



**Asociación
Caminos**

**ASOCIACIÓN DE INGENIEROS DE CAMINOS,
CANALES Y PUERTOS Y DE LA INGENIERÍA CIVIL**

INFRASTRUCTURE REPORT CARD OF SPAIN

COMPLETE WATER CYCLE REPORT 2023

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- 2. "The Global Competitiveness Report (GCI)." World Economic Forum (WEF)**
- 3. "The Global Adaptation Index (ND-Gain Indicators)." University of Notre Dame (USA)**
- 4. "Transport in the European Union." European Commission.**

Annex 6: Complete Water Cycle Indicators from Major Spanish Organizations



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1. Purpose and scope

The purpose of this report is to assess the infrastructure related to the Complete Water Cycle in Spain, following the methodology established by the Spanish Association of Civil Engineers (Asociación de Ingenieros de Caminos, Canales y Puertos y de la Ingeniería Civil, also **Asociación Caminos**). For its elaboration, support has been provided by institutions and organizations linked to the Complete Water Cycle, as well as the expertise of engineers, technicians, and experts who have collaborated with Asociación Caminos.

This document is part of a broader study that analyzes the state of six sectors of public works in Spain: Railways, Highways, Ports, Airports, the Complete Water Cycle, and Urban and Metropolitan Public Transportation. The methodology includes an objective evaluation, based on the analysis of quantitative indicators from both Spain and other selected countries in our economic environment, referenced to the most representative data of each sector in an international context. It also includes a qualitative evaluation of public works in Spain, based on the opinions of a selected group of experts for each sector.

The report is complemented with several Annexes:

- **Annex 1: List of tables.** Complete list of the report's tables.
- **Annex 2: List of figures.** Complete list of the report's figures.
- **Annex 3: Acronyms.**
- **Annex 4: Bibliography and references.** Details the bibliography used and the databases and publicly available documents considered and consulted in this report.
- **Annex 5: Indicators from major international organizations.** Includes detailed information about the evaluations, indices, and indicators from the main organizations that assess infrastructures.
 - “Report Card for America’s infrastructure.” American Society of Civil Engineers (ASCE)
 - “The Global Competitiveness Report (GCI)”. World Economic Forum (WEF)
 - “The Global Adaptation Index (ND-Gain Indicators)”. University of Notre Dame (EE.UU.)
 - “Transport in the European Union”. European Commission.
- **Annex 6: Indicators from the main Spanish organizations,** which includes information about the indicators from the main Spanish organizations:
- **Annex 7: Basic data and details of the indicators used for the quantitative evaluation.**

2. Description of Spain's Complete Water Cycle Infrastructure

In Spain, water is a public resource and its regulation falls under the jurisdiction of various public administrations. Water management is highly heterogeneous, involving both state and regional administrations, as well as independent municipal regulators and numerous private operating entities. Competences are widely distributed and, in many cases, lack coordination among different operators. Water supply management is divided among the public sector (35%), the private sector (33%), mixed public-private management (22%), and municipal management (10%).

The following diagram schematically represents the Complete Water Cycle and the interactions between the various entities.

