Spain

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

- Spain has high intensity water use and is considered to be water-stressed in some regions. Water reuse and desalination are both used to meet demand.
- Water tariffs are highly variable by municipality, but in general do not cover amortised costs and renewal.
- More work is required to comply with the UWWTD.
- Climate change is projected to bring increased risk of drought in already water-stressed areas.

Context

Spain's level of GDP per capita sits just above the EU member state median and its future economic growth forecasts a little below. Its relatively high urbanisation rate of 80% is forecast to climb to over 86% by 2050. Despite near universal water supply connection, wastewater treatment remains an issue.

Spain is characterised by complex climate patterns due to the presence of mountain ranges, the Mediterranean Sea and the Atlantic Ocean. Spain's natural water endowment is below the OECD average and is geographically varied. Two-thirds of the country has a semi-arid climate with several regions being affected by recurring droughts (OECD 2015).

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 24 100 (13/28)	Eurostat	2016
	Projected GDP growth	1.9% (20/28)	IMF	2016-2022
	Projected urban population variation by 2050	1.14x (14/28)	UN	2017-2050
Water Supply and Sanitation	Estimated annual average expenditure per capita	EUR 122	Authors based on EUROSTAT	2011-2015
	Population not connected	0%	EC	2015
	Annual domestic sector consumption per capita	71 m3	EUROSTAT	
	Leakage rate for public water supply	30%	EC	2017
	Non-revenue water	c.29%	EurEau	2017
	Compliance with UWWTD Art.3, 4 and 5 (Index)	83% (22/28)	EC	2014
Flood Protection	Estimated annual average expenditure per capita	EUR 3 (18/27)	EC survey	2013-15
	Pop. potentially affected in flood risk areas	25%	EC report	2015
	Value of assets at risk (rise 2015-30):	0.67x (4/28)	WRI	2015-2030

Note: A rank of 1 implies best in class.

Main drivers and projections of future investment needs

Water supply and sanitation

Spain has one of the highest intensities of water use in the OECD (OECD, 2015). Additional pressures on available water sources come from per capita consumption growth, industrial activity, the use of water for energy production, and tourism and leisure activities (EC, 2017a).

Spain is considered water stressed in some areas, meaning water demand exceeds the water resources available under sustainable conditions. Water reuse and desalination are additional resources used in water stressed areas to meet demand (EC 2017a). Spain is one of the countries in the world where water reutilization is most widespread (EurEau, 2017). The majority of reclaimed water is used for agricultural and environmental purposes (González-Gómez et al, 2017). The production capacity of desalinated water almost doubled between 2000-06 (OECD, 2015). However, the cost of desalination remains an obstacle (Navarro, 2018).

Spain achieves very high compliance rates of 99-100 % with the DWD (EC, 2017a). Approximately 78% of drinking water in Spain is sourced from surface water, 18% from groundwater sources, and 4% from desalination (EurEau, 2017).

Spain demonstrates relatively high compliance rates with the UWWTD, with 99.7% of wastewater collected and 86.2 % is subject to secondary treatment. However, only 38% of

wastewater that should be subject to more stringent treatment is actually treated as such (EC 2017a).

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. Projected investment needs – Water supply and sanitation to 2050 (m. EUR)

SPAIN		Baseline 2015	2020	2030	*Total by 2030*	2040	2050
BAU water supply and sanitation	**CAPEX**	**2579**	**2757**	**3106**	-	**3507**	**3921**
	TOTEX	**5705**	**5782**	**5998**		**6274**	**6536**
Scenario Compliance + for water supply and sanitation	**ADD. CAPEX**	-	**1338**	**1077**	***13206***	-	-
	ADD. TOTEX		**2844**	**2133**	***27174***		
Compliance with DWD, access and efficiency (water supply)	ADD. CAPEX	-	91	91	*915*	-	-
	ADD. TOTEX		231	231	*2307*		
Compliance with UWWTD (sanitation)	ADD. CAPEX		1246	985	12291		
	ADD. TOTEX		2614	1903	24867		

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).

