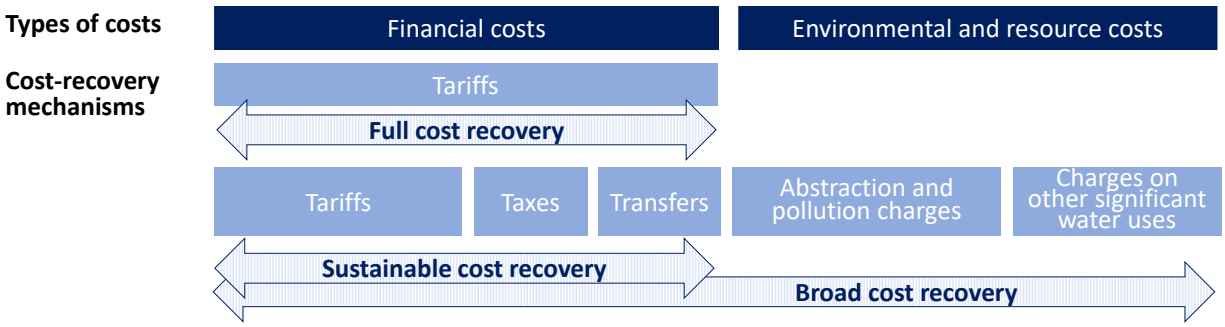
2.1.3. *Cost-recovery mechanisms: from full to sustainable and broad cost recovery*

The costs associated with water-related services can be covered through pricing, but it is not the only instrument. Experience shows the difficulties of achieving full cost recovery through tariffs alone in the WSS sector. This is not only true for cost elements going beyond supply costs, such as the cost of 'institutional' components, but also for investment costs, which are often not covered through consumer tariffs. Recognising these difficulties, the policy debate has moved away from a call for **full cost recovery** through tariffs, towards the concept of **sustainable cost recovery** introduced in the Camdessus report (Winpenny, 2003[7]), which identified three main features of sustainable cost recovery (OECD, 2010[6]):

- An appropriate mix of tariffs, taxes - the CIS on cost recovery (European Commission, 2004[3]) suggest to distinguish general taxes from those used to correct externalities, e.g. environmental taxes - and transfers (from the international community or charities) i.e. the "3Ts" defined in OECD (OECD, 2009[8]) (OECD, 2009[9]), to recover costs, and to leverage other forms of financing;
- Predictability of public subsidies to facilitate investment (planning);
- Tariff policies that are affordable to all, including the poorest, while ensuring the financial sustainability of service providers.

Broad cost recovery encompasses the recovery of not only the financial costs, but also the environmental and resource costs. It 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 pressures on water resource, including pollution, hydromorphology and scarcity. Broad cost recovery is linked to the **Polluter Pays Principle**, which is explored in the OECD background note for workshop 2 on the Polluter Pays Principle. The Polluter Pays Principle application would give further 'instructions' on who should pay, as far as the pollution cost are concerned. It would imply that the polluters - rather than the water consumers - should pay these extra costs.

Figure 2.1. Cost-recovery mechanisms: from full to sustainable and broad cost recovery



Note: "Charges on other significant water uses" are charges on water uses other than abstraction and pollution charges, such as taxes on pesticides and / or nitrates.
Source: Authors

Mechanisms for the recovery of financial costs

Tariffs in the water sector are the "price to be paid for a given quantity of water or sanitation service, either by households, irrigators, retailers, industries, or other users" (European Commission, DG Environment, 2021[1]). They generate revenues for water services, although not always sufficient to cover their costs, as mentioned above.

The following roles/objectives of the approach to tariff setting are particularly relevant to consider (OECD, forthcoming[10]): i) Cost recovery: consistency with the recovery of efficiently incurred costs. Importantly, this will include some recovery of capital expenditure (CAPEX) which was efficiency incurred in (and has accumulated over) previous years, to the extent that it remains to be recovered from customers. ii) The financeability of future investment requirements: providing a realistic and robust basis upon which utilities could fund investments that are likely to be viewed as appropriate and desirable. iii) Efficiency incentives: providing incentives to deliver appropriate performance levels at efficient levels of cost over time (see paragraph below on 'Adequate incentive pricing'). iv) Allowing for affordable, acceptable and equitable bills: while this can clearly raise broader social and political considerations, it is important to recognise the various implications that different tariffs setting approaches can potentially have in relation to these matters (see section 3.1. on Political and societal issues).

Mechanisms for the recovery of environmental and resource costs

Abstraction and pollution charges are the most often considered mechanisms for internalising some environmental and resource costs. Charges on other significant water uses (e.g. charges on hydropower production, charges on hydromorphological alterations, etc.) are also instruments to recover these costs, but their implementation is less common (as discussed in section 2.2. State of play of cost recovery in Member States). Abstraction and pollution charges are "compulsory payments to the competent body for a service directly or indirectly associated with the degradation of the water environment" (European Commission, DG Environment, 2021[1]), with water abstraction or pollution. They are aiming at "discouraging the use of a service (for example using charges in a licensing scheme may discourage users to apply for a permit)" (European Commission, DG Environment, 2021[1]). As explained above, according to the concept of broad cost recovery and the Polluter Pays Principle, abstraction and pollution charges are meant to cover (next to the costs of providing the water services covered through the 3Ts), the (additional) costs of remedying, mitigating or preventing pressures on water resources, including pollution, hydromorphology alterations and scarcity.

Most abstraction charges are based on the price per volume of water abstracted and charges are often differentiated according to the type and sector of user – e.g. agricultural, industrial or residential. In some cases other factors apply, e.g. the season, or the scarcity of the resource (OECD, 2016[11]). The principal variables governing the type of charge are (OECD, 2018[12]):

- Differential application to groundwater and surface water. Charges for groundwater are normally higher, due to the fact that the resource is often in part non-renewable, and difficult to restore once contaminated.
- Purpose. The purpose of abstraction charges can vary: to raise general revenue, to raise revenue for specific kinds of water resource management, to comply with the WFD, to create incentives for the efficient use of water, to limit water extraction in water-stressed areas, etc.
- Basis (methodology) for setting the charge. The options are volumetric (where the measurement of water abstraction is feasible), fixed (e.g. per hectare of land farmed), or per licensed amount (e.g. according to the ceiling allowed on abstraction).
- Destination of the revenues. Proceeds of the charges could return to the general (national) budget, or be earmarked for specific programmes or expenditures in national or local budgets. (In Georgia

revenues from the groundwater abstraction fee are returned to the budgets of municipalities in areas where the abstraction takes place).

- Sectors of application and type of user. The charges may apply only to certain sectors, or different rates apply per sector (agriculture, industry, water utilities, fisheries, forestry, hydro and thermal power, etc.). Smaller users are often excluded from the charge.
- Level of charge. There is wide variation. In general, the level is low, and is limited by the requirement to recover only the costs of administering the regime of monitoring and regulation. Countries using the charge to create an economic incentive for efficient water use typically levy higher rates (the state of play of cost recovery in Member States is detailed in section 2.2).
- Treatment of non-consumptive use. Sectors with a high proportion of non-consumptive use (commonly, hydropower and cooling for thermal power) are typically charged at a lower rate. Irrigated agriculture is sometimes classed as non-consumptive for this purpose, though this is not always warranted. Note that the notion of non-consumptive use is debatable, when reservoirs store water that could be used downstream, when they affect sediment flows, or when water is returned to the environment at a higher temperature.

Adequate incentive pricing

Article 9 of the WFD states that "Member States shall ensure that water-pricing policies provide adequate incentives for users to use water resources efficiently, and thereby contribute to the environmental objectives of this Directive". Indeed, water-pricing policies can be levers to encourage changes in behaviour leading to a reduction in water consumption or in the discharge of pollutants, or encouraging innovation to minimise environmental and resource costs. Pricing policies can: i) support users to improve their efficiency in their use of water resources by giving them financial incentives to move to practices or technologies that make better use of available resources; ii) provide incentives to users to switch to less polluting processes, products or practices, to reduce or eliminate the use of high-polluting production lines and practices, or to install facilities to treat polluted water before it is released into the environment (WATECO, 2003[4]).

The literature emphasises that, for a pricing system to be incentive-based, there should be a relationship between the payment and the amount of water used or the amount of pollution discharged. Incentive-based water pricing policies can range from water pricing without a variable component to pricing systems in which the entire tariff is linked to the volume consumed. If environmental and resource costs are included in volumetric pricing systems, the incentive is increased. Hence, the maximum incentive impact can be achieved when the tariff is volumetric and all costs are included (European Commission, 2010[2]). Nonetheless, the effect of a given water pricing scheme will depend on a number of factors, including the price elasticities of water demand (how responsive demand is to a change in price). Finally, the term "adequate" leaves some flexibility and scope of interpretation to the extent to which each cost-recovery mechanism needs to be incentive-based, since the criteria to make judgements whether the incentive provided is adequate are not defined in the WFD.

A broad scope of interpretation

The literature emphasises that the flexibility provided by article 9 leaves room for different approaches to implementation by Member States (European Commission, 2010[2]).

Among many other topics, there are debates among Member States on the definition of water services under article 9 of the WFD. For instance, Germany has initially based its implementation of the cost recovery principle on a narrow interpretation of the concept of "water services" including only the classic services of water supply and wastewater collection and treatment, which led to the case C-525/12 "European Commission v Federal Republic of Germany" in September 2014 (Lindhout and Van Rijswick, 2015[13]). The European Court of Justice concluded that the WFD environmental objectives not necessarily

imply that cost recovery should be applicable to all water-related activities mentioned in article 2 of the WFD. Similar cases were investigated in several Member States.

Moreover, article 9 allows for flexibility by specifying that, in implementing its requirements, Member States may "have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected", without giving more precisions or criteria to determine the extent and limits of this flexibility (what are the specific effects and conditions, etc.), thus leaving room for Member States (political) discretion on the grounds of affordability, equity and other issues (see section 3.1. on Political and societal issues).

Lastly, the notion of "adequate contribution" of the different water uses (at least households, industry and agriculture)[8] is not specified either with the WFD (with precise criteria to determine what is "adequate", for instance), which leaves flexibility in its interpretation. The way the "adequate contribution" is interpreted and applied in practice across the Member States may determine the level of contribution of water users to the costs of water services. It is generally accepted, however, that the impact of diffuse pollution on raw drinking water quality represents such a case (particularly agricultural pollution), but securing the contribution may be hampered by difficulties in linking the additional costs of water services to the actual polluters and by considerations of affordability, social equity and political acceptability (European Commission, 2004[3]) (see section 3.1.). A practical interpretation requires that the respective contributions of users are documented and eventual cross-subsidies are made transparent and open to public debate.