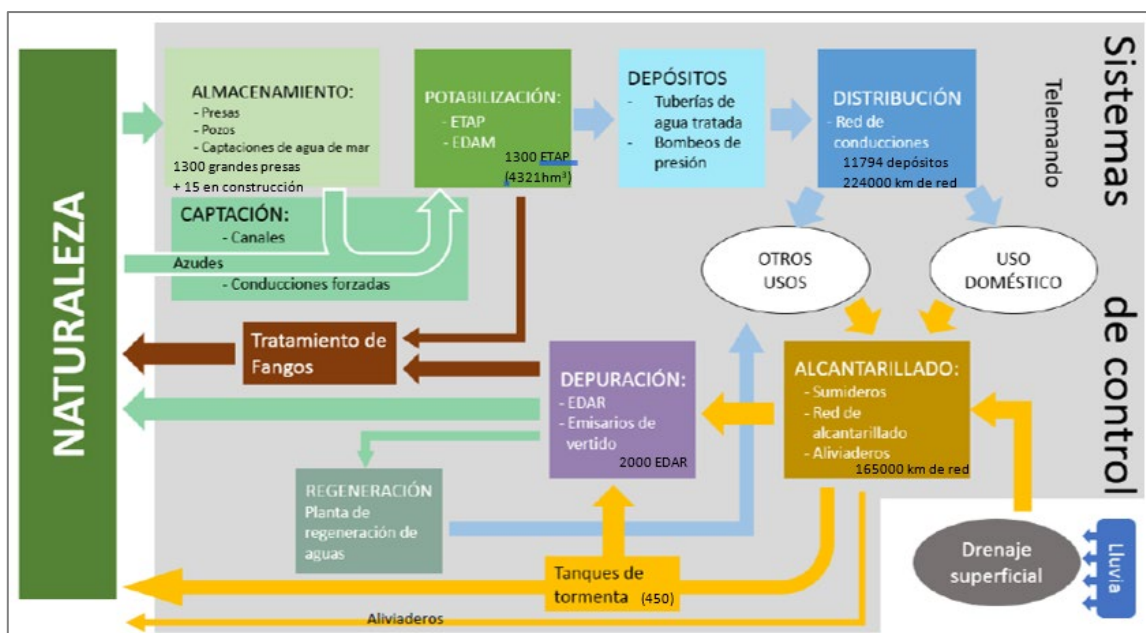


Figure 1: Diagram of the Water Cycle in Spain (AEAS)

The urban water cycle sector represents 0.64% of the GDP, with a turnover of 7.65 billion euros. The sector provides direct employment to 33,000 individuals, with highly qualified training. According to AEAS data, as reflected in their 17th National Study on Drinking Water Supply and Sanitation in Spain 2022, based on sector data from the year 2020, the average price of domestic water is 1.97 €/m³, one of the lowest in Europe, and it constitutes an average of 0.9% of Spanish households' expenditure.

The average household consumption is 131 liters per day per inhabitant. The highest percentage of urban water consumption is for domestic use (67.4%), followed by industrial and commercial use (11.9%), while the remainder (20.7%) is allocated for other purposes.

In Spain, there are 1,640 Drinking Water Treatment Plants (ETAP). The volume of water supplied to the systems is 4,057 Hm³, where there are 29,305 storage tanks, equivalent to 245 liters per inhabitant per day for all uses. This has increased for the first time since 2007, likely due to the rise in losses in the distribution network, which spans 248,245 km. El sistema de alcantarillado tiene aproximadamente unos 190.000 km, con más de 2.232 estaciones depuradoras de WATER (EDAR) que tratan un total de 4.066 hm³, unos 245 litros de WATER depurada por habitante y día.

