EIB water sector orientation

Building climate-resilient water systems

March 2023

European Investment Bank

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Summary and conclusions

Water infrastructure is what drives civilisation as we know it today. Water is a common resource that must be protected, and access to it must be equitable and affordable. The infrastructure is expensive, yet for services to remain affordable, prices are kept low and asset renewal is often postponed.

When you have just one chance to design a system, it is critical that it can stand the test of time. In the context of climate change and other increasing pressures from human activity, scarce public investment should therefore be well guided to maximise impact — the measure of an action's benefit to society and the planet — over time.

Using established and emerging metrics, this water sector orientation aims to clarify which types of investments have the highest impact as seen through the lens of the European Investment Bank's internal lending rationale, objectives, and drivers.

Within the European Union, safe drinking water and sanitation are available virtually everywhere after decades of sustained investment. Still, the European Union must operate, maintain, and upgrade existing water systems. New regulations will push for investments in the treatment of emerging pollutants such as hormones, pharmaceuticals, and residues of cosmetic products.

In addition, Europe will not be spared the effects of global warming. By 2050, more frequent floods and droughts will lead to significant risks for health, biodiversity, power production, inland navigation, tourism, and agriculture. Most of Western and Southern Europe will likely experience recurring and severe water stress, which will disrupt interconnected and vulnerable supply chains.

Globally, according to the World Health Organization and UNICEF, at least 2 billion people rely on drinking water sources that are contaminated with faeces, and 4.2 billion — more than half the people in the world — lack safely managed sanitation services. The United Nations predicts that water-related threats will become more pressing over the coming years. Population growth and a rapidly developing global economy, combined with the effects of climate change, will exacerbate the lack of access to water and sanitation for domestic use. Experts say that an unpredictable supply of water puts socioeconomic progress at risk and, in many regions, even threatens peace. The same is true for droughts and floods that destroy people's livelihoods and compromise their food security.

Ensuring the availability and sustainable management of water and sanitation for all is one of the United Nations' Sustainable Development Goals to be achieved by 2030. Yet, current investment levels for water are insufficient to address the challenges at stake. The UN Department of Economic and Social Affairs reports a funding gap of 61% for achieving sustainable water and sanitation for all.

The root of the problem lies in a number of market failures that reduce investment incentives for the private sector. The water sector is highly regulated, and each of the subsectors covered by this document is, to a significant extent, subject to market failures, such as imperfectly competitive markets, externalities, public goods, and asymmetric information.

In addition, various investment barriers slow down or hinder the design and implementation of investments or even prevent them from happening at all, as is usually the case for environmental investments. Investment barriers affect the cost and the risk of investment, and the level of competition. In the water sector, the biggest barriers are market fragmentation, regulatory uncertainty, capacity constraints among public sector promoters, and limited access to finance.

Building on its vision and commitment in the Climate Bank Roadmap and the Environment Framework, the European Investment Bank (EIB) has a role to play in helping water-related operations overcome market failures, and alleviating some of the identified investment gaps, having provided over €80 billion in investment since 1960.

This document informs the Bank's internal and external stakeholders about its strategic orientations in the water sector. In a context of limited available financing, it presents investment priorities in conventional infrastructure assets as well as innovations, such as the circular economy, nature-based solutions, and digitalisation. It highlights the types of investments that will maximise the Bank's impact and accelerate the achievement of its climate and environmental objectives.

The effects of climate change are being felt across the globe. Still, water remains largely absent from net-zero strategies; it is the invisible enabler for the transition to a green economy. The EIB Water Sector Orientation sheds light on the strong role climate-resilient water systems can play to achieve sustainable development for all.

1. Introduction

The European Investment Bank is one of the world's largest multilateral lenders to the water sector, and finances, on average, more than €2 billion per year of water infrastructure, both within and beyond the European Union. Operations approved in 2022 alone could supply safe drinking water to 25.4 million people, provide 10.8 million with improved sanitation, and reduce the risk of flooding for over 230 000 people.

The Bank's previous water sector orientation was adopted in 2017. It outlined the EIB's lending priorities in support of EU policies in the sector (water supply, wastewater management and flood protection) with the specific aim of improving water security.

Economic, social, environmental, and political developments have prompted this update of the Bank's water sector orientation, which was prepared on the basis of new EU and EIB strategies. The European Union adopted the European Green Deal in December 2019 (see Box 1), followed by the regulation on sustainable finance that defines a common classification system for sustainable economic activities in the financial system — the EU Taxonomy. In support of the Green Deal, the EIB Group issued the Climate Bank Roadmap[1], the Climate Adaptation Plan[2] (particularly relevant for the water sector, which accounts for a major share of the Bank's financing for climate adaptation), and the Environment Framework, providing a comprehensive summary of the EIB's contribution to environmental objectives.[3]

Box 1: The European Green Deal

The European Green Deal of December 2019 aims to transform the European Union into a fair and prosperous society, with a modern, resource-efficient, and competitive economy where there are no net emissions of greenhouse gases by 2050 and where economic growth is decoupled from resource use. It also aims to protect, conserve, and enhance the European Union's natural capital, and protect people's health and well-being from environment-related risks and impacts.[4] It thereby contributes to the implementation of the Paris Agreement, which was ratified by the European Union in October 2016. To achieve these objectives, it will be necessary to redirect funds towards sustainable projects and activities to make EU Member States more resilient against climate and environmental shocks. This is all the more important given that the 2020s is a critical and decisive decade for climate change.

Source: EIB (2023)

The new sector orientation also considers changes to the Bank's operating environment and relevant reviews from its independent services. Lastly, during 2022, an independent evaluation of water sector projects outside the European Union[5] was completed. Where relevant, recommendations made in the evaluation have been taken into consideration in this sector orientation.

Ultimately, the purpose of this document is to inform internal and external stakeholders about the Bank's strategic orientations in the water sector. It presents the types of investment projects that maximise the Bank's impact in the sector and that better contribute to the achievement of the environmental objectives defined by the EU Taxonomy. It presents the 2030 outlook for the water sector (Section 2), discusses the rationale of the EIB's involvement in the water sector with a focus on alleviating market failures (Section 3), and details strategic orientations for each of the four subsectors, including agricultural water, which was not covered in the previous sector orientation (Section 4).

[1] EIB (2020.) The EIB Climate Bank Roadmap. Available at: https://www.eib.org/en/publications/the-eib-group-climate-bank-roadmap..
[2] EIB (2021). The EIB Climate Adaptation Plan. Available at: http://www.eib.org/en/publications/the-eib-climate-adaptation-plan.
[3] EIB (2022). The EIB Environment Framework. Available at: https://www.eib.org/en/publications/20220213-eib-environment-framework.
[4] European Commission (2019). The European Green Deal. Available at: https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF
[5] EIB (2023). Evaluation of EIB support for the water sector outside the European Union (From 2010 to 2021). Available at: https://www.eib.org/en/publications/20220230-evaluation-of-eib-support-to-the-water-sector-outside-eu

2. Looking ahead: The water sector in 2030

Water investment needs and financing gaps

By 2050, over 40% of the global population is likely to live in river basins under severe water stress. More than 240 million people are expected to remain without access to an improved source of drinking water, and almost 1.4 billion are projected to remain without access to basic sanitation. In almost all regions, water quality is expected to deteriorate, and levels of pollution discharge in the oceans will likely increase in the coming decades.[6] Between 2030 and 2050, the increase in the global mean sea level will accelerate and is expected to be at least 25 centimetres higher in 2050 than the average for 1994 to 2014.[7] In 2050, land currently home to 300 million people will fall below the elevation of an average annual coastal flood. Demand for irrigation water is expected to decrease by 14% compared to its 2000 levels, as a result of a steep increase in demand for competing uses (especially industrial water), and a climate-induced decrease in supply. The resulting increase in water insecurity is likely to multiply the risk of conflict, and food price spikes caused by droughts may inflame latent conflicts and drive migration.[8]

This section identifies the factors that are likely to influence investments in the sector in the long term and, to the extent available, investment requirements until 2030, the target year for achieving the Sustainable Development Goals. Investment drivers are discussed in more detail in Annex 3.

Investment drivers

Domestic and industrial water. Within the European Union, water pollution, climate change and the protection of human health will require the utility sector to increase its investment budgets to maintain existing service levels. This trend has already started in north-western Europe and is becoming apparent elsewhere in the European Union. Climate change, along with population and economic growth, is also expected to increase demand for desalinated water, especially in water-stressed countries that are relatively affluent (and can afford this relatively costly type of water). Outside the European Union, there remains a large unfulfilled demand for access to public water supply networks. From 2020 to 2050, worldwide demand for industrial water is expected to outpace growth in demand for other freshwater uses.

