Portugal

The European Commission and the OECD jointly review investment needs and financing capacities for water supply, sanitation and flood protection in each of the European Union's 28 member countries[1]. A fact sheet was developed for each country. Each fact sheet: (i) highlights the main drivers of future expenditure and quantifies projected investment needs; and (ii) analyses past sources of financing as well as capacities to finance future needs.

The analysis reflected in the fact sheets aims to support cross-country comparisons. For some indicators, trade-offs had to be made between reporting the most up-to-date and accurate data for each individual country and using data available for all countries in order to support such cross-country comparisons. The fact sheets were reviewed by country authorities and have been revised to reflect comments as much as possible. Inaccuracies on selected items may remain, which reflect discrepancies between national and international data sources.

A full methodological document will be published to explain in detail the sources, categories and methods used to produce estimates. In a nutshell:

- Current levels of expenditure (baseline) on water supply and sanitation are based on a range of data sets from Eurostat, which combine water-related public and household expenditures.
- Projections on future expenditures for water supply and sanitation are driven by the growth in urban population. Additional scenarios for water supply and sanitation were developed to factor in such drivers such as compliance with Drinking Water Directive (DWD), Urban Wastewater Treatment Directive (UWWTD) and emerging EU water directives.
- The paucity of data on current levels of flood protection expenditures did not allow for monetisation of projected future investment needs. Projections of growth rates of future expenditures for flood protection combine estimates of exposure of population, assets and GDP to risks of coastal or river floods.
- The characterisation of past sources of financing in each country is derived from baseline data on current levels of public and household expenditures, debt finance and EU transfers.
- Countries' future financing capacities are approximated by analysing room for manoeuvre in 3 areas: i) the ability to raise the price of water services (taking into account affordability concerns); ii) the ability to increase public spending; and iii) the ability to tap into private finance. Affordability analysis is based on water-related household baseline expenditures, not on average tariffs (which are highly uncertain, inaccurate and not comparable across countries).

[1] Further information and project outputs can be found on the websites of the European Commission and the OECD.

The future costs of diffuse pollution, compliance with the Water Framework Directive, adaptation to climate change, contaminants of emerging concern, urban floods from heavy rains, as well as the potential of innovation to minimise future financing needs are explored qualitatively and will be reflected separately. Costs related to water storage and bulk water supply are not considered.

Key messages

- Portugal achieves high compliance rates with the EU DWD. Challenges remain with wastewater collection and treatment standards to meet the requirements of the UWWTD.
- Urbanisation and climate change may increase pressure on existing WSS networks and drive future investment needs up. Portugal faces constraints to raise public spending and attract investors to finance WSS infrastructure needs.
- Increased coastal inundation and erosion is a significant climate change-induced risk. The projected expenditures to protect against coastal flood risks is higher than in other EU states and remains an important source of future risk.

Context

Portugal's per-capita GDP is lower than the European average and projected economic growth remains limited. The overall population is forecast to decline.

Natural water resources are relatively abundant in northern Portugal, while the southern regions rely increasingly on storage for supply (OECD, 2011). Portugal shares four basins (out of a total of ten) with Spain, implying a relatively large level of external dependency on water supply and quality. These international basins are governed according to a Spanish-Portuguese convention on sustainable water use and co-operation.

Portugal’s total levels of abstraction per capita and intensity of freshwater use are close to OECD averages, with low levels for domestic use (OECD, 2011). Water use is predominately for agricultural production (approximately 75%), with the remainder split roughly evenly between industrial and urban uses (European Commission, 2017a).

Portugal ranks near the EU average in terms of population connected to water supply and sanitation, but its network performance and compliance with the UWWTD lag behind. The value of assets at risk from flooding is expected to decline for more frequent flood events, but increase significantly for more rare and extreme flood events.

Table 1 presents a number of key indicators characterising the country context and features relevant to future expenditures for WSS and flood protection. These indicators are further discussed in the next sections, including those that underpin the projections of future investment needs.