2.2. State of play of cost recovery in Member States

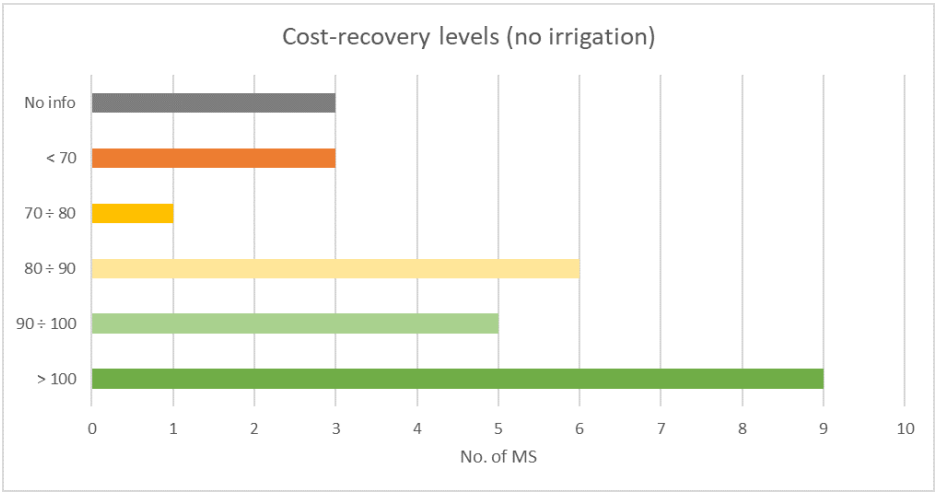
More than 20 years after the adoption of the WFD, while the implementation of cost recovery has improved in Member States, it has proven to be a challenge, especially with regards to financial costs in the irrigation sector, as well as environmental and resource costs.

2.2.1. *Recovery of financial costs*

Overall, the implementation of full financial cost-recovery for the water supply and sanitation sector still faces challenges in the EU, although some improvements have taken place since 2006 in coherence with the cost-recovery requirements of the WFD. As illustrated in the Figure 2.2 below, a third of EU Member States (MS) record average financial cost recovery levels equal to, or higher than 100% for water supply and sanitation services. For another third cost recovery levels are lower than 90% (European Commission, DG Environment, 2021[1]). On average, for the EU as a whole, revenues from water tariffs cover around 70% of the financial cost of providing water services (through water tariffs), with public financing covering the remaining 30% (OECD, 2020[14]).

[8] It should be noted that the water use(r) mentioned is not (only) about the customers, but also "prior" water uses that have an impact on the costs of water service provision (cf. nutrient run-offs from agriculture and their self-abstraction of water).

Figure 2.2. Average cost-recovery levels in EU Member States



Source: (European Commission, DG Environment, 2021[1])

Many factors explain differences in cost-recovery levels between Member States, including differences in water tariff levels[9]. However, further investigation would be required to better capture factors that constrain the application of the cost-recovery principle, and to identify possible solutions for addressing those. Note that revenues from water and sanitation tariffs represent more than 50% of the financial resources mobilised to finance Member States' WFD Programme of Measures (PoMs) (see Figure 2.3 below). In general, full cost recovery levels or cost-recovery levels above 90% do not compromise the affordability of water services, including for households in the lowest income decile, when considered at the aggregated level. Affordability might still be a concern for individual water service providers and vulnerable social groups. It needs specific attention in countries not yet reaching full (financial) cost-recovery and considering increases in current water and sanitation tariffs. (See section 3.1 for a discussion on affordability concerns in the European context).

Cost-recovery levels for irrigation are significantly lower than for water supply and sanitation, with significant differences reported within countries both for irrigation water tariffs and for cost-recovery levels (as a result of the types of irrigation, the basis for charging irrigation water, the age of the irrigation infrastructure, the type of management, whether irrigation water is supplied by collective systems or self-abstracted, etc.). Average financial cost-recovery levels reported by Member States (not considering self-abstraction for which financial cost-recovery can often be 100%) vary from a as low as 8% and to 92% (European Commission, DG Environment, 2021[1]). These figures need to be used cautiously as a result of the very fragmented available knowledge base and potentially different approaches applied to assess such cost-recovery rates[10]. While public subsidies to irrigation investments had recorded a regular decrease in many countries in the last 20-30 years, new interest in irrigation and water storage infrastructure to respond in particular to climate change, including to deliver rivers' ecological flows, might lead to future changes in the rational for allocating public subsidies to such investments.

[9] In 10 Member States out of 27, water and sanitation tariffs are set between 1 and 2 EUR/m^3; in 6 Member States between 2 and 3 EUR/m^3; and in 5 Member States, tariffs are above 5 EUR/m^3. Source: European Commission (2021), Economic data related to the implementation of the WFD and the FD and the financing of measures. Final study.

[10] Including when estimating cost-recovery levels for older irrigation systems, with challenges for estimating the consumption of fixed capital/the share of investment costs that need to be accounted for in cost-recovery calculations.

2.2.2. *Recovery of the costs of programs of measures: environmental and resource costs*

Recognising the importance of environmental and resource costs, Member States have put in place different economic instruments to transfer part of these costs to water users and economic operators and internalise them into their decisions and practices. Environmental charges or taxes targeting water resources and aquatic ecosystems are applied by Member States in relation to: water abstraction and polluting discharges; the use of pesticides and/or nitrates[11]; water metering; obstacles in water bodies or flow continuity disruption; alluvial sediment extraction; aquaculture; navigation, etc. Charges/taxes on abstraction and pollution are, however, the most commonly applied instruments (75% of EU Member States) (European Commission, DG Environment, 2021[1]). Note that not all revenues collected from these charges are re-directed (ear-marked) to water management (or to the wider management of natural resources and the environment), with part of financial revenues being allocated to the general state budget[12] or regional, local or municipal budgets[13].

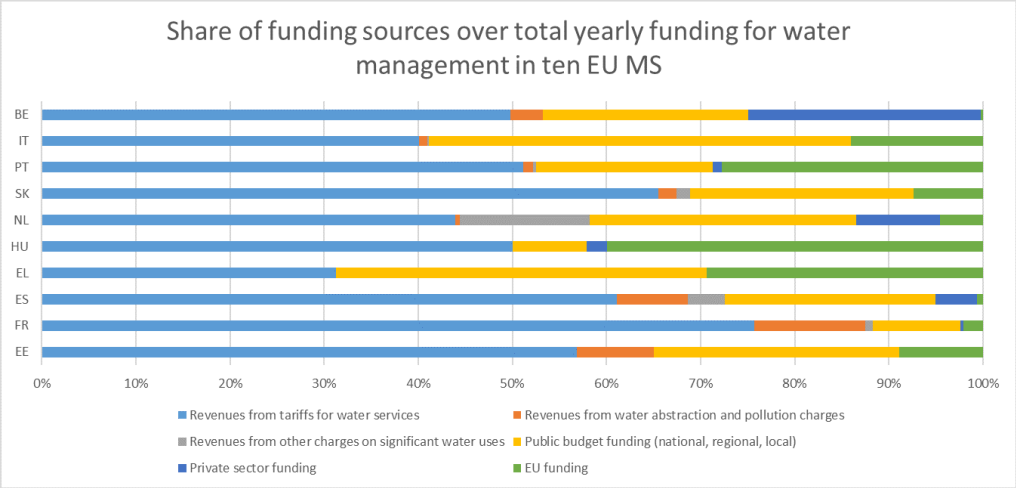
In general, however, the financial revenues collected via such environmental charges and taxes remain limited as compared to the existing level of degradation of aquatic ecosystems and of the costs of measures that would be required to bring water bodies to good ecological status. Indeed, the costs of water management, and in particular the WFD and FD PoMs, are covered by a diversity of financing sources beyond revenues from environmental charges applied to water, including revenues from water (mainly water supply and sanitation) services (see Figure 2.3 below). Overall, the most important funding source for water management remains water and sanitation tariffs (as a result of the still high importance of investments in drinking water and wastewater treatment infrastructure in many Member States), EU funds and national public funds, with revenues from abstraction and pollution charges put in place in several Member States coming third. Private investments to support water management remain limited with potentially untapped financial resources from private funding that could support water management projects and investments. Some innovative funding arrangements are applied in some Member States, e.g. Payments for Ecosystem Services (PES) schemes (e.g. in France); financial assistance schemes combining public funding and financial participation by farmers (e.g. in Ireland); the setting up of environmental funds financed by hydropower companies (e.g. in Sweden) (see background note for workshop 1 on Water Investment Planning and Financing). However, despite the increasing interest given to some of these financing mechanisms (e.g. for PES), these innovative arrangements remain of limited importance when considering the overall financial revenues they deliver to support water management.

[11] Applied in Denmark, France and Sweden

[12] For example in Estonia, Latvia, Lithuania and Hungary for water abstraction (European Commission, DG Environment, 2021[1]).

[13] For example in Estonia, Latvia, Lithuania and the Czech Republic for water abstraction also (European Commission, DG Environment, 2021[1]).

Figure 2.3. Share of funding sources for water management in selected Member States



Source: (European Commission, DG Environment, 2021[1])

2.3. Emerging trends

The previous section discussed how Member States are achieving recovery of current costs of their PoMs under the WFD. A number of factors determine the development of these costs in the future. Rising costs and additional investment requirements widen the gap between financing needs and capacity for the water sector. This section discusses relevant cost drivers and characterises the estimated financing gap in the next decade in European Member States.

2.3.1. *Cost drivers*

Drivers of investment needs in water security are wide-ranging and context dependent. The report of the OECD-World Water Council *High-Level Panel on Financing Infrastructure for a Water-Secure World* (Winpenny, 2015[15]) compiles the best available knowledge about future investment and water-related expenditures. The report acknowledges that projections in this area are particularly difficult. According to a Delphi survey, main drivers for future water infrastructure needs include responses to water-related risks, particularly droughts, floods and pollution, and how climate change affects water availability and demand (OECD, 2020[14]). For water supply and sanitation in the European context, Cambridge Econometrics (2017[16]) reports that main drivers for investment considered by stakeholders are compliance with EU policy, maintenance of sustainable services and higher efficiency in service delivery. This section discusses the factors (1) Demographic trends, (2) Climate change, (3) Contaminants of emerging concern, and (4) Compliance with increasingly stringent environmental policies and social expectations.

Demographic trends

Demographics is known to be a major driver for growth. It dictates the number of people to be connected to services. In the European Union, where a vast majority of people live in urban areas, urbanisation continues to drive investment needs in WSS. Currently, on average across the European Member States, 96% of EU citizens are connected to potable water supplies (only 57% in Romania). While the overall proportion of citizens connected to water supply services is expected to remain stable to 2050[14] (European Commission, 2017[17]), the total population is expected to increase in most EU countries. These trends

[14] Includes 27 Member States and the UK

amount to an overall greater number of people gaining connection in the future and hence drive investment needs.