Wastewater collection and treatment. In the European Union, the need to achieve compliance with the Water Framework Directive, the Urban Waste Water Treatment Directive and the Sewage Sludge Directive will continue to drive investments in wastewater infrastructure. The European Commission has adopted a proposal to revise the current Urban Waste Water Treatment Directive that aims to significantly reduce water pollution from urban sources and address micropollutants, align with the objectives of the European Green Deal (notably regarding energy use, greenhouse gas emissions and the circular economy), and improve the governance of the sector.[9] Outside the European Union, investments in wastewater infrastructure will be concentrated in large cities, where the provision of centralised collection and treatment of wastewater can no longer be postponed. There is also a substantial unfulfilled demand for on-site and decentralised sanitation services, especially in peri-urban areas outside the European Union where centralised wastewater collection systems are unaffordable or not economically feasible. Although the number of basic sewer connections is expected to increase in many developing countries, populations will often increase at higher rates, so that connection rates will decrease. In water-stressed countries, climate change is expected to drive increased investments in wastewater reuse.

[6] OECD Environmental Outlook to 2050. Available at: https://www.oecd.org/env/cc/49082173.pdf.
[7] European Environment Agency (2022). Global and European sea level rise. Available at: https://www.eea.europa.eu/ims/global-and-european-sea-level-rise (accessed 10 March December 2023).
[8] World Bank Group (2016). High and Dry: Climate Change, Water and the Economy. Available at: https://openknowledge.worldbank.org/handle/10986/23665.
[9] European Commission (2022). Proposal for a Directive concerning urban wastewater treatment (recast). Available at: https://environment.ec.europa.eu/publications/proposal-revised-urban-wastewater-treatment-directive_en.

Flood protection. Investments in this subsector will increase significantly, albeit from a low base, mainly because a continued increase in extreme weather events will mobilise political support for better protection against floods. However, outside the European Union, investment in other sectors (notably domestic water supply) will frequently take priority until at least 2030.

Agricultural water. The bulk of the investments in the sector within the European Union will focus on modernising existing irrigation and drainage infrastructure to increase agricultural productivity, comply with regulatory requirements, increase energy efficiency, and improve the status of the water bodies on which such infrastructure depends. Increased precipitation variability during the growing season may provide an incentive for some areas to invest in supplementary irrigation (including irrigation water reuse) to ensure the economic viability of agricultural production. Outside the European Union, while changes in dietary preferences will lead to an increase in demand for agricultural products, other factors such as climate change, population growth and the drive for economic development will compel a further expansion of irrigated areas. In addition, the interest in systems that collect stormwater for agricultural uses is growing.

Investment needs

Water supply. According to estimates of the Organisation for Economic Co-operation and Development (OECD), annual capital investment in water supply in the European Union will need to increase from €60 billion to about €90 billion per year from 2020 to 2030 in order to achieve complete service coverage, comply with European Union directives, and reduce leakage rates to 10%.[10] [11] Most of the estimated investment is required to increase coverage (especially in the central-eastern part of the European Union), and then to achieve compliance. Investment requirements for leakage reduction are relatively modest. Investments needed to only achieve SDG 6.1 (a target that has largely already been achieved in the European Union) by 2030 are estimated at about $113 billion per year worldwide, mostly for increasing access to piped water in non-EU countries.

Wastewater. According to OECD estimates, annual capital investment in wastewater in the European Union will need to increase from €40 billion to about €60 billion per year to achieve complete service coverage in urban areas with a population of at least 2 000 by 2030 and to comply with the European Union directives related to effluent quality. Investment requirements are closely related to population size, with the largest countries requiring the highest investments. The cost of undertaking the measures included in the proposal for a revision of the current Urban Waste Water Treatment Directive are estimated at about €3.8 billion per year in the European Union, from the first year of implementation until 2040 (this figure includes investment and operating and maintenance costs, and would be in addition to the increases estimated by the OECD).[12] According to the World Resources Institute, investments needed to achieve SDG targets 6.2 (improve access to sanitation) and 6.3 (improve water quality) by 2030 are estimated at about $300 billion per year worldwide (in constant 2015 prices). The global cost for achieving SDG target 6.2 is highest in South Asia and sub-Saharan Africa. For SDG target 6.3, costs are highest in East Asia, Europe, and Central Asia.

[10] Unless stated otherwise, all OECD estimates mentioned in this chapter were taken from OECD (2020). Financing Water Supply, Sanitation and Flood Protection: Challenges in EU Member States and Policy Options, OECD Studies on Water, OECD Publishing, Paris. Available at: https://doi.org/10.1787/6893cdac-en.

[11] OECD estimates do not include other investments needed to adapt to climate change, so actual investment requirements are likely to be higher.

[12] European Commission (2022). Proposal for a Directive concerning urban wastewater treatment (recast), Impact Assessment Report. Available at: environment.ec.europa.eu/publications/proposal-revised-urban-wastewater-treatment-directive_en.

Flood protection. There are no reliable figures on investment in flood protection infrastructure by country. According to the OECD, capital investments in the European Union were around €3 billion per year during 2011-2015, which is far lower than investments in water and wastewater infrastructure (estimated at over €100 billion during the same period). To put this figure into perspective: the value of insurance claims of riverine flood damage in Germany in 2021 alone was over €40 billion. At present, the cost of riverine floods in Europe is about five times as high as the cost of coastal flooding, although the reverse is expected by the end of the century. An indication of potential demand for flood infrastructure is given by the value of expected flood losses in the absence of adaptation to rising sea levels. In 2050, the expected losses in the world's largest 136 coastal cities would amount to $1.2 trillion per year.[13] Of these losses, $90 billion would accrue in the EIB's main markets (the European Union, the Eastern Mediterranean, Africa, and Latin America). Note that this figure gives an indication of potential demand for infrastructure as opposed to actual demand, which, as mentioned above, will largely be driven by policy priorities. Nevertheless, with the growing frequency of extreme weather events and floods, the Bank anticipates that investments in flood protection will increase at a faster pace than in the other subsectors covered by this orientation. The Bank has actively promoted increased investment in coastal protection through its Blue Sustainable Ocean Strategy (Box 2). However, because the increase starts from a low base, the investment requirements will initially remain modest.

Box 2: Blue Sustainable Ocean Strategy

In 2019, the EIB launched a strategy to support economic activities related to the oceans while preserving the health of the seas and coasts and protecting their biodiversity. This initiative aims to crowd in public and private investment for the ocean economy. For the water sector, the Blue Sustainable Ocean Strategy is especially relevant as it supports investment in sustainable coastal flood protection projects, i.e., projects that protect coasts against storm surges and sea level rise, coastal erosion and land loss and urban flooding within the coastal zone.[14]

Source: EIB (2023)

Agricultural water. Investment requirements depend directly on the objectives pursued by governments and private sector investors interested in agriculture. These objectives in turn depend on the environmental and social aspirations of the country or region where the investments are to be made. In 2019, the World Bank published a study titled "Beyond the Gap" where it identified investment needs in infrastructure, including those in irrigation.[15] This study found that only for irrigation, the annual average investment requirements in low- and middle-income countries range between a minimum annual spending scenario of $43 billion (0.12% of gross domestic product (GDP)) up to $100 billion (0.20% of GDP) for a maximum spending scenario during the period 2015-2030. Geographically, investment needs as a percentage of GDP are greatest in sub-Saharan Africa, followed in descending order by South Asia, East Asia and Asia Pacific, Latin America and the Caribbean, and the Middle East and North Africa. Beyond investment requirements, particularly outside the European Union, the improvement of irrigation service provision requires much more than just capital expenditure. It includes the persistent need to ensure sufficient operation and maintenance resources, including well-trained staff. Therefore, there is a need not only to invest more but also to design better focused investments that help to deliver better irrigation and drainage services in the long run. According to OECD data, total public agriculture-related support for water in 54 countries — the aggregate of the EU Member States that existed at the time, other OECD member countries, as well as 13 emerging economies — increased between 2000 and 2011 from $25.9 billion to

[13] Hallegatte, S., Green, C., Nicholls, R. et al. (2013). Future flood losses in major coastal cities. *Nature Climate Change,* 3, 802-806.
[14] EIB (2019). Blue sustainable ocean strategy. Available at: https://www.eib.org/attachments/thematic/eib_blue_sustainable_ocean_strategy_en.pdf.
[15] World Bank (2019). Beyond the Gap — How Countries Can Afford the Infrastructure They Need while Protecting the Planet. Available at: https://www.worldbank.org/en/topic/publicprivatepartnerships/publication/beyond-the-gap---how-countries-can-afford-the-infrastructure-they-need-while-protecting-the-planet.