Table 1. Key features relevant to future expenditures for WSS and flood protection

	Indicator	Value (rank if applicable)	Data Source	Year
Economy and Demographics	GDP per capita	EUR 17 900 (17/28)	Eurostat	2016
	Projected GDP growth	1.5% (25/28)	IMF	2016-2022
	Projected urban population variation by 2050	1.05x (21/28)	UN	2017-2050
Water Supply and Sanitation	Estimated annual average expenditure per capita	EUR 113	Authors based on EUROSTAT	2011-2015
	Population not connected	3.1%	EC	2015
	Annual domestic sector consumption per capita	59.7 m3	EUROSTAT	
	Leakage rate for public water supply	23%	EC	2017
	Non-revenue water	c22%	EurEau	2017
	Compliance with UWWTD Art.3, 4 and 5 (Index)	85% (20/28)	EC	2014
Flood Protection	Estimated annual average expenditure per capita	EUR 7 (9/27)	EC survey	2013-15
	Pop. potentially affected in flood risk areas	not available	EC report	2015
	Value of assets at risk (rise 2015-30):	0.62x (2)	WRI	2015-2030

Note: Rank 1 implies best in class among the EU member countries for which data is available for each indicator.

Main drivers and projections of future investment needs

Water supply and sanitation

In terms of drinking water supply, Portugal achieves very high compliance rates of 99-100% for the microbiological, chemical and indicator parameters laid down in the DWD (European Commission, 2016). Portugal has been increasing the quality of water supplied over recent years, although distribution losses remain a concern. Urbanisation will continue to put pressure on existing networks (WWF, 2018).

Challenges remain to achieve the requirements of the UWWTD. In 2014, Portugal reported that 99.8% of the wastewater load is collected and 88.6% is submitted for secondary treatment, of which 77.3% is compliant with the requirements of the Directive (the target is 92.5%). There are significant regional differences in compliance rates of the UWWTD, particularly regarding wastewater treatment. Furthermore, despite the improvement in compliance with the UWWTD, for which the use of EU funding has been fundamental, the incomplete implementation of the Directive has led to several rulings of the EU Court of Justice against Portugal, including financial sanctions (European Commission, 2017a). Investment needs for new wastewater infrastructure (reported in 2016 under article 17 of the UWWTD) to reach full compliance with the UWWTD is estimated to be EUR 122 million (European Commission, 2017b).

Table 2 projects future investment needs in water supply and sanitation for a business as usual and a compliance scenario. The compliance scenario consists of two dimensions: (1)

investments needed to comply with the revised DWD, extend access to vulnerable populations and improve network efficiency (reduce leakage); and (2) investments needed to comply with the UWWTD.

Table 2. Water supply and sanitation: Projected investment needs to 2050 (million EUR)

PORTUGAL		Baseline 2015	2020	2030	*Total by 2030*	2040	2050
BAU water supply and sanitation	**CAPEX**	**877**	**863**	**844**	-	**805**	**749**
	TOTEX	**1184**	**1204**	**1244**		**1259**	**1249**
Scenario Compliance + for water supply and sanitation	**ADD. CAPEX**	-	**356**	**288**	*3578*	-	-
	ADD. TOTEX		**507**	**434**	*5135*		
Compliance with DWD, access and efficiency (water supply)	ADD. CAPEX	-	19	19	*192*	-	-
	ADD. TOTEX		37	37	*373*		
Compliance with UWWTD (sanitation)	ADD. CAPEX		337	269	3386		
	ADD. TOTEX		469	397	4762		

Note: BAU projections on future expenditures for water supply and sanitation are estimated based on the growth in urban population. Additional scenarios for water supply and sanitation are based on drivers relating to compliance the DWD and UWWTD as well as (for water supply) the cost of connecting vulnerable groups and of reduced leakage. The projections do not take into account the age and pace of renewal of water supply and sanitation assets due to the lack of comprehensive and comparable data across EU member countries.
Source: OECD analysis based on Eurostat (water-related public and household expenditure data) for the baseline; United Nations and Eurostat (total and urban population statistics and projections); European Commission (estimates of costs of compliance with revised DWD and of connecting vulnerable groups, leakage rates, and distance to compliance with UWWTD).