The extent of the impact of urban population growth on expenditure needs for WSS may depend on the capacity of already installed infrastructure. Some countries or cities have reached full capacity and any growth in urban population will require additional construction of reservoirs, pipes and treatment facilities (e.g. Dublin, Ireland) (OECD, 2020[14]).

Further, as the urban population increases, it is anticipated that the number of people who face potential health risks from water-related disease outbreaks in public waters will remain significant, with 20 million in 2050, equivalent to 4% of the EU population. The countries with the greatest proportion of population potentially at risk are: Bulgaria (12%), Romania (8%) and Belgium (9%); whereas the highest numbers of citizens potentially at risk are found in: Italy (3.4 million), Spain (3.3 million) and Germany (2.7 million) (European Commission, 2017[17]; OECD, 2020[14]).

Demographic trends linked to urbanisation also entail the depopulation of rural areas and smaller towns. If not anticipated, these developments could lead to over-investment in oversized infrastructure that could be costly to operate and maintain in the future. The rural population in Romania, for example, is projected to contract by 40% in the coming decades, which could have implications for cost recovery in those areas (OECD, 2020[14]).

Climate change

Climate change will cause significant changes in the quality and availability of water resources. Its impacts manifest through the water cycle and have significant effects on sustainable water resource management. The IPCC (2021[18]) projects that heavy precipitations and associated flooding events will increase in intensity and frequency across many regions in Europe. The changing climate will also affect rainfall patterns, snow melt, river discharge and water availability more generally. While Northern Europe is projected to face an increase in precipitation, the southern part of the continent will experience a decrease in rainfall (IPCC, 2014[19]). Further, higher temperatures resulting from global warming can stimulate the growth of harmful algae and bacteria, degrading water quality. Water-related hazards can cause additional water pollution, e.g. floods triggering disruption of treatment facilities, sea level rise leading to saline intrusion to aquifers or heavy rainfalls causing pollutant loadings (Kerres et al., 2020[20]). Climate change will also affect water demand, e.g. through a projected increase in irrigation needs in Europe (IPCC, 2014[19]) and rising water demand for cooling in the energy sector, exacerbating competition for water and allocation challenges across sectors (OECD, 2021[21]). In addition to growing resource costs and costs for flood protection, costs might arise and increase for alternative water supplies, such as due to investments in water reuse or desalination or other evolving water infrastructure needs. In light of increasing climate variability, water storage and water buffer management are gaining importance (GWP, 2021[22]), which can further drive investment needs and the costs for achieving and complying with the objectives of the WFD.

There is significant uncertainty around how climate change effects will manifest on a regional and local level, as well as on the timing, magnitude and location of specific impacts (Kerres et al., 2020[20]). The unprecedented rate of change and potential novel changes outside of historical experience introduce a greater degree of uncertainty beyond what water managers have traditionally had to cope with. Higher levels of uncertainty also increase the costs of water management, as systems have to be robust to a broader range of potential hydrological conditions. The EU project ECONADAPT (2015[23]) states that the costs of retrofitting wastewater and storm water infrastructure to cope with higher water flows under climate change can be high. Hughes et al. (2010[24]) estimated the costs of climate change adaptation for OECD countries by region: overall the adaptation costs as a proportion of baseline expenditure range from 0.8 – 3.6% for Western Europe, and 6% - 13% for Eastern Europe for two adaptation scenarios. Along with rising costs in the future, a changing climate and increasing uncertainty challenge traditional investment planning

strategies and require new methods, such as resilience-based scenario approaches (see the thematic background note 1 in this series, for more detailed discussion).

Contaminants of emerging concern

Pollution from different sources increases the requirements and costs of water treatment. Contaminants of emerging concern (CECs) comprise a vast array of contaminants that have only recently appeared in water, or that are of recent concern because they have been detected at concentrations significantly higher than expected, or their risk to human and environmental health may not be fully understood. Examples include pharmaceuticals, industrial and household chemicals, personal care products, pesticides, manufactured nanomaterials, and their transformation products. The presence of pharmaceutical residues in the environment poses an increasing problem. Pharmaceuticals produced, consumed and subsequently excreted find their way into water bodies and the environment: Active pharmaceutical ingredients are found in surface waters, groundwater, drinking water, soil, manure, biota, sediment, and the food chain. This phenomenon is exacerbated by the escalating number and density of humans and livestock requiring healthcare and particularly in high-income countries with growing numbers of elderly people with chronic health problems, consuming pharmaceuticals. With this comes an increase in the diversity of pharmaceuticals produced, and a number of uncertainties associated with the environmental risk. There is currently a lack of knowledge concerning the fate of pharmaceutical residuals in the environment and their impact on ecosystems and human health, and the effects of mixtures of the substances; as well as a lack of methodologies to adequately assess associated risks. (OECD, 2020[14]; OECD, 2019[25])

Trasande et al. (2017[26]) estimate a median annual cost of EUR 163 billion in the European Union stemming from exposure to endocrine disruptors[15], which amounts to 1.28% of EU GDP. In the same analysis, the largest burden is found to be borne respectively by France (EUR 25.6 billion), the United Kingdom (EUR 24.7 billion) and Germany (EUR 24.6 billion).

Looking at CECs, Switzerland is undertaking measures to remove 80% of the contaminants from wastewater by 2040. The initiative entails investment costs of estimated EUR 1.1 billion for technical upgrades of treatment plants and EUR 119.6 million annually for operation and maintenance (OECD, 2019[25]). OECD has extrapolated the costs of the Swiss approach to estimate the aggregate level of additional expenditure needed for EU Member States to mitigate CECs. Depending on the pace of investment, these costs are projected to figure between EUR 129 and 206 billion over 2020 - 2040[16]. These figures give an indication of possible rising costs related to pollution with contaminants of emerging concern in the future. As awareness and knowledge of harmful substances are growing, so may the requirements and related costs to address and manage them (OECD, 2020[14]).

Compliance with stringent environmental policies and social expectations

Environmental policies are becoming increasingly ambitious and stringent to match current trends and social expectations. In 2020, the European Commission revised its Drinking Water Directive with reinforced water quality standards that are more stringent than WHO recommendations. The revised directive addresses emerging pollutants, such as endocrine disruptors and microplasctics, and introduces a risk-based approach to reduce pollution at source. It also stipulates measures for better access to water for vulnerable and marginalised groups, thus driving water infrastructure investment needs (European

[15] WHO defines endocrine disruptors as “an exogenous substance or mixture that alters function(s) of the endocrine system and consequently causes adverse health effects in an intact organism, or its progeny, or (sub)populations” (IPSC, 2022[46])

[16] Estimates include 27 EU member states + UK. The projection does not ambition to provide an indication of the future costs of treating CECs across the European Union. It can be considered as a theoretical exercise, and provides an upper estimate of the costs of addressing pharmaceutical residues in freshwater in Europe.

Commission, 2022[27]). The revised policy package entails an estimated additional increase in set-up costs of EUR 5.9 billion to EUR 7.3 billion (European Commission, 2018[28]). Similarly, the Urban Wastewater Treatment Directive (UWWTD) is currently under revision, a legislative proposal for a revised Directive is expected in the second quarter of 2022. The current version of the UWWTD is investment heavy with estimated total annual costs of EUR 18 billion with the current level of implementation and an additional EUR 2 billion for a scenario of full compliance (European Commission, 2019[29]). A more stringent UWWTD could incur additional investment needs and drive costs further. Costs for water management can also be driven by policies and social expectations around water quality and other environmental domains, such as nature conservation, biodiversity or protection against flood risk. Rising public awareness on climate change and natural degradation might raise social expectations on more stringent policies. Expectations on flood protection, for example, has shown to reflect past experiences with flooding and rise with development level and awareness of what is at stake. In the European context, the Floods Directive does not specify any particular level of flood protection and the appropriate level of security remains a political decision on a country level. As public expectations might evolve over time, additional costs could occur linked to higher standards for flood protection (OECD, 2020[14]).

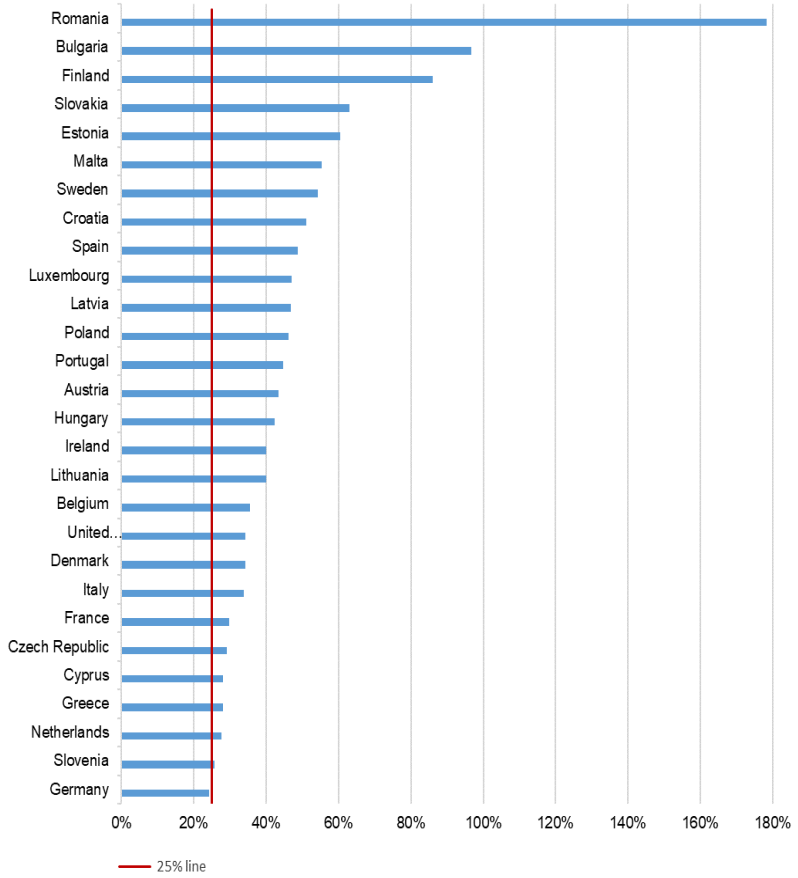
2.3.2. *Increasing gap between water-related financing needs and capacity*

The above discussed trends will drive costs and investment needs in the future which may compromise the capacity of the water sector to cover the costs through water-related revenues. Rising investment needs with limited finance and revenue sources reveals an increasing financing gap for water security in European Member States. Already today, current investment levels are insufficient to achieve and maintain compliance with the WFD and significant investment gaps persist. In France, for example, the investment gap that needs to be filled to achieve good status of water bodies is estimated at EUR 66.65 billion (European Commission, DG Environment, 2021[1]). As of 2019, 64% of the River Basin Districts in the EU had yet to secure finance for all relevant sectors to implement their second PoMs (European Commission, DG Environment et al., 2019[30]). 79% of the River Basin Districts named the lack of finance as an obstacle for the full implementation of their first PoMs (European Commission, 2019[31]).