$54.2 billion and then declined slowly to $41.6 billion in 2019.[16] While these figures depict the level of public investment in agricultural water management, the actual needs are higher, clearly indicating a need for private sector involvement. This should include farmers, whose buy-in and financial contribution is increasingly important in line with international and EU best practices.[17]

Cross-sectoral developments. In addition to these sector-specific observations, the EIB also anticipates that technological changes and the increased importance of resource recovery will lead to more partnerships among utilities and other participants in the water, food, and energy sectors, which may increasingly coordinate and share investments. Technological solutions may also help utilities and other service providers to improve water efficiency. Such solutions include but are not limited to automated leak detection, automated leak repair, advanced metering infrastructure and digital twins (see also Box 3).

Box 3: Innovation in the water sector

The climate crisis, ageing and growing populations and dwindling resources are urging us to transform the way we live, learn, work, and produce. Innovation and technology are crucial to make this transformation happen. Innovation is also key to economic growth and employment. It drives prosperity and the European Union's competitiveness. Emerging technologies such as artificial intelligence, quantum computing and advanced manufacturing will have a profound impact on employment and the economy. In the water sector, the challenges are on a different scale to what they were in past decades and are only set to increase, as previously mentioned. With more challenging issues to be tackled, existing solutions may no longer be cost-effective, and technological and organisational developments may open doors to new and better possibilities. The Bank provides support for investments in research and development, as well as for the commercialisation and deployment of novel water technologies to both private and public sector companies or entities, or public-private partnerships. The EIB Group's financial offering covers direct loans, guarantees and equity investments via financial intermediaries and is complemented by the provision of advisory services.[18]

Source: EIB (2023)

[16] OECD (2020). Agricultural Policy Monitoring and Evaluation 2020, OECD Publishing, Paris. Available at: https://doi.org/10.1787/928181a8-en.

[17] For example, the EU Water Framework Directive 2000/60/EC and related acquis.

[18] For details about the EIB's products and services, see https://www.eib.org/en/products/index.htm

3. Rationale for EIB financing in the water sector

Why should a public bank be involved in the water sector?

To address **market failures**, public intervention is often needed. Such intervention is provided in many forms, including but not limited to public ownership, sector regulation, fiscal incentives (such as grants, subsidies, and tax relief), and public financing of water sector infrastructure. Box 4 summarises the main types of market failures associated with the water sector.

Box 4: Market failures in the water sector

In economic theory, private markets lead to efficient decisions — including investment decisions — under a demanding set of conditions. In reality, these conditions are only met to varying degrees. Investment decisions are, in practice, likely to be hampered for several reasons. In the water sector, these include:

- **Imperfect competitive markets.** In the water sector, there is a pervasive market failure resulting from strong increasing returns to scale, as drinking water supply, wastewater collection and treatment and, in some cases, agricultural water supply are all natural monopolies.
- **Externalities**. Investments in the water sector often result in positive externalities. For example, the upgrading of a wastewater treatment plant normally improves the quality of groundwater, surface water, or the sea, and reduces greenhouse gas emissions (which indirectly benefits parties other than customers of the wastewater treatment plant). Another example of a positive externality is research and development (R&D), which typically generates benefits for society that are not fully captured by the provider of the R&D. Conversely, the construction of an energy-intensive treatment facility, such as a wastewater treatment or desalination plant, may result in negative externalities if the energy source increases greenhouse gas emissions. Because the providers of goods with positive externalities cannot charge indirect beneficiaries, markets will provide fewer goods with positive externalities than is optimal from a societal point of view. In contrast, without some form of public intervention, markets would produce more goods with negative externalities than would be societally optimal.
- **Public good**. An example of a public good is a flood protection system. Such a system generates benefits for all people living in the area protected by it. None of these people can be excluded from these benefits (non-excludable). The protection provided to one person in the area does not subtract from the protection offered to other persons in the same area (non-rival). The private sector will not provide public goods in the quantities and qualities that would be optimal from a societal point of view, simply because it will not be able to exclude non-paying consumers from using the good (for this reason, this market failure is also referred to as a "missing market").
- **Asymmetric information**. Another common market failure in the sector is the mismatch between the economic life of water sector infrastructure (which is usually long), and the availability of long-term financing (the term of which often cannot match the economic lifetime, especially in countries with relatively undeveloped financial markets). This market failure is mainly caused by asymmetric information between potential borrowers and potential lenders, as the latter typically do not have the data needed to correctly price long-term financing for water sector projects and enforce contractually agreed debt service payments and end up not offering such financing.

Source: EIB (2023)

As the EU Climate Bank, the EIB complements these interventions by providing its borrowers with long-term financing on terms that are not normally available in domestic financial markets. It also helps borrowers, through its advisory services, prepare investment programmes that best meet the needs of their clients.

In addition to market failures, both private and public sector promoters face a set of **investment barriers** that slow down or hinder the design and implementation of investments or even prevent them from happening at all. The problem is particularly acute where environmental investments are concerned. Investment barriers are factors that adversely affect the cost and risk of investment, and the level of competition. In the water sector, the most relevant barriers are:

- **Market fragmentation.** In countries with highly fragmented markets, most water utilities do not fully benefit from economies of scale and are too small to qualify for direct loans from the EIB.[19]
- **Regulatory uncertainty.** In countries where water sector regulation is either absent or subject to political pressure, tariffs are often far below cost-recovery levels and tariff adjustments cannot be predicted with a high degree of confidence. In such an environment, service providers normally do not have direct access to long-term financing, including loans from the Bank. Tariffs being below cost-recovery levels is not a problem per se, provided that the gap between the full cost of the service and the income from tariffs is adequately funded from taxes and transfers. This, however, is not often the case in countries with high levels of regulatory uncertainty.
- **Capacity constraints among public sector promoters**. The preparation of bankable investment projects requires planning, operation and maintenance capacities that are often lacking, especially in highly fragmented markets and in markets outside the European Union.
- **Limited access to finance**. This barrier typically affects service providers that depend heavily on capital investment grants from the public sector (especially flood protection and agricultural water supply) and is usually correlated with limited creditworthiness.

It should be noted that barriers vary considerably across countries, especially with regard to market fragmentation (for example, there are ten drinking water providers in the Netherlands, compared to over 30 000 in France). In general, the investment barriers mentioned here are much more severe outside the European Union than in Member States.

[19] Examples include Estonia and Lithuania. For these markets, the OECD emphasises the role of policy and economic regulation to support the bundling of small service providers (Towards Sustainable Water Services in Estonia: Analyses and Action Plan | en | OECD). The OECD has also analysed the role of intermediaries, who can bundle projects together so that they reach a size that is attractive for investors and to minimise transaction costs (role of intermediaries to facilitate water.pdf (indiaenvironmentportal.org.in).

4. Building climate-resilient water systems

The EIB's strategic orientations for the water sector

The EIB aims to generate a positive economic, social, and environmental impact for society. Its financing tackles market failures by reducing investment gaps, in line with the Bank's public policy goals[20] and its climate action and environmental sustainability objectives. In addition, all EIB investments contribute to the achievement of one or more SDGs.

In this context, the Bank's investments in the water sector will be strategically oriented towards:

- **Domestic and industrial water supply.** Outside the EU, new and extended climate-resilient water supply systems still have the biggest impact on achieving SDG 6, whereas the development of alternative sources and storage for areas where water scarcity is a large threat contributes more to climate action. Digitalisation and asset management optimisation efforts significantly contribute to the Bank's climate action and environmental sustainability objectives, especially if they result in increased energy efficiency and the reduction of non-revenue water.
- **Wastewater.** Investments in new or extended wastewater treatment plants and sewage collection systems help achieve SDG targets 6.2 (improve access to sanitation) and 6.3 (improve water quality). They best contribute to the Bank's climate and environmental objectives and have relatively high investment requirements both in the European Union and in large cities elsewhere. Investments in new or upgraded wastewater treatment plants have substantial potential to fight climate change by reducing greenhouse gas emissions through the better treatment of wastewater and digestion of sludge. In the European Union, there is an increased interest in equipping wastewater treatment plants with quaternary wastewater treatment processes to eliminate or drastically reduce micropollutants in the effluent (Box 5). The proposal for a revised Urban Waste Water Treatment Directive addresses micropollutants. Other areas of increasing importance are phosphorous recovery and wastewater reuse.
- **Flood protection.** All types of flood protection investment projects can substantially contribute to SDG target 11.5 (reduce damage from natural disasters), climate change adaptation and — particularly nature-based solutions — to environmental sustainability.
- **Agricultural water.** Investments that enable the shift to more energy-efficient pumping systems and/or allow greater use of renewable energy sources can make a significant contribution to climate mitigation. With increasing water scarcity, economically viable alternative water sources such as treated wastewater, improved water productivity and water efficiency, and investments that increase the efficiency and reliability of water supply to closely match actual irrigation needs (such as ICT equipment) all contribute to climate adaptation. Crop diversification is also a valid climate adaptation strategy for monocultures in irrigated areas that are more vulnerable to weather variability, pests, and diseases. Desalination technologies remain, in general, too expensive to produce agricultural water. Until green desalination technologies can produce water with an acceptable carbon footprint and at an economically viable level to justify their use in agriculture, these technologies will not be feasible for large-scale agricultural purposes.