Potential future EU legislation and increasing public expectations may require the removal of emerging contaminants, such as micro-plastics and pharmaceuticals. This is likely to increase the costs of wastewater treatment significantly, beyond those presented in Table 2.

Flood risk management

Portugal is exposed to both coastal and riverine flood risks across its territory from climate change and anthropogenic factors. Increased coastal inundation and erosion, as well as tidal encroachment into lagoons and estuaries are a significant climate change-induced risk (European Commission, 2009; OECD, 2011). Approximately 2% of mainland Portugal displays high or very high vulnerability to risk of flooding (Costa et al., 2014). Reservoirs may help manage inland flood risks, however, the human modification of river networks, principally by the construction of reservoirs, has reduced sediment supply to coastal regions, thereby aggravating the coastal erosion problem. (European Commission, 2009)

Portugal has completed flood risk and vulnerability mapping that considers the potential impact of various climate change scenarios. The efforts to develop quality forward-looking flood maps in Portugal was partly driven by the need to address low insurance penetration rates by providing insurance companies with a basis for pricing flood risk (OECD, 2016). National law forbids development in areas adjacent to rivers without pre-authorisation and within 50 metres of the coast (OECD, 2014; 2016).

In the absence of adaptation, sea level rises over the next century are projected to have a modest negative impact on Portugal's GDP (Bosello et al., 2012). The high rates of erosion make the Portuguese coastal zones increasingly vulnerable to climate change and especially to rises in sea level. The coastal zones north of Lisbon and the Algarve barrier coast are considered most exposed. (European Commission, 2009).

Table 3 highlights growth factors in future investment needs for protection against (riverine and coastal) flood risks. The projected expenditures to protect against coastal flood risks is higher than in other EU states and remains an important source of future risk.

Table 3. Protection against coastal and river flood risks: Projected growth rates of investment needs to 2030

	Expenditures to protect against river flood risk			Expenditures to protect against coastal flood risk
	Total growth factors, by 2030			Categories (1-4), by 2030
	Expected urban damage	Expected affected population	Expected affected GDP	
Portugal	1,27	0,87	1,07	2

Note: It was not possible to establish a robust baseline of current expenditures for flood protection due to the absence of comprehensive and comparable data across EU member countries. As a result, this table presents projected growth factors in future expenditures. A growth factor is defined as the factor by which current flood risk expenditures should be multiplied in order to maintain current flood risk protection standards in the future (by 2030). For coastal flood, countries were classified in one of four categories of projected coastal flood risk investment needs, in which 1 indicates very low growth of projected investment needs and 4 very high growth of projected investment needs by 2030.
Source: OECD analysis based on the Aqueduct Global Flood Analyzer of the World Resources Institute (river flood impacts by urban damage, affected GDP, and affected population), the global database of FLOod PROtection Standards (Scussolini et al., 2016) (for countries river flood-related protection level), the European Commission Joint Research Centre (change of build-up in areas vulnerable for coastal flooding), a 2010 study by Hinkel et al, (number of people exposed to coastal flooding, and damage costs in the case of a coastal flood event).

Other pressures affecting water quality compliance with the WFD

Over 40% of natural surface water bodies and 70% of heavily modified or artificial water bodies achieve the "good ecological status" required by the EU Water Framework Directive. Over 80% of groundwater bodies achieve good chemical status, but only one-third of surface water bodies and heavily modified and artificial water bodies (70% unknown). Most (87%) of groundwater bodies are in good quantitative status (European Commission, 2017a).

Diffuse pollution from agricultural production is the major source of water pollution in Portugal, affecting nearly half of all surface water bodies. Point sources of pollution and alterations to the natural flow and morphology of water bodies affect approximately one in four water bodies (European Commission, 2017a). Intrusion of saline water associated with global warming and sea level rise is an increasing concern (European Commission, 2009). Continued improvements in monitoring, status assessment, and implementation of Programmes of Measures are needed to ensure compliance with the WFD (European Commission, 2017a).