OECD (2020[14]) produced estimates on investment needs in Member States to comply with the Drinking Water Directive, the UWWTD and the Floods Directive by 2030. Although these data only include WSS services, “they provide a good indication of the expenditure trends for the coming years” (European Commission, DG Environment, 2021, p. 52[1]). In aggregate, European Member States need to spend an additional amount of EUR 289 billion by 2030[17], to achieve and maintain compliance with the named directives. Comparing this sum with current expenditure levels as a baseline on a country basis reveals that all countries need to increase their current annual investments by more than 20% in order to achieve compliance. Some countries face the challenge of much larger financing needs, such as Romania (+180%), Bulgaria (+100%) and Finland (+85%). Figure 2.4 gives an overview of additional financing needs compared to current investment levels per country.

[17] The EU aggregate presented here refers to the EU + the United Kingdom. In addition to being included in the EU aggregate, the UK also features in figures from this report.

Figure 2.4. Per Annum additional expenditures by 2030



Source: OECD (2020), Financing Water Supply, Sanitation, and Flood Protection: Challenges in EU Member States and Policy Options, OECD, Paris

In conclusion, these estimates on future financing needs and capacities reveal rising challenges for cost recovery. For example, while water tariffs are one of the main revenue sources for WSS services, an increase of tariffs commensurate to the increase of investment needs (of over 20%) seems socially and politically unlikely. The structure and level of water tariffs as well as other approaches to recover WSS costs, and broader water management costs, might need further consideration given the context of increasing costs in the future.

3. The implementation of cost recovery: practical issues and emerging options

The second section demonstrated that, despite improvements in the implementation of cost recovery during the last decade, there are still efforts to be made to reach this objective. The context of rising costs will amplify the challenge in the future. This third section explores (political, societal and technical) obstacles to cost recovery, which explain operational difficulties and delays. Options to minimise costs and diversify financing sources are also examined.

3.1. Political and societal issues

Political and societal considerations (affordability, equity…) may, in some cases, conflict with the objective of the recovery of costs for water services. Indeed, pricing mechanisms can serve multiple policy objectives contributing to different sustainability dimensions, notably i) financial sustainability, guaranteeing long-term operation of physical assets; ii) economic efficiency, allocating water to the most beneficial uses for the community and avoiding wastage of economic resources, iii) environmental sustainability, discouraging depletion of critical natural capital and iv) social equity, securing adequate access to affordable water at fair and equitable conditions. While these objectives can support one another, they might also be conflicting. Tensions are likely to occur between the objectives of achieving financial sustainability and cost recovery through water tariffs, and social equity.

3.1.1. *Social equity*

The Equity principle focuses on who, within a group of users, bares the costs and benefits of water management. It aims to ensure equity in the access to water services and protection against water-related risks. It is considered in water management only in a limited number of countries, including Lithuania, Finland, France, Ireland and the Netherlands (OECD, 2021[32]).

When it comes to bearing the costs of WSS for households, a potential conflict between financial sustainability through increased tariffs and social equity through access to affordable services arises (OECD, 2010[5]; Leflaive and Hjort, 2020[33]). From an equity perspective, special attention should be paid to such groups as marginalised groups, poor households, or disabled or sick people, as they may lack equal access to essential services, or be more vulnerable to poor service quality. As efficiency only requires that total welfare is maximised, there is no requirement that the outcome is equitable: welfare maximisation does not consider distributional issues. As a result, equity objectives may sometimes conflict with efficiency objectives and both policy objectives need to be reconciled (Leflaive and Hjort, 2020[33]; OECD, 2011[34]; OECD, 2013[35]).

A commonly made objection against the use of tariffs as a financial instrument for water supply and sanitation services is that tariffs inequitably affect poor households, who need to allocate a larger share of their revenues to cover water bills (Leflaive and Hjort, 2020[33]; OECD, 2011[34]). However, in reality, the tensions between financial sustainability and social equity rest on a number of misunderstandings, and favouring one objective at the expense of the other may undermine the possibility of achieving either of

them (OECD, 2010[5]). Keeping tariffs artificially low for all customers, including those who can afford the full price of the service, is a common tendency that leads to the vicious cycle of decaying infrastructure and deteriorating services. Where the poor are connected to a public service, deteriorating services may hurt them disproportionately (Leflaive and Hjort, 2020[33]). Further, if utilities need to rely on tariffs, it may provide them adverse incentives to extend their networks to poorer areas, since they may perceive the poor as loss-makers (even though this is often a misperception). Limited network extensions would force citizens in poorer areas to pay much more to obtain WSS services, which could be of inferior quality. This may justify the of use additional sources of funding, such as allocations form the public budgets or transfers (OECD, 2010[5]). While cost recovery through tariffs is considered best practice, at least to cover the operation and maintenance costs of service provision, the public good dimension of WSS provides a rationale for covering some costs through taxation. Factoring in affordability considerations and using social tariffs are another mechanism to reach higher cost recovery levels through tariffs while ensuring equity (Leflaive and Hjort, 2020[33]).

3.1.2 Affordability issues in the European context

Affordability can be assessed by comparing the price of water services (the water bill) with the capacity-to-pay of final users. Macro affordability issues can be addressed in the context of strategic financial planning. Planning allows to minimise costs (by revisiting the level of service, the technical options, or the sequence of projects) and increase revenues (through tariffs, taxes, or transfers). Micro affordability indicates that tariffs are too burdensome for specific population groups. (Leflaive and Hjort, 2020[33])

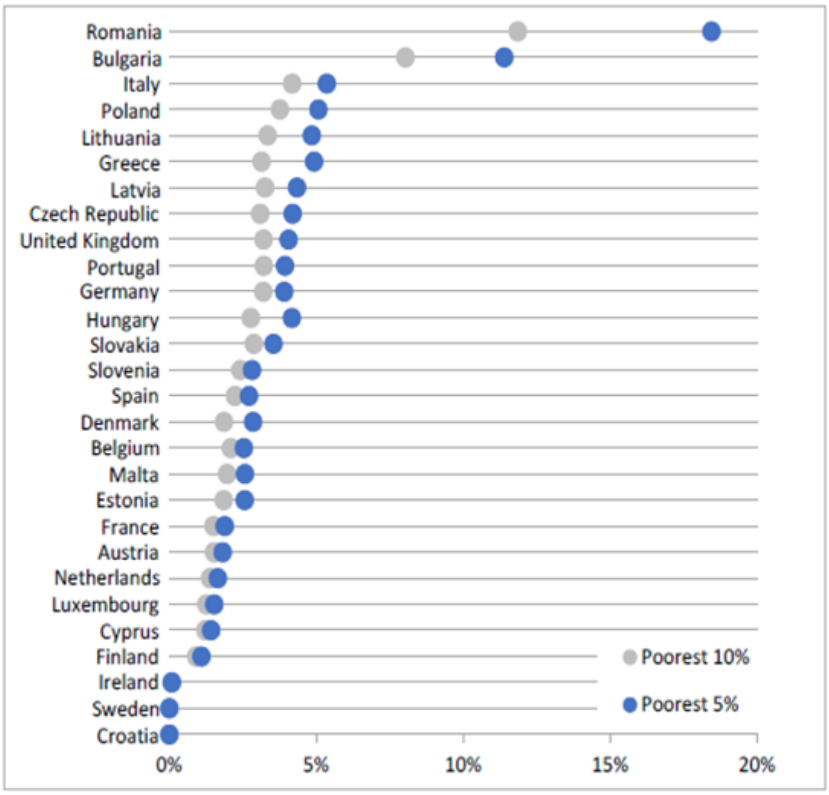
In the European context, analysis showed that cost recovery levels between 90% and 100% do not seem to compromise the affordability of water services[18]. Even under a full cost scenario, WSS would remain affordable, including for households in the lowest income decile in all countries with exception of Romania, where full cost recovery in the WSS sector would result in low-income households spending 7.3% of their budget. (European Commission, DG Environment, 2021[1]) An OECD analysis (2020[14]) found that in 24 EU Member States, more than 95% of the population could pay more for water services without facing affordability constraints on 2011-2015 average[19].

As discussed in section 2.3. on Emerging trends, costs and investment needs of the WSS (and water resource management in general), are expected to increase in the future. OECD (2020[14]) analysed potential affordability concerns, when passing the projected additional expenditures for WSS by 2030 to households. Figure 3.1 below gives an overview of projected affordability issues. It suggests that in most countries, except five or six, the additional costs could be borne by households via tariffs without creating affordability issues for 90% of the population. However, it also reveals that half of EU Member States would face affordability issues for at least 5% of the population. This shows different levels of vulnerability to tariff increases across countries, and affects the way accompanying measures should be designed to mitigate the social consequences of higher prices.

[18] Affordability issues can be considered to arise when households spend more than 3%-5% of their disposable income on water bills. This analysis uses a 5% threshold. It uses average affordability levels, expressed as the percentage of the average water bill over the average income in the country, and the affordability levels for the vulnerable groups, expressed as the percentage of the average water bill over the lowest income decile. In the latter case, the average water bill is considered, and not the actual water bill which would include social tariffs and other affordability measures, which are in place in several countries

[19] considering a 3% threshold

Figure 3.1. Projected affordability issues



Note: Lack of household expenditure data for Croatia and Sweden. Known underestimate of total expenditures for Finland and Sweden. Households' disposable income is constant at 2011-15 level.
Source: (OECD, 2020[14])

Overall, in most EU countries – and in particular in those facing the most severe financing challenges - there is room to ensure that tariffs for water supply and sanitation services reflect the costs of service provision (OECD, 2020[14]). A recent analysis (European Commission, DG Environment, 2021[1]) recommends the use of ex-ante assessments on the affordability of higher water tariffs, in particular concerning vulnerable households, and to implement accompanying measures (e.g. social tariffs) to mitigate any affordability-related issues. Room of manoeuvre is significant in Cyprus[20], where urban water supply and sanitation tariffs (both from water boards and municipal departments) are lower than in most other European countries. In Croatia, affordability concerns create very little room to manoeuvre in terms of tariff increases. One option would be seasonal tariffs in touristic areas, matching peak demand (OECD, 2020[14]). Mechanisms to address affordability issues are varied, although most Member States seem to use reduced water and sanitation tariffs for households with low revenues. Countries without mechanisms

[20] 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.

to address affordability issues for water and sanitation services for lower income households are Latvia, the Slovak Republic and Sweden (OECD, 2021[32]).