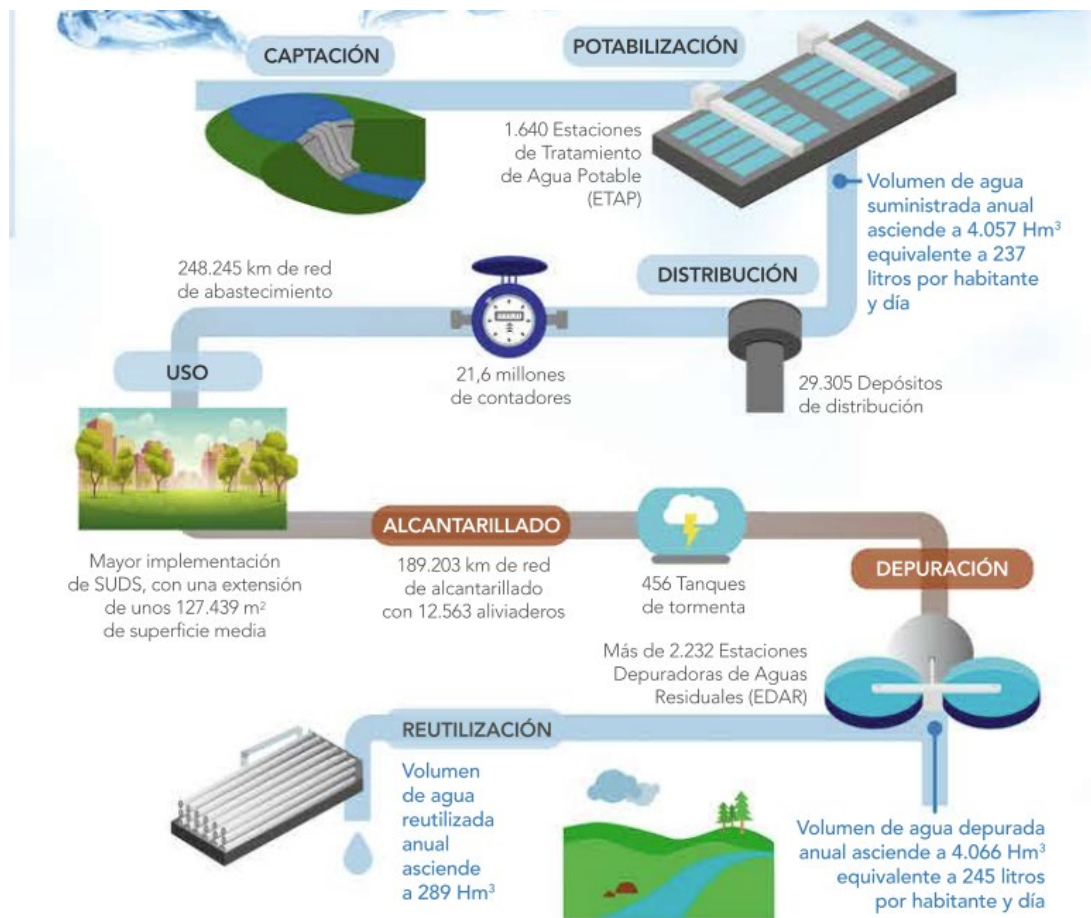


Figure 2: The figures for the Complete Water Cycle (AEAS)

2.1. Upstream water capture infrastructure

In Spain, 65% of the water collected for water supply comes from surface runoff, stored in about 1,300 large dams; 26% comes from groundwater sources, and the remaining 9% is obtained from desalinated water (Spain ranks fifth in the world in terms of the number of desalination plants, totaling 900 facilities with a capacity of 1.45 million cubic meters per day). In recent years, a decrease in the quality of the captured water at its source has been observed. However, water intended for human consumption undergoes rigorous monitoring by operators and health authorities and is of good quality.

Furthermore, the sector continues to make significant efforts to proactively manage risks. Thus, 78% of water supplies have implemented Water Sanitary Plans, and 10% are in progress, in accordance with the future requirements of the European Drinking Water Directive, which is expected to come into effect in 2023. Implementation reaches 95% in metropolitan areas.

2.2. Water Treatment Infrastructure

Spain has around 1,640 Drinking Water Treatment Plants (DWTPs) with a capacity of over 4,000 hm³.

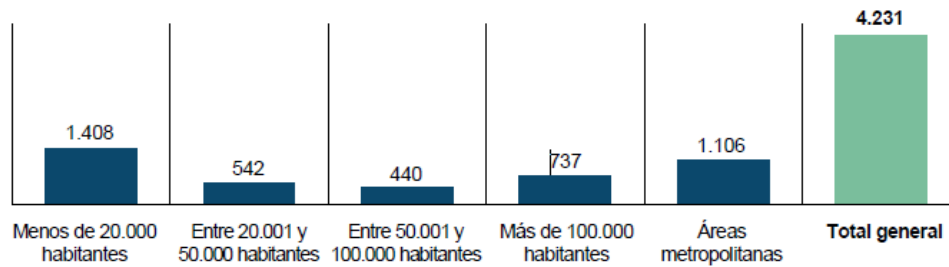


Figure 3: Purified water supplied to the network according to the size of population centers (AEAS)

2.3. Infrastructure for water distribution

The water distribution networks in Spain encompass a total of 248,000 km of pipelines (equating to 4.8 meters of pipe per inhabitant).

Upon analyzing the materials employed in the network's composition, it becomes evident that polyethylene is the most extensively utilized material (constituting 34% of usage), followed by ductile iron (at 32%) and asbestos cement (comprising 20%).