Climate change is expected to increase annual mean temperature by approximately 1.5 ºC for the period 2011-40, from 2.5 ºC to 2.9 ºC during 2041-70 and from 3.6 ºC to 4.8 ºC for the period 2071-2100 (OECD, 2013). The greatest increases are expected during the spring and summer. There is also a general decrease in precipitation, with the greatest decrease to be felt in the Atlantic basins and Canary Isles, the Guadalquivir River Basin and the southern Iberian Peninsula. Rising temperature and decreased precipitation are expected to increase the frequency of intense and short droughts over first decades of the 21st century as well as increase in the frequency of longer droughts over the last decades of the 21st century (OECD, 2013).

Flood risk management

In comparison to other OECD countries, Spain's inland and coastal flood risk perception is generally low (OECD, 2016). The areas of Spain most exposed to flooding are the

Mediterranean and Cantabrian coasts as well as the Canary Islands (Olcina et al., 2015[1]). All populated floodplains have existing structural protection, such as flood walls, levees, dykes, river diversions and reservoirs (Olcina et al., 2015[1]). Spain does not currently use nature-based flood protection mechanisms (EU, 2017b).

Table 3 highlights growth factors in future investment needs for protection against (riverine and coastal) flood risks. Urban floods from heavy rains will be discussed separately (not in the country fact sheet). The increase in the value of assets at risk from river flood events is lower than in other countries, although this 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	
Spain	0,93	0,57	0,66	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).

Climate change is expected to reduce risks associated with river flooding over coming decades.

Other pressures affecting water quality compliance with the WFD

The use of fertilizers and the excessive pressure on water resources in some river basins causes a high concentration of nitrates and phosphorus along much of the Mediterranean coast. Groundwater quality is affected by the salinization of aquifers and agricultural run-off (OECD, 2015).

Dams and related infrastructure, which play a key role in hydropower generation, irrigation, water supply and flood control, have exerted pressures on surface bodies, 14% of which are considered to be heavily modified (OECD, 2015).

In 2012, it was estimated that there were more than half a million illegal wells in Spain, potentially causing further water stress (EC, 2012).

Past financing strategies and room for manoeuvre to finance future needs

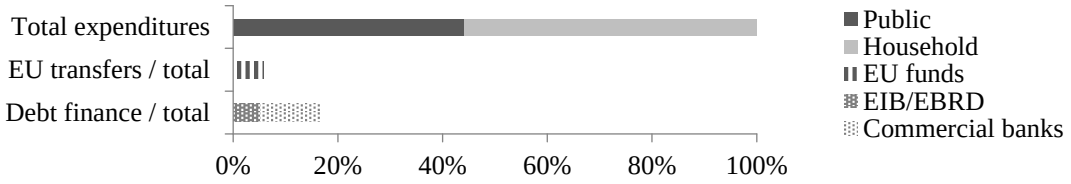
Water supply and sanitation

In Spain, urban water supply and sanitation services are a municipal responsibility. Service provision is a mix of public and private depending on the municipality. Regardless of the management model, tariffs must be approved by the responsible municipality (EurEau, 2017). Spain has the most variable water price in Europe, with differences of up to 500% between municipalities, reflecting the diversity of contexts and water sources in use. In general, tariffs for supplied water are slightly lower than the EU average (EurEau, 2017).

In general, current tariffs cover operating costs but do not cover the amortisation of existing infrastructure or its renewal (EurEau 2017). There can also be political economy challenges to increasing water tariffs, which are specifically sharp in Spain (García-Rubio et al, 2015).

As depicted in Figure 1, Spain has been relying slightly more on household than public expenditures to finance WSS. The EU is a significant financier of the Spanish water and sanitation infrastructure, both through grants by the European Commission and through loans from the European Investment Bank. Between 1986 and 2008 Spain received Euro 21 billion in EU funding for water infrastructure. Spain was in the top five for receiving funding from EU Cohesion funds for 2014-2020 (EC, 2017b). Debt appears to have played an important role in financing upfront investments, highlighting the financial sustainability of an important number of projects.