3.2. Technical issues

Technical issues, including lack of data availability and challenges to assess and operationally implement financial, environmental and resource cost recovery, can also be an impediment for Member States to achieve the recovery of costs for water services.

3.2.1. *Data availability*

As explained in section 2.1, to comply with the requirements of article 9 of the WFD, Member States must provide information on the specific water services involved, their costs (including possible environmental and resource costs) and the way they are paid for (or not), providers, users/polluters and possible subsidies/transfers, etc. (WATECO, 2003[4]). Member States also have to comply with the mandatory analysis of pressures and impacts (WATECO, 2003[4]).

Gathering this information can be complex and time-consuming, when not available already. Thus, the requirements of the WFD, as explained by the CIS, were progressive in terms of reporting (only available data for the first years of implementation of the WFD and flexibility in terms of geographical scope), with a request to report on the information and knowledge gaps.

As of today, most of the Member States were able to provide information on financial cost-recovery levels for the water and sanitation sector (excluding irrigation), but three Member States did not provide information on the extent of cost-recovery. This highlights the challenges that Member States face in assessing cost recovery levels and applying the cost-recovery principle (and the related Polluter Pays Principle) (European Commission, DG Environment, 2021[1]).

Concerning water supply for irrigation, the financial aspects of irrigation water provision seem to receive less attention in the EU. Data are often scattered between different sources and/or incomplete, and implementation of the cost recovery principle is often weak. Indeed, in several Member States, irrigation water is managed independently (e.g., by irrigation consortia) of water and sanitation services for households, industry, and services. As a result, data specific to the irrigation sector are not available in several countries (European Commission, DG Environment, 2021[1]).

With respect to the geographical scale of the reporting, information on existing pollution, uses, financial costs and prices is generally collected for water service areas (or combined water service areas). This information then needs to be aggregated to the river basin scale. However, converting the data to the river basin level can be complicated. For example, in addition to determining the connected populations in each district, it may be necessary to disaggregate water service assets and costs from the service level to the district (European Commission, 2004[3]). Data is often available at varying geographic scales and heterogeneous. Assessing environmental and resource costs – that may relate to the sub-basin or entire river basin (e.g. if a pollution created in the upstream part of a river basin has negative impact in the estuary of the same river) – requires a good assessment of the scale at which environmental impact of existing water services and uses take place. Costs can then be computed for each water service at the scale of the river basin.

A range of actions for filling the economic and financial knowledge gap related to the costs of the Programs of measure, but also the cost recovery mechanisms and levels, is suggested by the European Commission in the report on “Economic data related to the implementation of the WFD and the FD and the financing of measures (European Commission, DG Environment, 2021[1]):

- Update Member States' reports to collect more robust and consistent information, including reporting on current levels of funding and cost recovery. Rather than a simple compliance exercise, the report suggests that this should be a collective effort to build a shared knowledge base on costs so that the challenges of WFD implementation are shared with policymakers at different levels.
- Strengthen the knowledge base that can support WFD implementation through additional studies and research, particularly with respect to cost categories and the performance of economic instruments and financing mechanisms.
- Improve the sharing and benchmarking of practices among EU Member States, with regard to economic and financial assessments, strategic financing, innovative instruments, etc.

3.2.2. *Methods to assess financial, environmental and resource costs*

There is no consensus on recommended methodologies for assessing and operationally implementing financial, environmental and resource cost recovery, which can lead to difficulties in comparing estimates of cost recovery levels. For environmental and resource costs, the issue is in fact whether the costs can actually be estimated and included, and not so much about the rate of coverage.

Challenges of estimating financial costs

Despite the consensus on the fact that financial costs should be recovered, there are challenges in estimating financial costs in a unified manner (for example how historical capital expenditures, depreciation[21] and subsidies should be taken into account in the calculations). A number of issues are still debated in relation to financial costs estimations, which leads to differences in cost recovery (European Commission, 2010[2]). Amongst the issues highlighted in the financial cost assessments by Member States are the implications of applying alternative accounting systems for capital cost, approaches to treating annual depreciation and the treatment of financial costs of multifunctional infrastructure (European Commission, 2010[2]).

Allowances for depreciation/capital maintenance can be viewed as having both a backward and a forward-looking role. The backward-looking role can be understood as concerned with the recovery of capital expenditure that was incurred in previous years. Thus, cost recovery suggests a backward looking approach – getting the investment costs back, either to pay off the external capital providers or to build up internal reserves to replace the asset. Depreciation under this approach is sometimes referred to as the return of capital, as it can be understood as providing for the return of part of the stock of past capital expenditure that has yet to be recovered. The approach to funding the recovery of capital expenditure incurred in previous years is typically viewed as critical when the credibility of the cost recovery arrangements is being considered. It can therefore have a significant bearing on the ability of utilities to raise new finance, and the costs of raising that finance. In some cases, this method can lead to underestimation of revenues needed to maintain and renew assets financed through grants (EU funds) as no cost was incurred – which may be an issue in some countries which essentially relied on EU funding to build new assets over the last 2 decades (Estonia is a good example). The forward-looking role can be understood as more directly concerned with the financeability of future capital maintenance requirements. In particular, the depreciation allowance results in an additional cash income that can be earned from charges, and that additional cash income will affect the extent to which a company will be able to fund future capital maintenance requirements through revenues from customers, and its ability to (and terms upon which it can) raise external funds, typically through borrowing (OECD, forthcoming[36]).

The treatment of depreciation is a complex issue that varies among water utilities within and between Member States. The way depreciation is calculated and treated when assessing the financial costs can

[21] The depreciation allowance represents an annualised cost of replacing existing assets in future.

affect differently the cost recovery rates. For this reason, Member States are required to clearly establish how depreciation and capital expenditures are treated in the financial costs and how this affects cost recovery (European Commission, 2004[3]).

Estimating depreciation requires defining the value of existing assets and a depreciation methodology. Several methods can be used to estimate the value of existing assets, mainly the historical value, the current value and the replacement value methods. Moreover, utilities have different depreciation policies and diverging depreciation schedules (European Commission, 2010[2]). Indeed, there are several existing approaches to determine allowances for depreciation / capital maintenance. For instance, two alternative approaches that are used in a range of jurisdictions are: a current cost depreciation (CCD) approach applied in relation to all relevant assets (including EU funded assets); and, an infrastructure accounting approach that effectively treats capital maintenance as though it were operational expenditures (OPEX) (and so involves funding expected capital maintenance requirements directly through prevailing charge levels). When one assesses the desirability of different approaches, several factors can be relevant, including affordability considerations and efficiency incentives.

Methodological and operational challenges of estimating and recovering environmental and resource costs

Environmental and resource costs are not commonly estimated. Estimating them is methodologically challenging and there is no consensus on a recommended approach. Hence, in terms of cost recovery, the question is whether costs can actually be estimated and included and not so much, for the moment, about the rate of coverage. Different methods of measuring environmental costs and benefits are existing, which are more or less efficient, costly and appropriate in different contexts. As a consequence, making recovery of environmental and resource costs operational is also a significant challenge. Environmental and resource costs are rarely reflected in current water tariffs and internalising these costs could be very difficult. In addition, it is questionable whether resource cost can be assessed and charged for consistently, particularly at a local level (European Commission, 2010[2]). Moreover, environmental and resource benefits include sometimes non-use value[22], that can hardly be quantified (WATECO, 2003[4]).

To implement the environmental and resource costs recovery requirement, Member States would have to evaluate the environmental impact of each water service in their country and assess its monetary value. This exercise would prove most difficult and resource intensive to be achieved, as the data and environmental models are often not available (European Commission, 2010[2]). Notably, this implies that the linkages of each water service activities within a river basin (measures taken to achieve objectives in one area will potentially have impacts downstream or on other parts of a watershed) need to be fully understood. Only once the magnitude of change in environmental quality has been measured, it is possible to link it to unitary costs and benefits estimated through different techniques, or with the evaluation of the measures that would be needed to prevent and mitigate.

In order to recover environmental and resource costs effectively, several approaches and methods are discussed. In principle, some methods allow to produce estimate by applying standardised monetary values to specific physical impacts. In practice, many uncertainties are linked to the results of using valuation methods in the water domain. Given the difficulties related to economic valuation, other approaches, considered more pragmatic, are based on avoided costs or the costs of measures to reach the good ecological status required by the WFD. For instance, relating the environmental costs to the costs of mitigating measures can be an option. The environmental costs can be internalised if the polluter is charged for the costs of mitigating measures. Among the approaches identified by Members States to internalise theses costs are: the water pollution and abstraction charges, the mitigation measures, the

[22] Benefits that are not associated with any direct use but that exist because individuals value an ecological resource without using or possibly even intending to use it, for example water quality and biodiversity in a lake (WATECO, 2003[4]).

legislation to prevent over-abstraction and the legislation to enforce the implementation of the statutory requirements with respect to wastewater discharges (European Commission, 2010[2]).

Besides, resource costs can be covered via the scarcity premium as shadow price of constrained freshwater supply. Indeed, the resource costs in the tariff on water abstraction generates revenues that can be used to cover the costs of alternative water supply sources (reuse, desalination…). When this is operationalised as a scarcity premium (a price component that reflects the scarcity of the resource), it also helps to render the alternative water "production" economically viable (Dinar and Tsur, 2021[37]). This requires a regulator that can achieve the implied money transfer.

Various techniques are proposed by the Common Implementation Strategy guidance No.1 (WATECO, 2003[4]) for the valuation of environmental costs and benefits, which are more or less resource intensive, practical, and have different financial implications. The document outlines four possible methodologies for estimating those costs: market methods, cost-based valuation methods, revealed preference methods, stated preference methods (see Table 3.1 below).

As an alternative to direct assessment of environmental costs, the use of "value transfer" ("benefit transfer" in the case of benefits) is also a possibility and is particularly relevant when technical, financial, or time resources are scarce. This method takes information on environmental costs or benefits from existing studies and uses this information for analysis at the river basin level, thus transferring values from the site where the study was conducted (the "study site", where the dataset is available) to the site where the results are used (the "policy site"). Nonetheless, as the costs and benefits were estimated in different contexts, the results are unlikely to be totally transferable and accurate in the broader context. In order to ensure that the transfer of derived values to other contexts can minimise the potential for estimation errors, a "stepwise approach" must be undertaken.