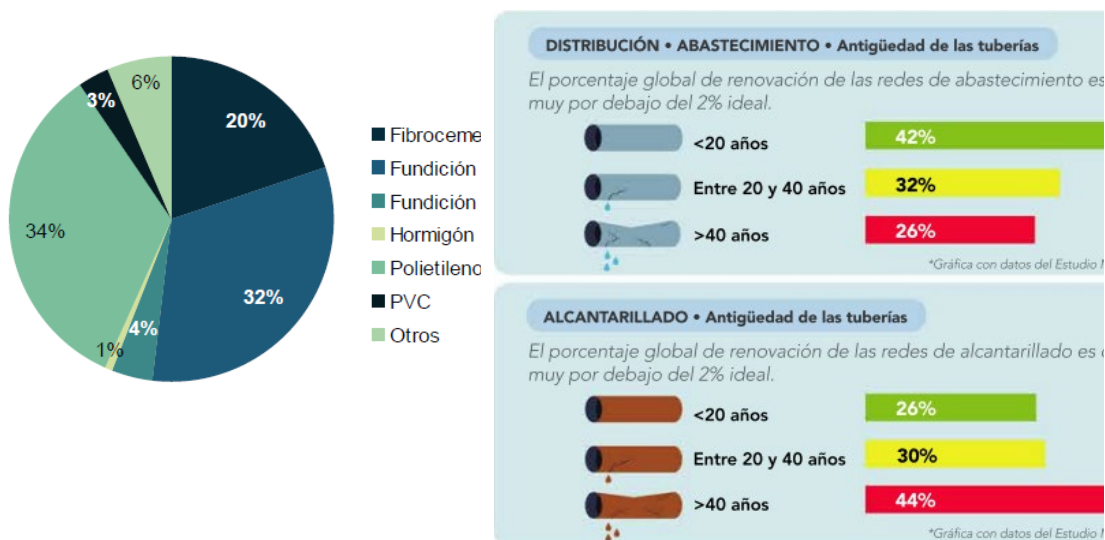


Figure 4: Percentage distribution of materials used in drinking water distribution pipelines in Spanish networks and age of conduits (AEAS)

The study conducted by AEAS-AGA shows that there has been a noticeable aging of these installations, as only 26% are less than 20 years old, 30% are between 20-40 years old, and the remaining 44% are over 40 years old, with a renewal percentage that reaches alarming levels of 0.2%.

In the supply of water to cities and industries, one of the main problems is the losses in distribution networks; it is estimated to account for about 50% to 70% of the extracted water. This significant loss is mainly due to evaporation and, especially, leaks in the network. According to some experts, with proper management, these losses could be reduced to around 15%.

The water meter fleet is of great significance (21.6 million), with 24% of them being less than 5 years old, 40% between 5 and 10 years old, and 36% over 10 years old. The renewal rate is 7%.



In some Autonomous Communities (CC.AA.) such as Andalusia, Aragon, Basque Country, Madrid, or Navarre, the proportion of public participation in water supply management is greater than 50%. On the other hand, in Catalonia, Canary Islands, Murcia, and the Valencian Community, water supply management is predominantly private or mixed.

2.4. Sewer Infrastructure in Spain

In Spain, 76% of sewage networks are combined: stormwater and wastewater flow through the same conduit, while the remaining 24% have separate networks. Efforts are being made to establish separate networks wherever possible to treat only urban wastewater.

Among the materials used in the sewage network, concrete stands out with 56% of the total network, followed by PVC with 24%.

There is a gradual aging of the sewage networks, which currently total 189,200 km of pipes, or 4 meters of pipe per person, with a renewal rate of 0.6%.

2.5. Reuse and Treatment Infrastructure in Spain

In the year 2020, Spain had a total of 2,232 Wastewater Treatment Plants (WWTPs), which treated a combined volume of 4,066 hm³ of wastewater.

The percentage of wastewater reuse across different Autonomous Communities varies significantly, as depicted in the following figure:

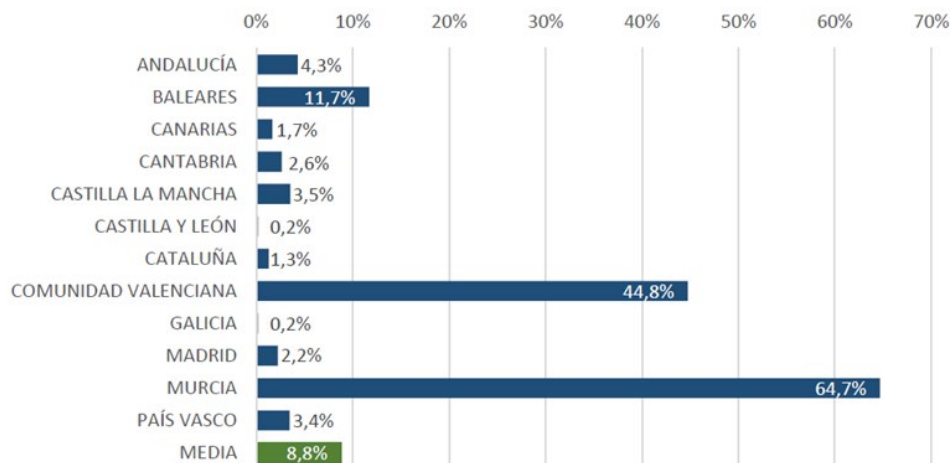


Figure 5: Percentage of wastewater reused out of the total supplied by Autonomous Communities (AEAS)

The European Union has developed a Circular Economy strategy to combat climate change. Water supply and sanitation operators are engaged in this strategy to enhance waste management:



Figure 6: Circular Economy and Energy Savings Diagram. Destination of Reused Water and Sludge (AEAS)

The following figure from the European Environmental Agency depicts Wastewater Treatment Plants (WWTPs) according to the type of treatment:

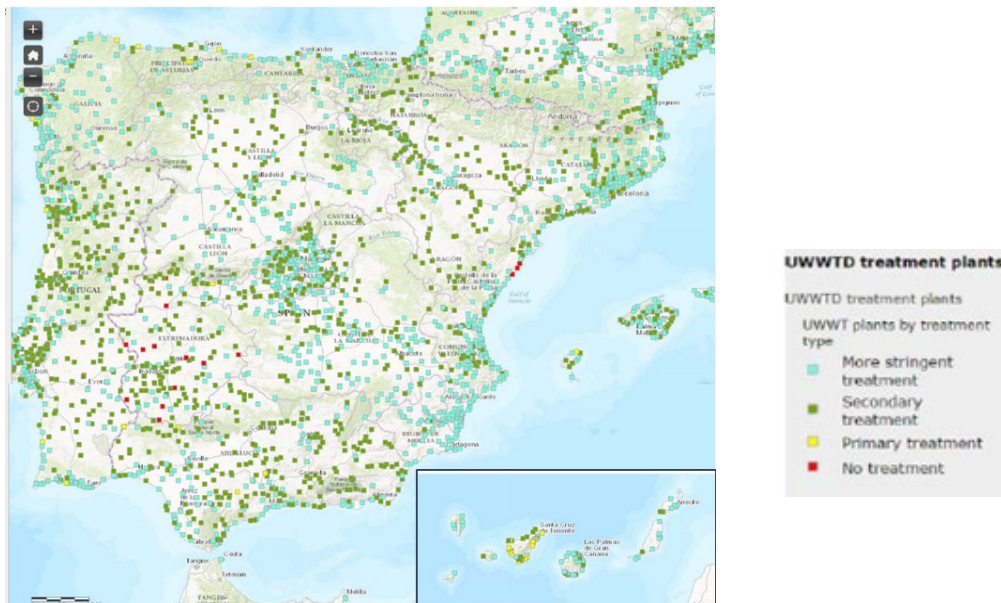


Figure 7: Wastewater Treatment Plants (WWTPs) in Spain according to the type of treatment. (Fuente European Environment Agency)



3. Methodology

The methodology designed by Asociación Caminos includes an objective evaluation that analyzes quantitative indicators referenced to the most representative data of each sector, as well as a qualitative evaluation based on the opinions of a selected group of experts.

The **quantitative evaluation** is conducted through a comparative study with other countries in our economic and social environment, considering the most representative indicators of the sector (both from Spain and other countries). These indicators are obtained from publicly accessible databases available in important multilateral organizations such as EUROSTAT, OECD, World Bank, UN, World Economic Forum, International Transport Forum, among others. The preference is to gather data that has been collected using comparable criteria among different countries, allowing the analysis of indicators' evolution over time.

The **qualitative evaluation** exclusively pertains to Spain and is based on the responses obtained from a questionnaire sent to a selected group of experts in the sector. The responses obtained are processed anonymously and confidentially, adhering to the current data protection legislation. Once the expert responses are processed, they are integrated (with a weight of 50%) into the quantitative assessment of the sector to obtain the final evaluation of the sector in an international context.