[20] The EIB's public policy goals are discussed in The EIB Group Operational Plan 2022-2024.

With agriculture's sheer footprint in the water, food and energy nexus, multipurpose infrastructure that achieves several objectives such as flood protection, energy generation and the provision of drinking and agricultural water may often be a preferred route to mitigate the impact on the environment and produce better outcomes for local communities.

Box 5: Micropollutants and microplastics: Contaminants of emerging concern

Micropollutants are compounds such as industrial chemicals, pharmaceuticals, cosmetic products, pesticides, and hormones that, through daily use, find their way into the environment and potentially back into our food chain. Microplastics are tiny solid plastic particles (smaller than 5 millimetres) that are increasingly found in the ocean, in aquatic animals and even in Arctic ice. At present, about 1.5 million tonnes of microplastics enter the oceans every year. Conventional wastewater treatment plants are an effective means to reduce pollution by microplastics in treated wastewater, as they capture up to 99%. However, to reduce micropollutants in treated wastewater, it is necessary to invest in additional treatments (better known as quaternary treatment or, more colloquially, "the fourth step"). In the European Union alone, the total investment needed to implement a process for the effective removal of micropollutants is estimated at €1.2 billion to €2.6 billion per year.

Source: EIB (2023). Microplastics and Micropollutants in Water: Contaminants of Emerging Concern. Available at: https://www.eib.org/en/publications/20230042-microplastics-and-micropollutants-in-water

The table below summarises the strategic orientations for each of the subsectors covered by this document. For all strategic orientations, the EIB will be able to support both infrastructure and research and development projects.

What the EIB is already doing vs. strategic sector orientations

What the EIB is doing…	
…and will continue to do	**…and will seek to develop or do more of * (STRATEGIC SECTOR ORIENTATIONS)**
DRINKING WATER SUPPLY	
New or extended water supply systems (in EU Member States)	New or extended water supply systems (in countries outside the European Union)
Improved efficiency of water supply systems	Digitalisation of water utilities
Rehabilitation of existing water supply systems	Optimisation of asset management
Desalination plants (“last resort”)	Alternative water resources and additional storage to cope with climate change, notably drought risk
WASTEWATER COLLECTION AND TREATMENT	
Rehabilitation of existing sewer networks	New or extended sewer networks
Upgrade of wastewater treatment plants	New and/or extended wastewater treatment plants
	Systems for removing micropollutants
	Digitalisation of wastewater utilities
	Sludge management, including recovery of phosphorus and other nutrients
	Wastewater reuse
FLOOD PROTECTION	
Flood protection structures for inland and coastal areas	Urban stormwater management systems (including sustainable urban drainage systems)
	Early warning systems
	Nature-based solutions
AGRICULTURAL WATER MANAGEMENT	
New irrigation or drainage schemes	Crop diversification as a strategy for climate adaptation and mitigation
	Energy-efficient pumping systems with increased use of renewable energy
	Multipurpose infrastructure including flood protection/energy generation/provision of drinking water/agricultural water systems
	Extended use of alternative water sources and focus on increasing water productivity
Modernisation of existing irrigation or drainage schemes	Investments to reduce water losses in storage and conveyance systems, improve water efficiency and increase reliability of water supply, and closely match irrigation service with actual irrigation needs
	Increase use of ICT to improve water management

* The development or increase of activities in line with strategic sector orientations does not necessarily imply an increase in lending volume of these types of investment projects vis-à-vis lending volumes realised in recent years.

The following sections cover the Bank's orientation towards each of the subsectors in more detail.

Domestic and industrial water supply

Drinking water supply projects generate substantial positive externalities by enabling socioeconomic development in the areas covered by such projects, among other things. In the European Union, where most of the population is connected to public water supply systems that provide potable water, this target has mostly been achieved already, and new systems are mainly built to accommodate population growth and improve the efficiency of existing systems. This is not the case in many countries outside the European Union, where coverage rates are much lower and there is still a significant unmet demand for piped water connections. The rehabilitation of existing water supply systems or investments to improve efficiency do not, by themselves, increase access. Desalination plants constitute a special case: they are normally built in areas where existing sources of freshwater are exhausted, and building such plants is almost always motivated by the need to continue to provide the population with potable water. As such, they prevent an expected reduction in access to safe drinking water.

Investment projects in this subsector may contribute significantly to climate change adaptation and climate change mitigation, and depending on the context, to environmental sustainability.

- **Climate change mitigation.** Most of the greenhouse gases emitted in the domestic and industrial water sector originate from equipment needed to produce drinking water and distribute this water to the final users. This equipment is typically powered by electricity that is supplied from the national grid. This means that greenhouse gas emissions generated by this subsector are not only driven by the power consumption of the utilities themselves but also by the energy mix that is used to generate electricity feeding the grid (the average quantity of carbon dioxide equivalent emissions per kilowatt-hour generated is known as "the grid factor"). To reduce total greenhouse gas emissions, a utility should attempt to reduce the amount of power needed to satisfy demand for domestic and industrial water in its service area. This can be done through one or more of the following measures: (i) reducing non-revenue water (m^3 produced minus m^3 supplied to final user); (ii) reducing the average power consumption (kWh per m^3 supplied to final user) by improving equipment and system efficiency; and (iii) reducing the average water consumption (m^3 demanded by final user).

  Drinking water utilities with high loss rates, a high average power consumption and a high average water consumption have the greatest potential to contribute to climate change mitigation. In many EU Member States, the scope for further reducing greenhouse gas emissions is limited. Outside the European Union, drinking water utilities normally need to serve service areas with a rapidly increasing population, in which case there is the opportunity to put in place efficient systems from the start.

- **Climate change adaptation.** Climate change requires investments in the improved physical resilience of assets, in alternative or back-up water sources, or in additional storage facilities to cope with extreme weather events (notably droughts) while maintaining service quality at current levels.[21] In water-stressed countries, most investments in water supply systems are at least partly triggered by the need to adapt to the adverse impacts of climate change. Water-stressed countries without sufficient freshwater resources increasingly need to invest in non-conventional sources such as desalination plants, which is a costly form of adaptation. Because of their potentially high carbon footprint, desalination plants are only financed by the EIB under specific circumstances. Climate change is also expected to result in an increase in investment costs to strengthen the physical resilience of water infrastructure (this observation also applies to the other subsectors covered by this document).

[21] Alternative or back-up resources may include emergency interconnections with neighbouring utilities, or the use of resources so far considered too costly to treat (such as brackish water and polluted groundwater) or to transport (such as from another river or a reservoir lake). Additional storage facilities could be for raw water (lakes) or treated water (service reservoirs).

- **Environmental sustainability.** Investment in efficiency improvements and the rehabilitation of existing systems contribute towards environmental sustainability as they promote better resource utilisation rates. This is not the case for new or expanded systems.

Wastewater collection and treatment

Wastewater projects are associated with substantial positive externalities, especially in the form of public health and environmental benefits. Although access to piped sewerage systems is relatively high in the European Union, it remains lower than access to piped water. In many Member States, there is also a backlog in complying with effluent quality standards because of infrastructure deficits, operational failings, planning delays, and other reasons. In most non-EU countries, service coverage rates and effluent quality are usually even lower. As a result, investing in new or extended sewage collection systems and in new, extended or upgraded wastewater treatment plants is expected to contribute significantly to achieving both indicators. Outside the European Union, there is also a large unfulfilled demand for on-site sanitation in peri-urban areas. Adequate wastewater collection and treatment is also a primary means to combat diarrhoeal diseases (over 95% of related deaths occur in developing countries). Diarrhoeal diseases are the second leading cause of death in children under five worldwide.

Investments in this subsector may contribute significantly to climate change mitigation and environmental sustainability by improving the quality of water bodies and promoting resource reuse.

- **Climate change mitigation.** The potential for reducing greenhouse gas emissions is often higher in the wastewater sector than in the water sector, partly because wastewater collection and treatment may be more energy intensive than providing drinking water (a wastewater treatment plant is often the single largest electricity consumer in a city), but especially because wastewater utilities have the potential to reduce greenhouse gas emissions — notably methane — from untreated or poorly treated wastewater under anaerobic conditions. The methods for minimising emissions by wastewater collection and treatment include: (i) improving wastewater treatment processes; (ii) removing stormwater from wastewater collection systems; (iii) reducing the average power consumption (kWh per m^3 collected and treated); and (iv) using renewable energy — ideally biomethane from sludge digesters.