Table 3.1. Methodologies for estimating environmental values

Method	Definition	Overall assessment
Market Methods	These methods use values from prevailing prices for goods and services traded in markets. Values of goods in direct markets are revealed by actual market transactions and reflect changes in environmental quality: for example, lower water quality affects the quality of shellfish negatively and hence its price in the market.	Good method if market data exist but limited to direct use values for goods traded on a market. Since this is often not the case, other methods must be used.
Cost-based Valuation methods	This method is based on the assumption that the cost of maintaining an environmental benefit is a reasonable estimate of its value. References for this type of valuation include the costs of preventative and/or mitigation measures. This assumption is not necessarily correct: all mitigation may not be possible, in which case actual mitigation costs would be an underestimate of true environmental costs. By contrast, mitigation measures might not be cost-effective and those costs might be an over-estimate of the environmental costs. A distinction needs to be made between: • The costs of measures already adopted, which are theoretically already included in financial costs. These costs should be reported as a distinct financial cost category. Counting them as environmental costs would be double counting; and The costs of measures that would need to be taken to prevent environmental damages up to a certain point, such as the Directive's objectives. These costs can be a good estimate of what society is willing to forego.	Practical and relatively easy - a good starting point, although the costs of the environmental damage itself tends to be underestimated with this method.
Revealed Preference methods	The underlying assumption is that the value of goods in a market reflects a set of environmental costs and benefits and that it is possible to isolate the value of the relevant environmental values. These methods include recreational demand models, hedonic pricing models and averting behaviour models	This set of techniques tends to be time-consuming and costly to use. The use of such techniques could be reserved to particular environmental issues that raise specific problems
Stated preference methods	These methods are based on measures of willingness to pay through directly eliciting consumer preferences on either hypothetical or experimental markets. For hypothetical markets, data are drawn from surveys presenting a hypothetical scenario to the respondents. The respondent makes a	As above

	hypothetical choice, used to derive consumer preferences and values. Methods include contingent valuation and contingent ranking. It is also possible to construct experimental markets where money changes hand, e.g. using simulated market models. In the questionnaire, it is possible to ask respondents how much they would pay for avoiding an environmental cost or how much they value a given environmental benefit.	

Source: WATECO, 2004, Common implementation strategy for the water framework directive (2000/60/EC) - Guidance Document No 1

As an illustration of the methodological and operational challenges of estimating and recovering environmental and resource costs, valuing ecosystems (and thus damages to ecosystems) can be particularly challenging. For instance, France has launched a national programme to support the quantification and monetisation of the value of ecosystems and ecosystem services in 2012. The programme's 2018 report estimates that the value of the capacity of French rivers to retain nitrogen exceeds EUR 2 billion annually (OECD, 2022[38]). However, no monetary value could be attributed to nearly half of the ecosystem services analysed due to a lack of available data or appropriate methodologies (EFESE, 2018[39]). As damages to ecosystems (and related environmental and resource costs) can be hardly valued, they can consequently hardly be charged for. Nature-based solutions (NbS) are measures that protect, sustainably manage or restore nature, with the goal of maintaining or enhancing ecosystem services to address a variety of social, environmental and economic challenges (OECD, 2020[40]; OECD, 2021[41]). The benefits of NbS have been found to outweigh the costs of implementation and maintenance in a range of contexts. NbS can result in substantial avoided costs (OECD, 2022[38]). However, monetising diffuse and non-market benefits is difficult and comparable metrics for NbS performance are lacking. Some funding models, such as Water Funds have been developed that can recover the costs of investment as avoided costs or through tariffs (OECD, 2018[42]). NbS that use Payments for Ecosystem Services, such as Water Funds, need a strong regulatory regime due to the long timeframe for realising benefits (OECD, 2018[42]).

3.3. Options to recover rising costs

This section discusses two sets of options that can contribute to recover rising costs. A first one aims at minimizing costs now and in the future, and thus lowers the need for revenues and funds for cost recovery. The second one endeavours to diversify financing sources through innovative arrangements to supplement existing funding.

3.3.1. *Options to minimise costs*

Several options can minimize the costs for water services. Firstly, increasing operational efficiency and effectiveness of existing infrastructure and services can optimize the use of available funding. It can lead to financial savings that can be used to provide better services and to contribute to cost recovery. Further, operational efficiency and timely asset management can postpone investment needs and help avoid decaying infrastructure. In practice, however, where the renewal rates of water assets are known, they often reflect a significant backlog of investment in operation and maintenance for existing assets. The box 3.1. below discusses a potential investment backlog in the European context.

Secondly, water user efficiency measures can help minimize investment needs in supply augmentation and alternative water supplies. Particularly in light of climate change and potentially increasing water stress in some regions, efficient water use becomes vital. Measures can include incentive-based water pricing, as stipulated in the WFD and discussed above.

Thirdly, improved planning, priority setting and sequencing of investment can optimize future investment needs. Investment planning should factor in demographic trends, including depopulation of rural areas and

smaller towns to avoid over-investment in oversized infrastructure that will be costly to operate and maintain in the future. For example, the rural population is projected to contract by 40% in Romania in the coming decades, which has implications for current infrastructure development (OECD, 2020[14]). Going beyond the compilation of individual projects, plans should consider how investments can be sequenced over time to improve resilience to future developments and anticipate future investment needs (and factor in existing investment backlogs) (see discussion on strategic investment pathways in background note to workshop 1).

Fourthly, innovation and integrated approaches can contribute to cost savings and increased efficiencies. Water-related innovation is multifaceted: In agriculture, for example innovation is associated with the development of water-efficient irrigation or the adoption of practices that reduce nutrient flows back to water bodies. For WSS, innovation can improve storage techniques, monitoring of river flows and pollution loads, and the operation of infrastructure. EU Member States already equipped with infrastructures may face distinctive challenges to transition towards alternative systems: technical path-dependency and risks of stranded assets can limit the appetite for and the feasibility of alternative systems, at least in the short term. Member States where additional infrastructure is required may find it easier to adopt alternative systems and techniques and ultimately perform better with less capital costs.

Water-related innovation is not limited to new technologies: non-technical innovations, such as sustainable urban planning (e.g. water-sensitive urban design (Brugge and Graaf, 2010[43])) can also contribute to water security and cost reduction. Innovation does not come in isolation; it delivers best when combined with financial and governance measures, and when the interface between urban and rural environments is properly addressed. This highlights the importance of policy coherence and inter-sectoral planning across water policies and other policy domains.

Box 3.1. The impact of investment backlog on costs

Where the renewal rates of water assets are known, they often reflect a significant backlog of investment in O&M for existing assets. In the WSS sector in European Union countries, renewal rates are typically below levels that would be commensurate with assets' life expectancy. Other parts of the water sector – such as agricultural water – face similar challenges with ageing and deteriorating assets. Failure to monitor assets, resolve problems or implement upgrades in a timely way can lead to excessive water losses, including non-revenue water, which undermines the efficiency and effectiveness of water services and raises costs. High rates of non-revenue water are often a sign of operational inefficiency and can provide a partial insight into the extent of backlogs of investment in O&M. A recent OECD study found that there is significant potential to reduce non-revenue water in EU countries including Bulgaria, Poland, Cyprus and Romania, including through targeted maintenance of assets to improve leakage control and drive asset renewal and modernisation.

This investment backlog in EU countries leads to a form of backlog in water resources management (degradation, scarcity), which will lead to higher costs later on, thus weakening the economic model, making recovery even more uncertain in the future. It also triggers an equity issue, as failure to recover costs today results in transferring costs to future generations.

Sources: OECD (2022), Financing a Water Secure Future, OECD Publishing, Paris
OECD (2020), Financing Water Supply, Sanitation and Flood Protection: Challenges in EU Member States and Policy Options, OECD Publishing, Paris

3.3.2. *Diversifying financing sources*

There is a range of options to harness various sources of finance for water projects. Widening the implementation of charges on (other) significant water uses and unlocking untapped (private) sources of finance through innovating funding arrangements could contribute to improving cost recovery for water services.

Expanding charges on significant water uses (other than water abstraction and polluting discharges)

Charges on significant water uses, other than water abstraction and polluting discharges (taxes on pesticides and / or nitrates, water metering fees, etc.) are implemented in less than half of the Member states and their expansion could be promoted (European Commission, DG Environment, 2021[1]). While nitrates and pesticides are among the main water management problems in the EU, only three countries - Denmark, France and Sweden - have put in place a specific charge (such as fertiliser and pesticide taxes to reflect the costs of water pollution) to address the issue, and another one (Bulgaria) is planning to implement it. This observation highlights the weaknesses in the implementation of the polluter-pays principle in the EU. Indeed, if no specific charges are established, the environmental costs of using nitrates and pesticides are born by the society as a whole, or by other user groups (European Commission, DG Environment, 2021[1]). Expanding the implementation of these types of charges could contribute to the recovery of costs for water services.

Innovative funding arrangements to unlock untapped (private) sources of finance

There is a positive correlation between cost-recovery levels and access to debt finance. Indeed, stable revenue streams and financial health of utilities are a pre-condition to attract repayable commercial finance (OECD, 2020[14]). To attract investors' interest, tariffs need to be set in a predictable and transparent way

with the aim of covering operation and maintenance costs, the cost of debt service and a progressive share of capital expenditure where feasible (OECD, 2022[38]). A lack of sustainable cost recovery can leave commercial lenders hesitant to provide loans as they need an assured sufficient and constant operating surplus that can service the debt over the maturity period (Pories, Fonseca and Delmon, 2019[44]).

Private and institutional debt finance represents only under 6% of estimated total expenditures for WSS, and even about 1% in the EU-13. Despite a strong economic case, distinctive features of water-related investments pose barriers for private finance (OECD, 2022[38]), including pervasive under-valuing of the resource and arising benefits for both public and private actors and the nature of water-related investments (relatively small-scale and fragmented, leading to high transaction costs and perceived high risks for investors).

As mentioned in section 2.2, innovative funding arrangements are emerging and represent a significant potential for Member States to raise additional revenue for water management and internalise pressures on water bodies, resulting from abstraction or pollution. The following mechanisms, among others, are particularly promising in this respect (further developed in the background note for workshop 1 on financing and investment planning):

- The implementation of a Payments for Ecosystem Services (PES)[23] system from utilities to farmers in exchange for the protection of catchments and the quality drinking water sources...
- Instruments targeting (or voluntary agreements with) the energy hydropower operators who can deliver additional financial resources to contribute to the good status of water bodies, particularly rivers and hydro-morphological restoration (e.g. in Sweden, a share of the traded hydropower electricity is allocated to a mechanism funding measures that aim at addressing negative impacts caused by hydropower production, thus providing funding streams for mitigation measures, through the eco-label Milöval (European Commission, DG Environment et al., 2019[30]).
- The development of financial mechanisms to support the effective implementation of nature-based solutions (for instance, a storm water tax on property developers for impermeable surfaces that increase the risk of urban flooding could raise revenue for flood protection measures and incentivise nature-based solutions, such as sustainable urban drainage systems), including Natural Water Retention Measures (NWRM) which are widely financed through public funds (national or EU).
- Pricing policies based on the beneficiary pays principle, such as specific taxes for actors who benefit from sustainable water resource management, e.g. land and property developers (such as land-value capture mechanisms, detailed in the box below), or application of the Precautionary Principle for flood protection activities. It should be noted that the beneficiary pays principle is not defined in WFD – hence it is acceptable as long as it does not contravene PPP.