To facilitate the evaluation, the analysis is grouped into eight sets of common characteristics for all sectors, but with specificities for each sector, referred to as "Criteria": Capacity, Performance, Financing, Adaptation to the Future and Sustainable Development, Operation and Maintenance, Safety, Resilience, and Engineering and Innovation.

The evaluation of each Criterion is obtained as a result of a weighted assessment of the selected Indicators for that Criterion. Once the eight Criteria indices for each sector are obtained, the Sector index is also calculated as a result of a new weighted assessment of these Criterion indicators.

To establish an international comparison of Spain's Complete Water Cycle sector, major European countries have been selected: Germany, France, the United Kingdom, Italy, and Turkey; four countries from the Americas: the USA, Mexico, Brazil, and Peru; three countries from Africa: Egypt, Israel, and Saudi Arabia; and three countries from Asia: Japan, China, and India. However, not all countries have been evaluated for all indicators due to a lack of basic data.

The objective indicators and expert surveys address the following questions (similar to the ASCE report) for each Criterion of each sector:

- **Capacity:** Does the provision and capacity of the public works sector meet current demands?
- **Performance:** Are the current performance and physical conditions of the public works sector adequate to meet current user expectations?
- **Financing:** What investment is allocated to financing the public works sector? How much is applied to infrastructure creation and to operation and maintenance?
- **Adaptation to the Future and Sustainable Development:** Is the capacity and performance of the public works sector prepared to meet future expectations and demands? Are the resources and investments considered adequate to cover future sector needs? How are



actions promoting environmental sustainability being implemented? Are active measures applied to achieve the established objectives for decarbonizing public works and transportation?

- **Operation and Maintenance:** Is the public works sector being operated and maintained according to its needs?
- **Safety:** Is the public works sector safe for users? Are effective measures implemented to ensure safe performance and operation?
- **Resilience:** When faced with threats and adverse incidents, what is the capacity of the public works sector to prevent, protect, and minimize consequences for users, the environment, the economy, and national security? Is the public works prepared to recover its initial state within a reasonable time once the threat or adverse incident has ceased? Are there alternatives to meet the service it provides?
- **Engineering and Innovation:** Are the resources allocated to engineering in the design, construction, conservation, management, and operation of the public works sector considered adequate? Is the investment in innovation sufficient? What new techniques, materials, technologies, and operational methods are being implemented to improve public works? Is progress being made in digitalization, monitoring, and sensing throughout the complete cycle of public works? Is the information provided to users adequate?

The methodology used to assess each Indicator is the result of an adjustment and transformation process of the selected ratios. **To avoid excessive data dispersion (due to topographical, territorial, economic, population distribution peculiarities, etc.) and to minimize the effect of outlier data points, it is necessary to limit them both from above and below. After obtaining the ratios, the dispersion of the values achieved in the different countries and years considered is analyzed.**

For this purpose, two methods have been considered for each indicator to avoid dispersion. The first method considers the mean and standard deviation of the data from the historical series, assigning as limit values the mean minus 1.5 times the standard deviation and the mean plus 1.5 times the standard deviation. The second method uses percentiles of the data from the historical series, analyzing the 90th or 80th percentile and the 10th percentile. The most suitable method to limit dispersion is adopted for each Indicator in each case. In some cases, there are exceptions to this general rule, such as the Safety indicators, for which the minimum value assigned is zero, considering it as the value that should obtain the highest score.

Once these values are obtained, they are transformed on a scale from 0 to 10, with 10 being the highest value and 0 being the lowest. Next, the following rating is assigned:

Rating System of Asociación Caminos							
Asociación Caminos	0 a 2,9	3,0 a 4,9	5,0 a 5,9	6,0 a 6,9	7,0 a 7,9	8,0 a 8,9	9,0 a 9,9
	Very Insufficient	Insufficient	Sufficient	Highly Sufficient	Good	Very Good	Excellent
	F	FX	E	D	C	B	A

Table 1: Rating system for Indicators, Criteria, and Sectors

When all the Indicators for each Criterion are calculated, they are then weighted to calculate the Criterion Indicator. This weighting is done based on the importance assigned to each Indicator in forming the Criterion Indicator.



Assigning weights to each Indicator represents one of the major challenges. To address this, the input of experts is essential. Based on their experience and knowledge, they assign these weights.