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



Source: EUROSTAT (for public and household expenditures), European Commission (for EU transfers), European Bank for Reconstruction and Development, European Investment Bank, IJ Global, Thomson Reuters, Dealogic (for debt finance).

Table 4 indicates that Spain is faced with a range of financing constraints. Affordability is not a critical issue but the proportion of the population at risk of poverty is relatively high. Further, the country's prevailing fiscal condition constrains public spending. Both aspects may restrict the possibility to tap into commercial debt financing in the future.

Table 4. Indicators of future financing capacities

	Indicator	Value (rank)	Year	Data Source	Assessment
Ability to price water	Country-level average price for water supply and sanitation / m3 (PPP)	1.4 EUR (13/27)	2009	EC Joint Research Centre (forthcoming)	Medium
	Water expenditures in lowest household income decile	1.25% (8/26)	2011-15	Authors based on EUROSTAT	
	Full cost recovery equivalent in lowest household income decile	2.24% (7/28)	2011-15	Authors based on EUROSTAT	
	At-risk-of-poverty rate	22.3% (26/28)	2016	EUROSTAT	
Ability to raise public spending	Tax revenue / GDP	34.1% (9/28)	2016	EUROSTAT	Medium to Low
	Government consolidated debt / GDP	99% (23/28)	2016	EUROSTAT	
	Sovereign rating	BBB+	2017	Standard & Poor's	
Ability to attract private finance	Domestic credit to private sector / GDP	119% (6/28)	2015	World Bank	Medium

Main challenges driving future investment needs

Flood risk management

Flood protection infrastructure is traditionally funded by the national and regional governments in Spain. In recent years, there have been some attempts to transfer part of these costs to local governments and individuals. For example, after the flood of October 2005 in the central Costa Brava area of Catalonia, it was decided that the Ridaura River would be contained with flood walls. However, the public authority asked the locality of Calonge to provide 25% of the funding needed to complete the project (Olcina et al., 2015[1]).

The organization responsible for victim compensation in case of flooding is a state agency, the Insurance Compensation Consortium (Consorcio de Compensación de Seguros or CCS). Premiums charged to households and businesses do not vary with the level of risk (OECD, 2016).

References

EurEau (2017), Europe's water in figures: An overview of the European drinking water and waste water sectors.

EurEau (2017). Water Matters: An insight into the successes and challenges facing the European water sector. http://eureau.org/administrator/components/com_europublication/pdf/37ad5aa917274354636c27938924de66-eureau-layout-for-web.pdf

European Commission (EC) (2012) A Blueprint to Safeguard Europe's Water Resources

European Commission (EC) (2015) Report on the progress in implementation of the Floods Directive, Commission Staff Working Document.

European Commission (EC) (2017a) The EU Environmental Implementation Review (EIR) package, 28 Country reports, http://ec.europa.eu/environment/eir/pdf/report_es_en.pdf

European Commission (EC) (2017b) European level report: Evaluation of the contribution of Operational Programmes to the implementation of EU water policy

European Commission (EC) "Spain: Country overview and assessment of climate change adaptation" *The economics of climate change adaptation in EU coastal areas*, https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/docs/body/spain_en.pdf

European Commission DG Environment (2017) Bridging the water investment gap

García-Rubio, Miguel A; Ruiz-Villaverde, Alberto; González-Gómez, Francisco. (2015) Water Tariffs in Spain: What Needs to Be Done? *MDP – Water*.

González-Gómez, Francisco & García-Rubio, Miguel A. & Guardiola, Jorge. (2012). *Introduction: Water Policy and Management in Spain. International Journal of Water Resources Development.*

OECD (2013), Water and Climate Change Adaptation: Policies to Navigate Uncharted Waters, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264200449-en

OECD (2015), *OECD Environmental Performance Reviews: Spain 2015*, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264226883-en

OECD (2016), *Financial Management of Flood Risk*, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264257689-en

Olcina, J. et al. (2015), "Flood policy in Spain: a review for the period 1983-2013", http://dx.doi.org/10.1108/DPM-05-2015-0108.