  In the EU, there is still significant scope for reducing greenhouse gas emissions from wastewater in countries with low coverage rates. A major constraint to increasing investments in wastewater projects is limited cost recovery levels, which means that such projects often require substantial capital subsidies.

- **Climate change adaptation**. Investments in this subsector may also contribute to climate change adaptation through, for example, investments in facilities for domestic or industrial wastewater reuse, and the separation of combined sewer systems. In fact, any resource efficiency investment contributes to climate change adaptation because it means fewer natural resources are used.

- **Environmental sustainability**. Wastewater projects promote the sustainable use and protection of water and marine resources and directly contribute to pollution prevention and control.

Flood protection

Flood protection projects address the market failure that is also referred to as a "missing market". In the absence of measures to adapt to rising sea levels, economic losses will increase substantially, both in percentage terms and absolute terms.

Investment projects in this subsector can contribute significantly to climate change adaptation and environmental sustainability.

- **Climate change adaptation.** In the short and medium term, the increased frequency of extreme weather events (notably heavy rainfall and storms) will result in increased flooding, both in riverine and coastal areas, causing severe social and economic effects. Rising sea levels will further exacerbate the impact of flood events. Many floods protection projects — including early warning systems — are undertaken with the explicit aim of adapting to climate change.[22]
- **Environmental sustainability.** Nature-based solutions may contribute directly to the sustainable use and protection of water and marine resources, and often also help protect and restore biodiversity and ecosystems (especially nature-based solutions, such as "room for the river" projects).

Agricultural water management

Agricultural water management projects address a variety of market failures, including imperfect competition, positive externalities, public goods, and asymmetric information. Investing in agriculture is one of the most effective ways to address poverty, as most poorer people depend on it.[23] Given that water is often the main limiting factor for agricultural production, investments in agricultural water management can increase food availability and help ensure the sustainable management of water.

Investment projects in agricultural water management often contribute substantially to climate change adaptation and mitigation as well as to environmental sustainability.

- **Climate change mitigation.** Agricultural water management in some countries requires substantial amounts of energy for pumping. This is not only due to the large water volumes normally required, but also to the long distances or high elevations water needs to be pumped over. While a substantial proportion of the energy demand is satisfied by the power supplied through the electricity grid, a sizeable proportion is supplied directly via fossil fuels by using mobile pumps at farms. Therefore, irrigation and drainage users should aim to reduce overall pumping volumes and the related energy consumption, and, on a case-by-case basis, replace external energy demand with on-site, decentralised renewable energy generation directly linked to pumping and water regulation systems. This can be achieved by investing in pressurised schemes and highly efficient pumps and pump control systems, by integrating renewable energy systems and by diversifying water sources to maximise the use of gravity-fed flows. All energy-efficient irrigation investments have the potential to contribute substantially towards climate action. Moreover, when an irrigation scheme enables annual crops to be replaced by perennial crops such as tree orchards, the mitigation benefits can be substantial. This is because of increased soil carbon sequestration due to the change in soil management practices and the carbon sequestered in the orchard itself. In the European Union, the EIB has already started financing these types of projects, and growing demand is expected. Outside the European Union, the Bank's focus on irrigation and drainage modernisation will help to identify opportunities for such projects, particularly in Eastern Europe, the Caucasus, and Central Asia.

[22] Most flood protection projects consist of fixed structures that require little or no equipment. As a result, this subsector offers little scope for avoiding or reducing greenhouse emissions from reductions in power consumption.

[23] World Bank (2007). World Development Report 2008: Agriculture for Development. Washington, DC. Available at: https://openknowledge.worldbank.org/handle/10986/5990.

- **Climate change adaptation.** In recent years, some countries within the European Union, including some beyond the Mediterranean countries where irrigation has a long tradition, have shown interest in investing in water storage and irrigation as a response to the increased frequency and duration of droughts and dry spells during the agricultural growing season. Although water storage provides multiple benefits, more storage can exert considerable environmental pressure on water bodies. Careful planning is required to identify opportunities for multipurpose reservoirs that can simultaneously serve different sectors with proper mitigating measures in place to maintain an adequate water status in the bodies affected. Outside the European Union, the need to develop new irrigation and drainage schemes is sometimes justified to maintain agriculture in areas where rain-fed cultivation starts to fail too often due to unreliable rainfall. Systems that collect and store stormwater for use in the agricultural sector are normally also driven by the need to adapt to climate change (which, in most parts of the world, adversely affects the availability of freshwater resources). Stormwater collection may have the additional benefit of decreasing the impact of flooding.

  The modernisation of irrigation schemes also has great potential to support climate adaptation efforts, as modern conveyance systems could substantially reduce water seepage and evaporation losses. Water productivity needs to be considered hand in hand with proper water allocation systems to achieve net water savings at the basin level and avoid promoting the extension of irrigated areas by only considering the irrigation scheme level.

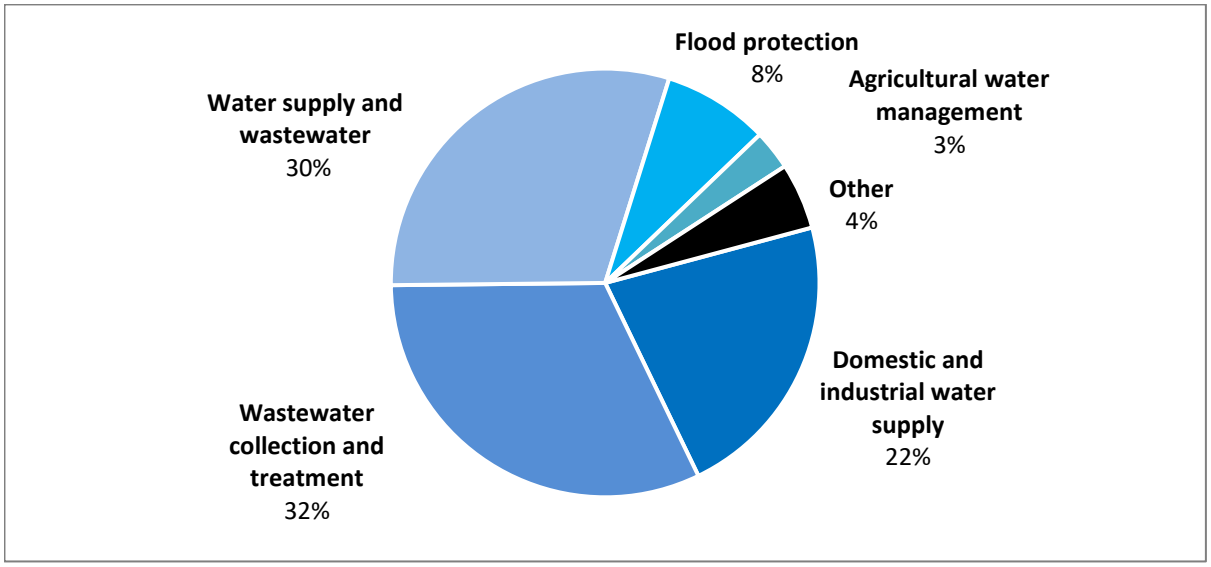
- **Environmental sustainability.** Investing in the modernisation of irrigation and drainage schemes may achieve better resource utilisation and thus contribute towards environmental sustainability. Mere rehabilitation investments do not always contribute significantly to environmental sustainability unless they achieve net water savings or improve resource utilisation. New schemes may contribute positively towards environmental sustainability if they replace unsustainable resource utilisation, such as the over drafting of groundwater.

Annex 1. EIB lending to the water sector, 2018-2022

During 2018-2022, the EIB financed about €12.6 billion of water sector infrastructure, mostly in the form of long-term investment loans and allocations under framework loans. About 30% of the water sector loans went to entities outside EU Member States, which is a much higher share than for the total of the EIB's lending (about 10%).

As shown in Figure A1, wastewater collection and treatment was the largest subsector by lending volume (32%), followed by combined water supply and wastewater projects (30%) and domestic and industrial water supply (22%). Flood protection, agricultural water management and other water sector operations accounted for the remainder (16%).

Figure A1: EIB water sector lending, 2018-2022
(Share of total signature value)



Source: EIB (2023).

In this period, the EIB financed about €2.8 billion in stand-alone **domestic and industrial water projects**, and an additional €3.8 billion in **combined water and wastewater projects**. In the European Union, most of these projects were initiated and prepared by public utilities to maintain service levels and comply with European Union directives. Most water supply projects outside the European Union were initiated by central government agencies to increase access to piped water supply systems and were co-financed by international financial institutions.