[23] PES are voluntary mechanisms where suppliers of ecosystem goods and services (EGS) are paid by the beneficiaries to manage the ecosystems so that the provision of EGS is maintained and/or enhanced.

Box 3.2. Land value capture – a suite of tools to finance water-related investments

According to the "beneficiary pays" principle, expressed in the Vancouver Declaration during Habitat I, the beneficiaries of public investments that valorise their land should partly cover such costs or return their benefit to the public. The means by which beneficiaries can pay back include taxes, such as land taxes and betterment charges; development charges or permit fees; pricing and compensation policies; adequate assessment of land values; and leasing publicly owned land.

Experience in water-related projects is limited so far. Casablanca, Morocco, paved the way. Casablanca is characterised by rapid urbanisation; its population is expected to grow from 3.5 million to 5 million inhabitants by 2030. Extending the water network, securing access to the resource and protecting it against frequent floods are serious concerns for the local authority, which needs to finance these projects. The city defined a new investment programme in 2007. Revenues from user tariffs cover operational and maintenance costs and the renewal of existing assets (accounting for 70% of total cost over the last decade). A dedicated account (fonds de travaux) covers the remaining costs (essentially land acquisition, network extension and social connections). Financed mainly by contributions from property developers, it has financed a growing share of total investment, from 7% in 2004 to 54% in 2014. Property developers also cover the costs of connecting to the network and in-house equipment. Their contribution varies depending on the type of housing (social housing, villas, hotels and industrial zones), and they pay additional costs for developments that do not feature in the master plan. Contributions are waived when the developments take place in underprivileged neighbourhoods and slums.

Source: UN (1976), The Vancouver Declaration on Human Settlements, https://www.un.org/en/conferences/habitat/vancouver1976. OECD (2019), Land Value Capture: Framework and Instruments, unpublished paper; OECD (2015), Water and Cities, OECD Publishing, Paris

- Environmental offset markets (companies, governments and other actors buy carbon or environmental credits to offset their own emissions or negative environmental impacts), which can generate revenue streams for such water-related investments as wetland conservation, as wetlands are carbon sinks and can thus potentially generate blue carbon credits (examples can be found in the previous background note on financing and planning).
- Extended producer responsibility (EPR) [24] could also potentially further contribute to cost recovery in the water sector. It is discussed in the OECD background note on the Polluter-Pays principle.

Essentially, the potential of using the appropriate combination of sources of finance, mixing different public and private sources, in the water financing framework is still not sufficiently acknowledged. Moreover, combining water-related investments with objectives from other domains, such as agriculture, energy, tourism and urban planning can help to exploit synergies, creating opportunities to capture additional revenues and can unlock investment by applying an integrated approach across the value chain of water-related investment (OECD, 2019[45]). Examples include pollution taxes, which can provide funding for investments in water quality or wastewater treatment. Taxes on urban development in floodplains or impervious surfaces generate revenues for flood protection measures (OECD, 2022[38]). A repeatedly

[24] 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.

reported lack of cross-sectoral coordination, however, hinders the effective use of funding from other sectors and highlights the need for better coordination of planning processes across sectors.

Existing innovative mechanisms are often not implemented at scale, and would require attention and knowledge-sharing on their design, implementation, the conditions under which they perform, their impacts and their contribution to the overall policy goals (European Commission, DG Environment, 2021[1]). Experience sharing among Member States on how these mechanisms are designed and implemented, how to ensure they perform well, could support their expansion (European Commission, DG Environment, 2021[1]).

The financial resources that these innovative instruments can provide, along with a greater focus on cost-effective measures, could help to decrease the number of water bodies for which less stringent environmental objectives are proposed on the basis of disproportionate costs (in accordance with Article 4(5) of the WFD), resulting in less stringent environmental objectives in those areas. This would provide a significant boost to the overall objectives of the WFD (European Commission, DG Environment, 2021[1]).

4.Looking ahead: how fit is cost recovery for the future?

The previous sections recalled definitions of cost recovery as set in the Water Framework Directive and accompanying documentation. They signalled progress made by Member States to recover some of the costs of their programme of measures. They also flagged pending issues, which can be methodological, technical or political in nature. Options to address some of these issues were explored in the preceding section. This section looks ahead and questions how cost recovery is fit for emerging and future challenges.

The underlying observation is straightforward. While Member States keep struggling to recover some of the costs of their programme of measures, it is clear that costs are likely to increase in the future, driven by the need to address the increasing investment backlog and such drivers as the need to adapt to a changing climate and more stringent environmental and health regulations supported by social expectations. It is not clear how these constraints can be reconciled in practice. Two practical questions emerge:

- What is the appropriate level of stringency for environmental policies?
- How much can water policy instruments support future cost increases?

The point is not to question cost recovery as such, but to explore whether it remains practical in the emerging context in Europe.

What is the appropriate level of stringency for environmental policies?

The ambition of the WFD is good status for all European waters. This is a significant contribution to water security in Europe, as it ambitions to mitigate risks of too little, too much and too polluted waters. As discussed in OECD (2013), the appropriate level of security remains a political question. More specifically, water security comes at a cost. The appropriate level of water security needs to reflect how much a community is willing and able to pay to achieve such a level of security. The answer to this question essentially remains a political question. A disconnect can arise, if i) the community expressing the demand is too poor to afford covering these costs; ii) costs are higher than the value of the required environmental functions (reducing economic efficiency); or iii) other communities are unwilling to provide support through some form of financial transfer (e.g. higher taxes or cross-subsidies from higher water prices) (OECD, 2010[5]).

How much can water policy instruments support (environmental) policy objectives?

Equity issues can become complicated when the costs of meeting environmental requirements are being considered in water policy instruments (typically in tariffs for water supply and sanitation services). A common approach is to simply treat any costs associated with meeting environmental requirements as though they are WSS service provision costs, and therefore should straightforwardly be viewed as to be borne by the relevant set of WSS customers. This is typically the case when water bills are expected to cover the cost of adapting service provision of climate change, or when a service provider is expected to

cover the costs of treating wastewater to a certain environmental standard for the benefit of a (basin-wide) community.

In some circumstances, however, this may not result in a close alignment between those being asked to pay the costs of meeting the relevant environmental requirements, and those who benefit from the requirements being met. That is, there may be significant positive externality effects.

The extent of geographic consolidation can be highly relevant in this context, as it can affect how closely aligned the group that fund specific environmental improvements is with the group that benefits from them. For example, wastewater treatment plants can face stringent and costly phosphorus removal requirements that relate to concerns over nutrient levels in receiving waters. It could be viewed that these requirements have widespread benefits across the population, as a river basin scale. When the service area is large, it may be that there would be little practical difference between who bears the costs of, and who benefits from, phosphorus removal (relevant costs would be shared across a broad range of customers from more urban and more rural localities). However, when WSS service provision is fragmented, there is a risk of material disparities emerging between the set of customers who bear the costs of, and those who benefit from, some environmental protection measures provided by WSS companies.

In several Member states, the use of EU funds to support environmental improvements in recent years means that this potential source of tension will have been of limited relevance, as – to a large extent – the costs of meeting environmental requirements were not funded by the customers of the particular WSS companies to which those requirements applied. However, as EU-funded assets need to be maintained and replaced, and as other environmental requirements stand to be addressed, this source of tension can be expected to become more important over time.

In practice, the customers of a given company can be expected to both fund some environmental improvements that benefit others, and benefit from some environmental improvements that are funded by other customers (for example, as those other improvements may contribute to the achievement of national commitments, and in doing so confer widely dispersed benefits). The question arises as to whether the fragmented nature of the sector leaves some customers particularly exposed to funding wider benefits, and if that materially affects the financial sustainability of the relevant company. That might be the case, for example, if a company that serves a relatively modest customer base is required to install and/or maintain tertiary treatment processes that – because of small scale – had a very high unit cost.

The discussion suggests that recovering the costs of programmes of measures through water bills or water-specific economic policy instruments could be questioned in terms of equity. Equity issues may have been masked when past investments benefitted from transfers from the international community. They may emerge more explicitly as communities face the burden of renewing these assets or funding more stringent environmental and health policies in the future. This may tilt the discussion towards political and practical limits of raising tariffs (or water-related charges) and considering more substantial financial contributions from communities who generated the issues to be addressed through programmes of measures.

Annex A - Timetable of implementation of the WFD

The **Water Framework Directive** sets out clear deadlines for each of the requirements which add up to an ambitious overall timetable. The key milestones are listed below.

Year	Issue	Reference
2000	Directive entered into force	Art. 25
2003	Transposition in national legislation	Art. 23
	Identification of River Basin Districts and Authorities	Art. 3
2004	Characterisation of river basin: pressures, impacts and economic analysis	Art. 5
2006	Establishment of monitoring network	Art. 8
	Start public consultation (at the latest)	Art. 14
2008	Present draft river basin management plan	Art. 13
2009	Finalise river basin management plan including programme of measures	Art. 13 & 11
2010	Introduce pricing policies	Art. 9
2012	Make operational programmes of measures	Art. 11
2015	Meet environmental objectives	Art. 4
	First management cycle ends	
	Second river basin management plan	
2021	Second management cycle ends	Art. 4 & 13
2027	Third management cycle ends	Art. 4 & 13
2033 (and every 6 years thereafter)	Revision of river basin management plan	Art. 4 & 13

Source: European Commission, *WFD: Timetable for implementation*, https://ec.europa.eu/environment/water/water-framework/info/timetable_en.htm

Annex B – Article 9 of the WFD

Article 9 – Recovery of costs for water services

"1. 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.

Member States shall ensure by 2010:

— that water-pricing policies provide adequate incentives for users to use water resources efficiently, and thereby contribute to the environmental objectives of this Directive,

— an adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of the costs of water services, based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle.

Member States may in so doing have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected.

2. Member States shall report in the river basin management plans on the planned steps towards implementing paragraph 1 which will contribute to achieving the environmental objectives of this Directive and on the contribution made by the various water uses to the recovery of the costs of water services.

3. Nothing in this Article shall prevent the funding of particular preventive or remedial measures in order to achieve the objectives of this Directive.

