

Luxembourg

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 countries¹. 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

- Luxemburg stands out in Europe by its wealth and projected population growth.
- Compliance with DWD and UWWTD is very high. Access to tertiary treatment will need to improve, as the whole country is classified as a sensitive area.
- A distinctively high share of the population and GDP is expected to be exposed to flood risk in the future.

Context

Luxembourg has the highest per-capita GDP in the EU, although this is partly due to foreign companies recognising revenue. Future economic and population growth forecast are well above the EU median. Luxembourg's already high rate of urbanisation at 90% is expected to increase further, although this largely reflects the small size of the country and does not translate into large numbers of new connections. Water coverage and treatment compliance remain high. Future flood events present a serious risk.

A distinctive feature is the large share of the workforce that lives in neighbouring countries and commute on a daily basis. This non-resident population uses significant volumes of water and generate wastewater, affecting per capita ratios in Luxemburg as the value of asset at risk is projected to grow substantially.

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 90 700 (1/28)	Eurostat	2016
	Projected GDP growth	3.1% (6/28)	IMF	2016-2022
	Projected urban population variation by 2050	1.66x (1/28)	UN	2017-2050
Water Supply and Sanitation	Estimated annual average expenditure per capita	EUR 737	Authors based on EUROSTAT	2011-2015
	Population not connected	0.1%	EC	2015
	Annual domestic sector consumption per capita	70 m ³	AGE	2016
	Leakage rate for public water supply	19%	EC	2017
	Non-revenue water	n.a.	EurEau	2017
	Compliance with UWWTD Art.3, 4 and 5 (Index)	94% (15/28)	EC	2014
Flood Protection	Estimated annual average expenditure per capita	EUR 0.75	AGE	2011-15
	Pop. potentially affected in flood risk areas	14,577 (HQ100)	AGE	2013
	Value of assets at risk (rise 2015-30)	2.6x (23/28)	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

A sandstone aquifer supplies more than half of drinking water in Luxembourg.

The country benefits from high levels of investment and renewal of existing infrastructure. Non-revenue water is low. Compliance with DWD and access to secondary treatment of wastewater are very high.

Areas of improvement relate to the management of rain water (separate from collection of wastewater) and access to tertiary treatment (as the whole country is classified as sensitive area according to UWWTD). Fines were imposed in 2014, as regards the latter.

New contaminants are being found in the watercourses of the Alzette and the Mess, near industrialised and heavily populated areas. Additional treatment will be required, possibly combined with new regulation.

Table 2 projects future investment needs in water supply and sanitation. While more accurate projections may have been available for selected countries, proxies have been used which facilitate comparisons across countries. Other water-related investments could not be projected, due to lack of comparable data. A major caveat is the lack of accurate cross-country data on the state of the asset and on whether the business as usual appropriately reflects the need to renew existing infrastructures.

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

LUXEMBOURG		Baseline 2015	2020	2030	Total by 2030	2040	2050
BAU water supply and sanitation	CAPEX	254	284	340	-	384	413
	TOTEX	396	447	545	-	628	688
Scenario Compliance + for water supply and sanitation	ADD. CAPEX	-	18	21	218	-	-
	ADD. TOTEX	-	35	39	398	-	-
Compliance with DWD, access and efficiency (water supply)	ADD. CAPEX	-	2	2	17	-	-
	ADD. TOTEX	-	8	8	81	-	-
Compliance with UWWTD (sanitation)	ADD. CAPEX	-	17	19	201	-	-
	ADD. TOTEX	-	27	31	316	-	-

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).

Flood risk management

Table 3 projects future investment needs in protection against (riverine and coastal) flood risks. Urban floods from heavy rains will be discussed separately (not in the country fact sheet).

A large share of economic activity and the population is located in floodplain areas that will be confronted with more frequent and severe flooding in the future, due to climate change.