EIB loans for **wastewater** accounted for about one-third of its total lending to the water sector during 2018-2022. The Bank financed about €4.0 billion worth of wastewater projects (not including the €3.8 billion for combined water and wastewater projects mentioned above). In the European Union, most of these projects were initiated and prepared by public utilities or national governments to either maintain or achieve compliance with Urban Waste Water Treatment Directive 91/271/EEC and Sewage Sludge Directive 86/278/EEC. In recent years, the EIB has financed relatively few wastewater projects outside the European Union, where providing access to public water supply systems is often a higher priority for governments.

The EIB loans for **flood protection infrastructure** were concentrated in a small number of relatively large projects, which accounted for about 8% of the Bank's total water sector lending during 2018-2022 (signature value: €1.0 billion). Flood protection projects are usually initiated by national authorities to help implement national plans and, in the European Union, to comply with the requirements of the Floods Directive.

During the same period, the Bank financed about €0.4 billion worth of projects related to **agricultural water management**.[24] In the European Union, these covered both the public and private sectors. Projects outside the European Union were mostly undertaken by central government agencies dedicated to the development of land and water resources. Private sector companies and individual farmers could also be included under the scope of agricultural water management projects through the Bank's intermediated lending.

[24] The term "agricultural water management" comprises the management of water used in crop production under rain-fed conditions and under irrigation, as well as field water conservation practices, water harvesting, and supplemental irrigation and drainage. It also includes the use of water for livestock production and inland fisheries.

Annex 2. Eligibility criteria and due diligence requirements

The EIB will only finance investment projects that meet its:

- **General eligibility criteria.** A project meets the EIB's general eligibility criteria if it is in a country where the Bank is active, it does not involve an activity on the Bank's list of excluded activities and sectors, and it is Paris-aligned.[25]
- **Due diligence requirements.** Any project financed by the EIB must meet the general requirements, such as technical feasibility, economic feasibility, and compliance with the Bank's procurement guidelines and social and environmental policies (Boxes A1 and A2).

Box A1: Environmental and social policies

The EIB Group Environmental and Social Sustainability Framework is an overarching policy framework that allows the Group to focus on sustainable and inclusive development, committing to a just and fair transition and supporting the transition to economies and communities that are climate and disaster resilient, low carbon, environmentally sound, more resource efficient, and supportive of gender equality. It consists of a Group-wide Environmental and Social Policy and a revised set of EIB Environmental and Social Standards that describe the requirements that all EIB-financed projects must meet. At the heart of the Bank's Environmental and Social Sustainability Framework is a "mitigation hierarchy" stating that all the Bank's operations respect human rights, do not cause significant harm to the environment and are consistent with internationally agreed targets to fight against climate change and biodiversity loss, and avoid or mitigate potential adverse environmental, climate and social impacts. The latest policy has been in force since February 2022.

Source: EIB (2023)

Box A2: EIB Group Strategy on Gender Equality and Women's Economic Empowerment

Global water insecurity will exacerbate existing threats to the accessibility, availability, affordability, and quality of water services. Increasing women's involvement in the water sector is an opportunity to enhance the efficiency, effectiveness and sustainability of water projects and improve water security. At the same time, it is disproportionately harder for women and girls to lead safe, productive, and healthy lives without safe drinking water, adequate sanitation, and hygiene facilities at home and in places of work and education. In line with the EIB's Strategy on Gender Equality and Women's Economic Empowerment, the Bank aims to promote women's participation in the water sector across the globe through leadership, employment and entrepreneurship opportunities, and design water sector investments, in particular outside the European Union. This increases women's access to affordable and quality water, irrigation, sanitation, and hygiene facilities.

Source: EIB (2023)

- **Sector-specific eligibility criteria.** In agricultural water management, the Bank finances projects that encourage the sustainable use of water, resource efficiency and, where relevant, that follow the United Nations Economic Commission for Europe principles for the use of transboundary water resources. In principle, all other types of investment projects in the water sector are eligible. Projects to develop new water resources (including economically viable desalination of coastal or brackish water and inter-basin water transfers) are only supported provided that all demand-side measures, including measures to improve water efficiency and reduce network losses and other non-revenue water, have been fully considered and found to be insufficient to

[25] EIB (2022). EIB eligibility, excluded activities and excluded sectors list. Available at: www.eib.org/en/publications/eib-eligibility-excluded-activities-and-excluded-sectors-list.

address the gap between supply and demand, and that no environmentally and economically better alternatives are available. Such projects may include the establishment of multipurpose reservoirs that must respect the requirements of the Water Framework Directive, in particular Article 4.7 on new modifications to the physical characteristics of a surface water body, as well as the Bank's guidelines on hydropower development.[26] Lastly, as with any other agricultural water management project, desalination infrastructure for irrigation purposes needs to be financially self-sustained and economically justified by the agricultural added value. Desalination for agriculture is unlikely to be economically justified if not fully based on renewable energy resources.

The potential impact of an investment project is associated in large part with its expected contribution to the Sustainable Development Goals. The most relevant goals for the water sector are SDG 6, followed by SDG 3, SDG 11 and SDG 13 (Table A1). An investment project's contribution to achieving the taxonomy objectives is measured by an internal system that the Bank recently enhanced to track how its financing contributes to climate action and environmental sustainability. The Bank will prioritise the financing of investment projects that are in line with these strategic sector orientations, and that comply with its standards and procedures.

Table A1: SDGs of primary relevance to the water sector

SDG/SDG Target	
SDG 3: Ensure healthy lives and promote well-being for all at all ages	
Target 3.3	By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases, and other communicable diseases.
Target 3.9	By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.
SDG 6: Ensure availability and sustainable management of water and sanitation for all	
Target 6.1	By 2030, achieve universal and equitable access to safe and affordable drinking water for all.
Target 6.2	By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.
Target 6.3	By 2030, improve water quality by reducing pollution, eliminating dumping, and minimising release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and substantially increasing recycling and safe reuse globally.
Target 6.4	By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.
SDG 11: Make cities and human settlements inclusive, safe, resilient, and sustainable	
Target 11.5	By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.
SDG 13: Take urgent action to combat climate change and its impacts	
Target 13.1	Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.
Target 13.2	Integrate climate change measures into national policies, strategies, and planning.

Source: United Nations (2015).[27]

[26] EIB (2019). Environmental, Climate and Social Guidelines on Hydropower Development. Available at: www.eib.org/en/publications/environmental-climate-and-social-guidelines-on-hydropower-development.

[27] Details are available at: https://sdgs.un.org/goals.

Annex 3. Investment drivers

This annex discusses the primary factors affecting investments in each water subsector in detail.

Water supply

Socioeconomic developments in service area. In most EU Member States, changes in demand for water are typically modest and hence unlikely to cause a significant increase in the need for water supply infrastructure. Service area populations are expected to grow slowly, except in regions with high levels of immigration, and the average consumption is expected to remain stable or decrease. As a result, there is limited scope to increase coverage because coverage rates across most of the EU are already close to 100% (Member States in Eastern Europe are a significant exception).

High unfulfilled demand outside European Union. There is a significant unmet demand for domestic water supply services outside the European Union, both in terms of quantity and quality, as evidenced by indicators measuring the achievement of Sustainable Development Goal targets. In 2020, less than 30% of households in sub-Saharan Africa had access to safe and affordable drinking water, compared to 94% for households in Europe (SDG indicator 6.1.1). Rapid urbanisation, especially outside the European Union, will further increase demand. According to the United Nations, the world's population will increase from 8.0 billion in 2022 to 8.5 billion in 2030, and to 9.7 billion in 2050.[28] During 2022-2050, more than half of the projected increase in population will occur in sub-Saharan Africa. In 2050, more than 68% of the world's population will live in cities, up from 57% in 2022 and 60% in 2030.[29]

Climate change. This is perhaps the most important determinant of increases in investment budgets for drinking water utilities in the European Union that already comply with European Union directives and cover close to 100% of their service area populations. Because of an expected increase in extreme weather events (notably droughts), utilities will need to adapt to climate change by increasing their investments in alternative or back-up resources, or in additional storage facilities, to maintain current service levels and ensure water security in the future. To mitigate the adverse impacts of climate change, utilities are increasingly investing in measures to improve energy efficiency, reduce non-revenue water and digitalise their systems (see also Box A3). Some utilities in the European Union also have explicit targets to source energy from renewable sources with the longer-term goal of achieving net-zero carbon water. Outside the European Union, investments in public water supply systems are being accelerated, as on-site alternatives (such as wells and surface water) are rapidly becoming exhausted. Climate change is also likely to result in increased effluent reuse and increased demand for desalination plants in water-stressed countries. The global desalination market is expected to increase from $13.5 billion in 2021 to $28.9 billion in 2030, which implies an average annual growth rate of close to 9%.[30]

[28] United Nations (2022). World Population Prospects 2022. Available at: https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/wpp2022_summary_of_results.pdf.
[29] United Nations (2018). World Urbanization Prospects: The 2018 Revision. Available at: https://population.un.org/wup/publications/Files/WUP2018-Report.pdf.
[30] Smart Water Magazine (2022). Water desalination market to reach US$28.83 billion by 2030. Available at: https://smartwatermagazine.com/news/brainy-insights/water-desalination-market-reach-us2883-billion-2030 (accessed 10 March 2023).