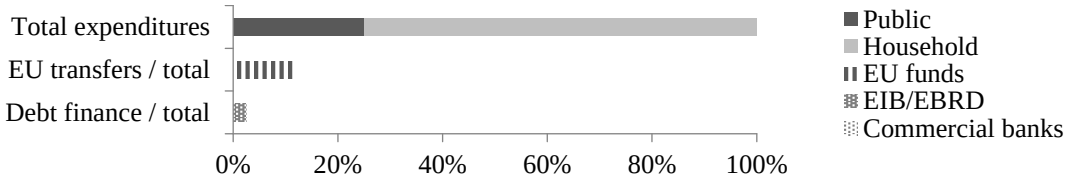
Past financing strategies and room for manoeuvre to finance future needs

Water supply and sanitation

Most households (90%) connected to water supply and sanitation infrastructure face multi-part water tariffs (increasing block tariffs), with much lower rates applied to the first block used (OECD, 2011). Wastewater charges are only applied in about 80% of municipal systems, and the method of levying varies across regions (e.g. fixed charges or based on property value). Thus, cost recovery is higher for urban water supply (82%) than for wastewater collection (48%). Portugal has benefitted greatly from EU funding and matching national funds for expanding its WSS network.

As depicted in Figure 1, Portugal has been relying mostly (75%) on household expenditures to finance WSS. Public expenditures represent 25% of the total, and have for a significant share, relied on EU transfers. Debt has played a minimal role in financing upfront investment.

Figure 1. Share of annual average expenditure on WSS, by source (2011-15 average, %)



Sources: Eurostat (for public and household expenditures), European Commission (for EU transfers), European Investment Bank, IJ Global, Thomson Reuters, Dealogic (for debt finance).

Based on criteria in Table 4, Portugal faces challenges to raise public spending and attract investors to finance WSS infrastructure needs.

Table 4. Indicators of future financing capacities for water supply and sanitation

	Indicator	Value (rank)	Year	Data Source	Assessment
Ability to price water	Water expenditures in lowest household income decile	2.25% (17/26)	2011-15	Authors based on EUROSTAT	Medium
	Full cost recovery equivalent in lowest household income decile	3.01% (16/28)	2011-15	Authors based on EUROSTAT	
	At-risk-of-poverty rate	19% (19/28)	2016	EUROSTAT	
Ability to raise public spending	Tax revenue / GDP	36.9% (14/28)	2016	EUROSTAT	Low
	Government consolidated debt / GDP	130.1% (26/28)	2016	EUROSTAT	
	Sovereign rating	BBB-	2017	Standard & Poor's	
Ability to attract private finance	Domestic credit to private sector / GDP	120% (5/28)	2015	World Bank	Medium

Flood risk management

Funding for flood and erosion protection is provided by the state but is also obtained through the EU Structural and Cohesion Funds. Over the period 1998-2015, the expenditure to protect Portuguese coasts against flooding and erosion totalled €131 million. (European Commission, 2009). In 2010, following the devastating Madeira Island floods and mudslides, the European Investment Bank provided EUR 250 million loan to the Portuguese Government, to support the Madeira Regional Government to re-establish lost and damaged infrastructure caused by the flooding (European Commission, 2010).

Mortgage lenders in Portugal generally require flood coverage on the assets against which they are providing financing. However, penetration rates remain relatively low. Insurance coverage for properties in flood-prone areas is not always available, or available only with high deductibles, at high cost and/or upon the implementation of specific risk prevention measures. The expectation of government compensation is also a significant challenge to insurance penetration in Portugal (OECD, 2016).

Significant investments in coastal flood protection have been made in Portugal in recent decades, with a split between traditional engineered infrastructure and green, nature-based infrastructure (e.g. breakwaters and beach rehabilitation) (OECD, 2011). In future, greater emphasis on nature-based solutions is recommended for flood prevention; they are often more cost-effective than traditional engineered infrastructure alternatives (RPA, 2014).

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