It's important to note that, to form the Criterion Indicator as a weighted assessment of the Indicators, the maximum value that the Criterion Indicator can reach is the result of summing the weight assigned to each Indicator by the maximum rating (10) that the Indicator can achieve, adjusted by a reduction coefficient (which has been considered as 0.9). The application of this reduction coefficient is considered essential to balance the integration of the indicators (for example: in the "Adaptation to the Future" Criterion, growth ratios of investment in relation to the growth of motorization rates, traffic, and population are analyzed. If the motorization rate decreases due to the increase in shared vehicle use, the sector's indicator would decrease even if the traffic increases).

As an example, for the "Operation and Maintenance" Criterion, the minimum value would be 0 (zero), and the theoretical maximum value of the Safety Indicator would be 120, reduced by 10% to 108.

Indicators	Weight	Max Score	Total Max score	
I 5,1	4	10	40	Investment and maintenance as a % of national GDP
I 5,2	1	10	10	Investment in operation and maintenance per capita
I 5,3	2	10	20	Investment in operation and maintenance per equivalent km of roads
I 5,4	1	10	10	Investment in operation and maintenance per domestic road passenger traffic (€)
I 5,5	4	10	40	Investment in operation and maintenance per domestic road freight traffic (€)
Total:	12	30	120	
% Max score over Max Value		90,0%	108,00	

When forming the Criterion Indicator, the mean and standard deviation are not taken into account, as this would distort the Criterion Indicator by overvaluing the assessments of the integration of the Indicators. However, a reduction percentage is indeed taken into consideration.

Furthermore, since data for certain countries and certain years might not always be available, this document has chosen to calculate the ratios without considering or estimating data that is not available. Thus, unverifiable or erroneous data is not considered in the assessment of the Criterion Indicator or the Sector Indicator. In this way, the Criterion Index and Sector Index only evaluate data for which there is confirmed information, following a method to prevent it from distorting the assessment achieved by a particular country.

In the earlier example, if reliable data for Indicator I 5.5 is not available for a specific country, the assessment of the Operation and Maintenance Criterion for that country would be calculated based on the maximum value of 68 (which results from subtracting 40, the maximum score of Indicator I 6.5, from 108, which is the total maximum score of all indicators, after applying the 10% reduction coefficient). For the assessment of other countries with data in all indicators, the value of 108 would be considered as the maximum score.



In other words, each country is evaluated based on the data that is truly reliable and comparable, even if fewer indicators are used for comparison with other countries. In any case, when this effect occurs, it is noted in the assessment of Criteria and the sector.



4. Quantitative Indicators of the Complete Water Cycle

For the comparative study, 57 quantitative indicators have been used, all of which are referenced to the most representative data in the sector (both from Spain and other countries), obtained from publicly accessible databases available in important multilateral organizations (EUROSTAT, OECD, World Bank, UN, World Economic Forum, International Transport Forum, UIC, etc.). The selection of sub-indicators took into account the opinions and experience of the consulted experts. It was also essential to have the appropriate database to compose the sub-indicator. The time period considered for this comparative study covers 5 years: from 2015 to 2019. It was not deemed appropriate to go beyond the year 2019 due to the distortion caused by the COVID-19 pandemic, which significantly altered the comparison of indicators in 2020 and partially during 2021.

Once the available databases were analyzed, it was considered appropriate to use the following databases:

- The World Bank (WB)
 - Population
 - Surface area
 - GDP (USD)
- World Economic Forum (WEF)
 - Quality indicators of the Complete Water Cycle infrastructure
- United Nations (UN), Food and Agriculture Organization (FAO), and AQUASTAT
 - % of the population using basic drinking water services
 - % of the population using basic sanitation services
 - % of the population using safely managed drinking water services
 - % of the population using safely managed sanitation services
 - Water extracted for non-domestic use/irrigated area (m³/ha)
 - Irrigated area (Mill Ha)
 - Available water per capita (Renewable freshwater resources/Population) (m³/year)
 - Water stress (Water extracted/Freshwater resources -Environmental flow) (%) (SDG: 6.4.2)
 - % of integrated water resources management (SDG: 6.5.1)
 - % Change in the permanent water area of lakes and rivers (SDG: 6.6.1)
 - % Annual freshwater withdrawal for domestic use/Total freshwater withdrawal
 - Renewable freshwater resources (10⁹ m³)
 - % of agricultural land under irrigation/total agricultural land
 - Agricultural land area (km²)
 - Water extracted for non-domestic use (Freshwater resources extracted - Water extracted for domestic use) (10⁹ m³)
 - % of water bodies in good ecological status (SDG: 6.3.2)
 - Water use efficiency (USD/m³) (SDG: 6.4.1)
 - m³ of treated wastewater
- University of Notre Dame (ND-GAIN)
 - Global Adaptation Index indicators from the University of Notre Dame (ND-GAIN)
 - Freshwater extraction rate (ND-GAIN Water Index)