Box A3: Digitalisation of the water sector

Digitalisation is the use of digital technologies to change a business process and provide new revenue and value-producing opportunities, including opportunities for cost optimisation. The digitalisation of an organisation normally starts with improving knowledge of existing systems. For water supply and wastewater services, this typically means the installation and use of data collecting devices (such as smart water meters and pressure sensors) and the digitisation of the network under their management. This is then often combined with the remote control of equipment such as pumps and valves from a central location through a supervisory control and data acquisition (SCADA) system. This digital information helps water utilities to better understand how their systems are functioning. This, in turn, enables them to reduce their operating costs (for example, by reducing water losses and improving energy efficiency), make better use of their assets (which would reduce future capital investment costs), optimise cost recovery through digitalised workflows, and improve customer service through better leak detection and reduced service interruptions and sewer overflows. Digitalisation may also lower resource consumption and greenhouse gas emissions. The digitalisation of a water supply network can be supplemented by broader data on water availability or rain patterns to enhance the performance of network operation, including in relation to flash floods and storage management. In the agricultural sector, SCADA systems are also becoming widely used in irrigation schemes and often help improve the quality of systems monitoring and ensure that irrigation services are better tailored to actual crop needs.

Source: EIB (2023)

Regulatory compliance. In the European Union, water utilities will need to invest to remain compliant with the Water Framework Directive and the revised Drinking Water Directive. In addition to climate change, some examples of pressures on our water supply include unregulated or inadequately regulated abstraction, which has led to the deterioration of groundwater resources. When not applied adequately or not properly handled, nutrients and pesticides may run off from farmland and deteriorate the ecological and chemical status of surface waters. Addressing these problems requires substantial investments. The revised Drinking Water Directive was adopted in December 2020 and will need to have been transposed into national legislation by January 2023. The main elements of the revised directive are updated water quality standards, tackling emerging pollutants, a risk-based approach for the assessment and management of the supply system and the whole water supply chain from the catchment area, and distribution measures to reduce water leakage. The directive will also improve the provision of information to consumers, create harmonised standards for materials and products in contact with drinking water, improve access to water, and promote the use of tap water. In addition, there is a current backlog of investments in many Member States, and it is likely that in most countries the rate of renewal of existing assets is too low to sustain service quality over time (the exact rate of renewal is largely unknown, which calls for improved performance standards, measurement, benchmarking, and reporting). Outside the EU, investments are mainly driven by the need to implement nationwide plans to increase the connection rate, often with the ultimate aim of achieving universal coverage.

Cost optimisation. Water utilities are increasingly focused on optimising their costs to remain financially sustainable while minimising tariff increases. This is especially important in an inflationary environment, which is expected to persist in the short and medium term. Cost optimisation may also have benefits for climate change adaptation (such as investments in reducing leakages) and mitigation (such as investments in renewable energy sources).

Wastewater collection and treatment

Socioeconomic developments in service area. The demand for wastewater collection and treatment services is closely correlated with the demand for water supply services, simply because most wastewater can only be collected and treated after it has first been delivered as clean ("non-waste") water. Socioeconomic developments also affect the type of wastewater treatment that is feasible. For example, centralised wastewater treatment is often not feasible in areas that are poor, have low population densities or extreme height differences. In such cases, on-site sanitation facilities are appropriate.

Climate change. The impact of climate change on the amount of wastewater that needs to be treated depends, in part, on the type of collection system that is in place. In combined sewer systems, the expected increase in stormwater due to climate change will, over time, result in increased "combined sewer overflows" (and hence in water not reaching the treatment plant). Climate change and rising energy prices are also triggering investments in sludge digesters to produce biogas. This will help to reduce greenhouse gas emissions from external power supplies, which continue to be partly generated by fossil fuels for most wastewater utilities. The goal to reduce greenhouse gas emissions is also driving investment in more efficient wastewater treatment processes. An increasing number of wastewater utilities have adopted net-zero emission goals. These can be achieved through a combination of more efficient wastewater collection and treatment processes, energy recovery and energy production. This is especially important given that increased effluent quality targets and more ambitious nutrient reduction targets (nitrogen and phosphorous) will require more energy-intensive processes. Climate change, in particular longer dry spells, is also expected to lead to increased investments in more advanced facilities for wastewater reuse (Box A4).[31] Lastly, climate change is expected to increase the cost of wastewater collection and treatment facilities to better adapt these to extreme weather events, thereby further increasing investment requirements.

Box A4: Wastewater reuse

Water is a valuable but limited and fragile resource. Wastewater presents opportunities for successfully recovering resources contributing to the circular economy and enabling long-term sustainable development.[32] EIB wastewater sector projects may contribute to a circular economy by supporting the recovery of energy from wastewater streams, treated wastewater reuse for industrial, agricultural, and urban water supply purposes, and recycling of nutrients from sewage sludge into fertiliser. The potential role of treated wastewater reuse as an alternative source of water supply is now well acknowledged and embedded within international, European, and national strategies. The proposal for a revised Urban Waste Water Treatment Directive promotes water reuse by Member States. SDG 6 specifically targets a substantial increase in recycling and safe reuse globally by 2030.

Source: EIB (2023)

[31] EU Regulation 2020/741 on minimum requirements for water reuse for agricultural irrigation entered into force in June 2020. The new rules will apply from 26 June 2023 and are expected to encourage and facilitate water reuse in the European Union.

[32] EIB (2022). Wastewater as a resource. Available at: https://www.eib.org/en/publications/wastewater-as-a-resource.

Regulatory compliance. In the European Union, wastewater utilities will need to invest to achieve compliance with the Urban Waste Water Treatment Directive and the Sewage Sludge Directive. The European Commission has adopted a proposal for a revision of the current Urban Waste Water Treatment Directive that addresses pollution from urban sources with reinforced effluent quality standards for nutrients in more areas, new emission standards for micropollutants, smaller population centres in the scope, and integrated urban wastewater management addressing urban runoff and stormwater overflows, with the use of green infrastructure. The proposal also includes a binding national target of energy neutrality for the wastewater sector, along with energy audits and the systematic monitoring of greenhouse gas emissions. It suggests tracking non-domestic pollution at source to support the reuse of treated wastewater and sludge and incentivising the recovery of phosphorus. Furthermore, Member States would be required to promote the reuse of treated wastewater.[33] Regarding governance, the proposal addresses the financing of micropollutant removal with an extended producer responsibility scheme. The proposal also includes the introduction of wastewater surveillance, and increased transparency based on key performance indicators, with digitalisation supporting enhanced reporting and monitoring. These requirements will further increase investment needs.[34] The Sewage Sludge Directive will be revised later and is expected to promote sludge valorisation, which will become mandatory in certain Member States (Box A5). In addition, recent legislation on wastewater reuse expresses the ambition for a more circular economy of the subsector.

Box A5: Sewage sludge as a resource

The Sewage Sludge Directive was approved in 1986, well before the approval of Urban Waste Water Treatment Directive 91/271/EEC, which made wastewater treatment for agglomerations with a population equivalent of more than 2 000 compulsory. At present, Member States produce at least 8.5 million tonnes of sewage sludge per year, and this amount is expected to increase in the coming years. Some Member States have banned the use of sewage sludge as fertiliser, partly to address concerns about traces of heavy metal, which has opened avenues for new types of disposals, such as enhanced anaerobic digestion or thermal drying, to produce a final product (such as cement) that requires no external consumption of energy. Other disposal methods, such as mono incineration, can be considered as transitional until more large-scale circular solutions are developed and become feasible. It is worth noting that phosphorus recovery from ashes obtained by incinerating sewage sludge is proposed as an activity for the EU Taxonomy.[35]

Source: EIB (2023)

[33] European Commission (2022). Proposal for a Directive concerning urban wastewater treatment (recast). Available at: https://environment.ec.europa.eu/publications/proposal-revised-urban-wastewater-treatment-directive_en.

[34] See also EIB (forthcoming). Microplastics and micropollutants in water: Contaminants of emerging concern.