4. Member States shall not be in breach of this Directive if they decide in accordance with established practices not to apply the provisions of paragraph 1, second sentence, and for that purpose the relevant provisions of paragraph 2, for a given water-use activity, where this does not compromise the purposes and the achievement of the objectives of this Directive. Member States shall report the reasons for not fully applying paragraph 1, second sentence, in the river basin management plans."

Source: Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

Annex C – Article 5 and Annex III of the WFD on Cost recovery

Article 5 - Characteristics of the river basin district, review of the environmental impact of human activity and economic analysis of water use

"1. Each Member State shall ensure that for each river basin district or for the portion of an international river basin district falling within its territory:

— an analysis of its characteristics,

— a review of the impact of human activity on the status of surface waters and on groundwater, and

— an economic analysis of water use

is undertaken according to the technical specifications set out in Annexes II and III and that it is completed at the latest four years after the date of entry into force of this Directive.

2. The analyses and reviews mentioned under paragraph 1 shall be reviewed, and if necessary updated at the latest 13 years after the date of entry into force of this Directive and every six years thereafter."

Annex III - Economic Analysis

"The economic analysis shall contain enough information in sufficient detail (taking account of the costs associated with collection of the relevant data) in order to:

(a) make the relevant calculations necessary for taking into account under Article 9 the principle of recovery of the costs of water services, taking account of long term forecasts of supply and demand for water in the river basin district and, where necessary:

— estimates of the volume, prices and costs associated with water services, and

— estimates of relevant investment including forecasts of such investments;

(b) make judgements about the most cost-effective combination of measures in respect of water uses to be included in the programme of measures under Article 11 based on estimates of the potential costs of such measures."

Source: Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

References

Brugge, R. and R. Graaf (2010), "Linking water policy innovation and urban renewal: the case of Rotterdam, the Netherlands", *Water Policy*, Vol. 12, pp. 381-400. [43]

Cambridge Econometrics (2017), *Bridging the water investment gap report to the European Commission DG Environment*. [16]

Dinar, A. and Y. Tsur (2021), *The Economics of Water Resources - A comprehensive approach*, Cambridge University Press, https://doi.org/10.1017/9781316678640. [37]

ECONADAPT (2015), *The Costs and Benefits of Adaptation: Results from the ECONADAPT Project*. [23]

EFESE (2018), *Les milieux humides et aquatiques continentaux*, Ministère de la transition écologique et solidaire, https://www.ecologie.gouv.fr/sites/default/files/Th%C3%A9ma%20-%20Les%20milieux%20humides%20et%20aquatiques%20continentaux.pdf. [39]

European Commission (2022), *Review of the drinking water directive*, https://ec.europa.eu/environment/water/water-drink/review_en.html (accessed on 25 April 2022). [27]

European Commission (2019), *Commission Staff Working Document, European Overview - River Basin Management Plans, SWD(2019) 30*, https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SWD:2019:0030:FIN:EN:PDF. [31]

European Commission (2019), *Service request supporting the Evaluation of Directive 91/271/EEC concerning urban waste water treatment Evaluative Study*, https://ec.europa.eu/environment/water/water-urbanwaste/pdf/Evaluative%20study_final.pdf. [29]

European Commission (2018), *Executive Summary of the Impact Assessment, Commission Staff Working Document, SWD(2017) 448 final*, https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1519213135975&uri=CELEX:52017SC0448. [28]

European Commission (2017), *Study supporting the revision of the EU Drinking Water Directive*, https://doi.org/doi:10.2779/650074. [17]

European Commission (2010), *Managing Scarce Water Resources - Implementing the Pricing Policies of the Water Framework Directive*, Entec UK Limited. [2]

European Commission (2004), *Common Implementation Strategy - Information Sheet on Cost Recovery*. [3]

European Commission, DG Environment (2021), *Economic data related to the implementation of the WFD and the FD and the financing of measures : final report*, Publications Office, https://data.europa.eu/doi/10.2779/163850. [1]

European Commission, DG Environment, S. et al. (2019), *Integrated Assessment of the 2nd River Basin Managament Plans: EU-wide storyline report*, Publications Office, https://data.europa.eu/doi/10.2779/640259. [30]

GWP (2021), *Storing water: A new integrated approach for resilient development, Perspective Paper*, https://www.gwp.org/globalassets/global/toolbox/publications/perspective-papers/perspectives-paper-on-water-storage.pdf. [22]

Hughes, G., P. Chinowsky and K. Strzepekc (2010), "The costs of adaptation to climate change for water infrastructure in OECD countries", *Utilities Policy*, Vol. 18/3, pp. 142-153, https://doi.org/10.1016/j.jup.2010.03.002. [24]

IPCC (2021), *Summary for Policymakers. Climate Change 2021: The Physical Science Basis*, Cambridge University Press. [18]

IPCC (2014), *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, IPCC, Geneva, Switzerland, https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf. [19]

IPSC (2022), *Global Assessment of the state-of-the-science of Endocrine Disruptors, International Programme on Chemical Safety, Geneva*. [46]

Kerres, M. et al. (2020), *Stop Floating, Start Swimming, Water and climate change - interlinkages and prospects for future action*, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), https://www.everydrop-counts.org/imglib/pdf/Water%20Climate%20Report%202020.pdf. [20]

Leflaive, X. and M. Hjort (2020), *Addressing the social consequencs of tariffs for water supply and sanitation*, OECD Environmental Working Papers, No. 166, OECD Publishing, Paris, https://doi.org/10.1787/afede7d6-en. [33]

Lindhout, P. and H. Van Rijswick (2015), *The Effectiveness of the Principle of Recovery of the Costs of Water Services Jeopardized by the European Court of Justice – Annotations on the Judgment in C-525/12 – European Commission v Federal Republic of Germany of 11 September 2014*, Journal for European Environmental and Planning Law, https://doi.org/10.1163/18760104-01201006. [13]

OECD (2022), *Financing a Water Secure Future*, OECD Studies on Water, OECD Publishing, Paris, https://doi.org/10.1787/a2ecb261-en. [38]

OECD (2021), *Scaling up Nature-based Solutions to Tackle Water-related Climate Risks: Insights from Mexico and the United Kingdom*, OECD Publishing, Paris, https://dx.doi.org/10.1787/736638c8-en. [41]

OECD (2021), *The interlinkages between water security and climate action, Background paper Session for the 8th Roundtable Meeting on Financing Water, 23. & 24. September 2021*, https://www.oecd.org/water/Background-paper-RT-on-Financing-Water-and-Climate-Action-Session-1.pdf. [21]

OECD (2021), *Toolkit for Water Policies and Governance: Converging Towards the OECD Council Recommendation on Water*, OECD Publishing, Paris, https://dx.doi.org/10.1787/ed1a7936-en. [32]

OECD (2020), *Financing Water Supply, Sanitation and Flood Protection: Challenges in EU Member States and Policy Options*, OECD Studies on Water, OECD Publishing, Paris, https://dx.doi.org/10.1787/6893cdac-en. [14]

OECD (2020), "Nature-based solutions for adapting to water-related climate risks", *OECD Environment Policy Papers*, No. 21, OECD Publishing, Paris, https://dx.doi.org/10.1787/2257873d-en. [40]

OECD (2019), *Land Value Capture: Framework and Instruments*, Unpublished paper. [49]

OECD (2019), *Making Blended Finance Work for Water and Sanitation: Unlocking Commercial Finance for SDG 6*, OECD Publishing, https://doi.org/10.1787/5efc8950-en. [45]

OECD (2019), *Pharmaceutical Residues in Freshwater: Hazards and Policy Responses*, OECD Studies on Water, OECD Publishing, Paris, https://dx.doi.org/10.1787/c936f42d-en. [25]

OECD (2018), *Financing water: Investing in sustainable growth. Policy Perspectives.*, http://www.oecd.org/water/Policy-Paper-Financing-Water-Investing-in-Sustainable-Growth.pdf. [42]

OECD (2016), *Water, growth and finance - Policy perspectives*, https://www.oecd.org/environment/resources/Water-Growth-and-Finance-policy-perspectives.pdf. [11]

OECD (2015), *Water and Cities: Ensuring Sustainable Futures*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264230149-en. [48]

OECD (2013), *Water Security for Better Lives*, OECD Studies on Water, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264202405-en. [35]

OECD (2011), *Economic Instruments for Water Management*, Working Party on Biodiversity, Water and Ecosystems, ENV/EPOC/WPBWE(2011)13. [34]

OECD (2010), *Pricing Water Resources and Water and Sanitation Services*, OECD Studies on Water, OECD Publishing, Paris, https://doi.org/10.1787/9789264083608-en. [5]

OECD (2010), *Pricing Water Resources and Water and Sanitation Services*, OECD Studies on Water, OECD Publishing, Paris, https://doi.org/10.1787/9789264083608-en. [6]

OECD (2009), *Managing Water for All: An OECD Perspective on Pricing and Financing*, OECD Publishing, http://dx.doi.org/10.1787/9789264059498-en. [9]

OECD (2009), *Strategic Financial Planning for Water Supply and Sanitation*, OECD internal document, http://www.oecd.org/water. [8]

OECD (forthcoming), *Analyses and Action Plan towards Sustainable Water Services in Estonia*. [36]

OECD (forthcoming), *Analyses and Action Plan towards Sustainable Water Services in Lithuania*. [10]

Pories, Fonseca and Delmon (2019), *Mobilising Finance for WASH: getting the foundation right*, Water.org, IRC and The World Bank, http://documents1.worldbank.org/curated/en/725521553154723194/pdf/Mobilising-Finance-for-WASH-Getting-the-Foundation-Right.pdf. [44]

Trasande et al. (2017), "Burden of disease and costs of exposure to endocrine disrupting chemicals in the European Union: an updated analysis", *Andrology*, Vol. 4/4, pp. 565-572, https://doi.org/10.1111/andr.12178. [26]

UN (1976), *The Vancouver Declaration on Human Settlement*, https://www.un.org/en/conferences/habitat/vancouver1976. [47]

WATECO (2003), *Common implementation strategy for the water framework directive (2000/60/EC) - Guidance Document No 1 - Economics and the Environment – The Implementation Challenge of the Water*. [4]

Water, O. (ed.) (2018), *Facilitating the Reform of Economic Instruments for Water Management in Georgia*, OECD Publishing, https://doi.org/10.1787/22245081. [12]

Winpenny, J. (2015), *Water: fit to finance? Catalyzing national growth through investment in water security, report of the High-Level Panel on Financing Infrastructure for a Water-Secure World, World Water Council and OECD*. [15]

Winpenny, J. (2003), *Financing Water for All - Report of the World Panel on Financing Water Infrastructure, chaired by Michel Camdessus*, http://www.financingwaterforall.org. [7]