Flood risk management plans encourage a combination of grey and nature-based solutions (restoring natural water retention areas and the eco-morphological structure of rivers) to provide additional natural retention volume and prevent flash floods. Luxembourg has a dense national network of meteorological and hydrological stations and initiatives for the public dissemination of information.

Coordination with upstream countries is organised for the Moselle.

Looking ahead, climate change is projected to increase the frequency of floods due to major redistributions of winter rainfall, causing an increase in maximum daily runoff during winter. The frequency and length of dry periods are projected to increase as well.

Such trends can shift the main recharge period of groundwater and affect water quality due to intensification of rainfalls (increasing erosions, rapid infiltration towards groundwater).

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	
Luxembourg	1,82	24,54	27,99	not applicable

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 selected pressures affecting compliance with the WFD

At the time of the first generation of river basin management plans, only 7% of surface water bodies in the country achieved good ecological status.

The Luxembourg sandstone aquifer is vulnerable to pollution.

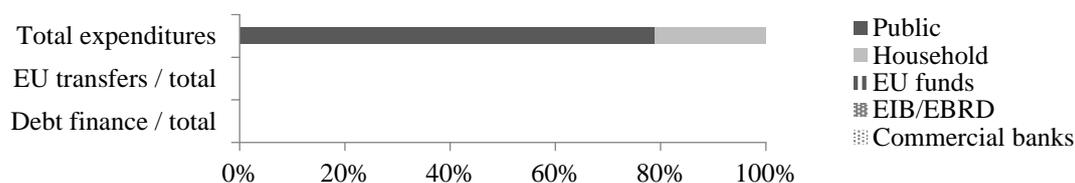
Agriculture water use is minimal in Luxembourg, compared with urban (still rising) and industrial (declining) water use. Still, livestock and dairy farming cause diffuse pollution (nitrates) and affect water quality.

Past financing strategies and room for manoeuvre to finance future needs

Water supply and sanitation

The Water Act of 2008 introduced the principle of full cost recovery for drinking water supply and urban sewage treatment. Abstraction and pollution charges are earmarked for the Water Management Fund, which is subsidised with public funding. The fund can cover part of the investment costs of water supply and sanitation infrastructure and catchment protection. As depicted in Figure 1, household expenditures represent just over 20% of the total. Luxembourg relies for the most on public expenditures to cover WSS costs.

The country has not benefited from water-related EU transfers. Debt finance does not appear to have played a role in financing water investments.

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, while affordability could become an issue in case of full-cost recovery, Luxembourg has significant leeway to increase the contribution of households compared to current levels. The country can also further rely on public spending thanks to a particularly healthy fiscal condition as well as should be in a position to tap into commercial debt financing should need be.

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	0.86% (4/26)	2011-15	Authors based on EUROSTAT	Medium
	Full cost recovery equivalent in lowest household income decile	4.08% (23/28)	2011-15	Authors based on EUROSTAT	
	At-risk-of-poverty rate	16.5% (15/28)	2016	EUROSTAT	
Ability to raise public spending	Tax revenue / GDP	39.6% (19/28)	2016	EUROSTAT	High
	Government consolidated debt / GDP	20.8% (2/28)	2016	EUROSTAT	
	Sovereign rating	AAA	2017	Standard & Poor's	
Ability to attract private finance	Domestic credit to private sector / GDP	95% (11/28)	2015	World Bank	Medium
	Ease of doing business global rank	63 (26/28)	2017	World Bank	

Flood risk management

Municipalities are in charge, with financial support from the central government. The Water Management Fund can cover part of the expenditures related to flood protection and rehabilitation of water courses. As noted above, the Water Management Fund is replenished by earmarked revenues from abstraction and pollution charges and is subsidised with public funding. The fund can cover part of catchment protection.

Luxemburg considers the benefits of green infrastructures in the context of adaptation to climate change. The National Nature Protection Plan 2017-2021 mentions that green infrastructures should be promoted for flood protection, instead of grey infrastructure, mainly by restoring wetlands.

References

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