[35] Annex to Platform on Sustainable Finance's report with recommendations on technical screening criteria for the four remaining environmental objectives of the EU taxonomy (March 2022)

Change in policy priorities. In most EU Member States, the financial cost of domestic and industrial water supply is fully covered by tariff revenues. This is not the case for wastewater collection and treatment, which is subsidised in most countries (including many Member States). As a result, investment decisions for wastewater projects are influenced by policy priorities. This is even more so the case in countries outside the European Union, where cost recovery rates tend to be lower. In some countries, there are increasing concerns about the impacts of wastewater discharge on the world's oceans, which has in some cases led to the voluntary adoption of measures to improve effluent quality beyond regulatory requirements (as practiced by wastewater utilities around the Baltic Sea) or to address plastic pollution, even though there is no regulatory requirement to do so (Box A6).

Box A6: Clean Oceans Initiative

In 2018, the EIB, the AFD and the KfW launched the Clean Oceans Initiative, the world's largest common initiative devoted to funding projects that aim to reduce plastic pollution at sea. By June 2022, the initiative had achieved almost 100% of its original target by providing €1.9 billion in long-term financing for public and private sector projects that reduce the amount of plastics, microplastics and other litter being discharged into the oceans through improved management of solid waste, wastewater and stormwater. As a result, the target was increased to €4 billion by the end of 2025, in collaboration with several new partners, including promotional banks from Italy (CDP) and Spain (ICO), which joined the initiative in 2020, and the European Bank for Reconstruction and Development (EBRD), which joined in 2022.

Source: EIB (2023)

Flood protection

Socioeconomic developments in flood-prone areas. The objective of flood protection infrastructure is to protect people and assets from floods. The potential demand for such infrastructure is therefore driven by the number of people and the value of assets in the area to be protected by the infrastructure provider.

Climate change. For flood protection projects, this is by far the most important investment driver. The global mean sea level has risen about 21 centimetres since 1900 and is expected to rise by another 10-15 centimetres by 2030.[36] This will require higher investments in coastal flood protection infrastructure. The expected increase in extreme weather events will also result in more frequent and more severe riverine floods.

Regulatory compliance. In many Member States, flood protection standards (such as 100-year return periods) were set without taking climate change into consideration, and no longer appear to be valid. In response, governments have increased protection standards, or are considering doing so. This will increase the required investments in flood protection infrastructure.[37] Quantifying flood risk under future climate change remains challenging due to large uncertainties in the current climate change modelling framework. This is nonetheless an essential requirement for the implementation of the second cycle of the Floods Directive. Member States are expected to take the likely impacts of climate change into account when planning the rehabilitation of existing or new flood protection infrastructure.

[36] European Environment Agency (2022). Global and European sea level rise. Available at: https://www.eea.europa.eu/ims/global-and-european-sea-level-rise (accessed 10 March 2023).

[37] For details, refer to European Commission, Directorate-General for Environment (2021). Current practice in flood risk management in the European Union: September 2021. Publications Office of the European Union. Available at: https://data.europa.eu/doi/10.2779/235272.

Change in policy priorities. Because flood protection is a pure public good that cannot be provided to individual users (a market failure known as a "missing market"), actual demand will mainly be driven by policy priorities.[38] These priorities are likely to increase with the expected frequency in extreme weather events, as demonstrated, for example, by a renewed interest in flood protection infrastructure in the aftermath of the floods that affected most of Europe in the summer of 2021.[39] Many flood protection projects actually begin as reconstruction projects in the aftermath of natural disasters such as hurricanes, storms and river floods. There is also an increased interest in nature-based solutions, which are well-suited to improving climate resilience to the negative effects of water shocks. These solutions include but are not limited to flood protection (Box A7). Sustainable urban drainage systems are an example of nature-based solutions in an urban environment (Box A8). The proposed revision to the Urban Waste Water Treatment Directive promotes both nature-based solutions and sustainable drainage with integrated urban wastewater management plans. It is worth noting that nature-based solutions are supported under the EU climate strategy, the biodiversity strategy, and the nature restoration law proposal.

Box A7: Nature-based solutions for flood and drought risk reduction

Nature-based solutions for flood and drought risk reduction refer to natural flood management measures that may have a key role to play in protecting against river and coastal flooding and preventing droughts. Nature-based solutions must benefit biodiversity and support the delivery of a range of ecosystem services such as climate mitigation, flood control, storing water to address droughts (hence benefitting water supply), water purification, and stabilising shorelines and slopes. A key element of the successful implementation of nature-based solutions is community engagement and participation in the decision-making process for the design and maintenance of such solutions over their lifetime. Examples in rural environments include the restoration of rivers, swamps, floodplains, and coastal wetlands. In urban areas, they include sustainable urban drainage systems (SUDS).

Source: EIB (2023)

Box A8: Sustainable urban drainage systems

The term "sustainable urban drainage systems" refers to a collection of practices that can play a pivotal role in urban water management by, for example, reducing rainfall runoff and related combined sewer overflows, increasing rainwater infiltration, and thus improving the water balance, or providing valuable habitats and therefore supporting biodiversity. Common examples of sustainable urban drainage systems are wetlands, soakaways, infiltration trenches, infiltration basins, green roofs, bioretention areas, and stormwater pre-treatment devices. The use of sustainable urban drainage systems helps improve both the quality and quantity of water in urban areas. It is anticipated that urban planners will increasingly include these drainage systems in urban stormwater management.

Source: EIB (2023)

[38] Flood protection also has benefits for the private sector. From that perspective, it would make sense to cooperate with land and property owners or developers.

[39] See also European Commission (2021). Forging a climate-resilient Europe — the new EU Strategy on Adaptation to Climate Change. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0082&from=EN.

Agricultural water management

Climate change. As a result of more unpredictable precipitation and increased water demand from all sectors due to increased population pressure and sustained economic growth, irrigation water is becoming scarcer over time. At the same time, crop water requirements will increase due to climate change. One way to adapt to this reality is by investing in more efficient irrigation technologies at the irrigation scheme level, by replacing open earth canals with either lined canals or pipelines, reducing leakages and increasing the use of pressurised localised irrigation on farms. The agricultural sector is already witnessing shifting agro-climatic conditions in certain regions, as can be seen in changes to the onset and length of growing seasons and having to cope with erratic weather. Investing in agricultural water management, including water storage, irrigation, drainage, and water harvesting, is often justified as a measure for adapting to these changing conditions.[40]

Market opportunities. After three decades of continuously declining food prices, the 2008 and 2011 food price spikes reversed the trend. Since then, higher food prices seem to be providing some incentive for investments in the sector. Given that irrigation is the single most important factor for increasing agricultural productivity in areas of the world where limited precipitation does not support commercial agriculture, it is receiving renewed attention. As a result of multiple global crises, food prices have been pushed upwards since mid-2020 and peaked in March 2022, reaching unprecedented levels. Although they subsided moderately at the end of 2022, they are likely to remain high for years to come. This situation of high food prices should provide an incentive for investments in the sector, especially in countries aiming to decrease their food import bills.

Policy support. Large irrigation schemes often require substantial investments in water storage and/or conveyance and distribution networks, which requires public sector involvement. Therefore, the level of investment in irrigation schemes in most countries depends to a large extent on the existence of public support for the sector. Government support for the sector also responds to the need for economic development, job creation and ensuring food availability through diversified and improved local food supply systems. These benefits need to be carefully assessed against the cost of the construction and modernisation of such schemes.

Regulatory pressure. With growing awareness of the need for environmental sustainability, regulations in most countries have moved towards limiting overall water abstractions to ensure environmental flows (the minimum flows required to sustain freshwater and estuarine ecosystems) and adequate water quality levels, and to preserve biodiversity. Given that irrigation is often the main water user by volume, it is the sector most under pressure to free up water volumes to enable all sectors to adapt to these regulatory changes. Likewise, given that agriculture uses the largest water volumes when compared with all other users, it will be under increasing pressure to address the diffuse pollution created mostly through the excessive use of nitrates and pesticides, which then leach out into groundwater and run off into surface waters. Within the European Union, this pressure will increase as the implementation of the polluter pays principle becomes embedded in all environmental legislation (since the Water Framework Directive came into force, no EU Member State has fully complied with the polluter pays principle in the agricultural water sector).[41] As a result, irrigation water prices are likely to increase. High energy prices also result in sustained high irrigation water costs, as modern pressurised systems often rely on pumping to deliver water to final users. These conditions prompt the need for users to make the best out of irrigation water, requiring a focus on increased water productivity, that is, to increase crop yields per unit of water used, through investments in high-efficiency technologies and the use of improved practices.

[40] See also FAO (2011). FAO Water Reports 36: Climate Change, water, and food security. Available at: https://www.fao.org/3/i2096e/i2096e.pdf.

[41] European Court of Auditors (2021). The Polluter Pays Principle: Inconsistent application across EU environmental policies and actions. Available at: https://www.eca.europa.eu/Lists/ECADocuments/SR21_12/SR_polluter_pays_principle_EN.pdf.

EIB water sector orientation

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