- Water dependency ratio (ND-GAIN Water Index)
 - Dam capNational GDP (Current €)
 - Statistical Annex. Transport in the EU 2018.
 - acity (ND-GAIN Water Index)
- OECD-International Transport Forum (OCDE)
 - Percentage of wastewater collected in sewer systems
 - Research, development, and innovation
- EUROSTAT and EU
 - National GDP (Current €)
 - Statistical Annex. Transport in the EU 2018.
 - EU economic investment report 2017-2018-2019



COMPLETE WATER CYCLE INDICATORS	
1 CAPACITY	
Water C.1	% of the population with access to basic drinking water services
Water C.2	% of the population with access to basic sanitation services
Water C.3	Water extracted for non-domestic use/irrigated area (m3/ha)
Water C.4	% Irrigated area/total area
Water C.5	(100-Water stress index)*available water per capita (m3)
Water C.6	% Irrigated area/agricultural land area
Water C.7	Water stress index (Water extracted from freshwater resources/(Renewable freshwater resources - Environmental flow) (%)) (SDG: 6.4)
2 PERFORMANCE	
Water P.1	Percentage of population using safely managed drinking water services
Water P.2	Percentage of population using safely managed sanitation services
Water P.3	Water use efficiency (USD/m3)/(GDP*10,000) (SDG: 6.4.1) UN
Water P.4	Percentage of wastewater collected in sewer systems
Water P.5	% of population connected to a wastewater treatment plant - primary treatment - (OECD)
Water P.6	% of population connected to a wastewater treatment plant - secondary treatment - (OECD)
Water P.7	% of population connected to a wastewater treatment plant - tertiary treatment - (OECD)
3 FINANCING	
Water F.1	(Total Expenditure Water Cycle Sector / population)*Investment Needs
Water F.2	(Total Expenditure Water Cycle Sector / real GDP) * Investment Needs * 1,000,000
Water F.3	(Maintenance expenditure / Total expenditure) * Investment Needs
Water F.4	Total Expenditure Water Cycle Sector / population
Water F.5	Total Expenditure Water Cycle Sector / real GDP
Water F.6	Operation and maintenance expenditure / Total expenditure
Water F.7	Investment Needs
4 Adaptation to the Future and Sustainability	
Water A.1	Freshwater resources (long-term average) - Evapotranspiration - (m3/person) (OECD)
Water A.2	Freshwater resources (long-term average) - Total renewable per capita (m3/person) - (OECD)
Water A.3	Freshwater extraction (long-term average) (millions m3) - Gross extraction per capita (m3/person) - (OECD)
Water A.4	Projected change in annual runoff (ND-GAIN Water Index)
Water A.5	Projected change in annual groundwater recharge (ND-GAIN Water Index)
Water A.6	Fresh water withdrawal rate (ND-GAIN Water Index)
Water A.7	Water dependency ratio (ND-GAIN Water Index)
Water A.8	Dam capacity (ND-GAIN Water Index)
Water A.9	% Technologies related to water treatment and purification (OECD)
Water A.10	% Gross extraction of freshwater per capita / total renewable freshwater per capita
5 OPERATION AND MAINTENANCE	
Water O.1	Expenditure on water sector operation and maintenance / population
Water O.2	% Expenditure on water sector operation and maintenance / real GDP
Water O.3	Reliability of water supply. GCI Index (WEF)
6 SECURITY	
Water S.1	Premature deaths, per million inhabitants (unsafe water source) (OECD)
Water S.2	Premature deaths, per million inhabitants (Unsafe sanitation) (OECD)
Water S.3	Premature deaths, per million inhabitants (Lack of safe handwashing facilities) (OECD)
7 RESILIENCE	
Water R.1	Available water per capita (Renewable freshwater resources/Population) (m3/year)
Water R.2	(Renewable freshwater resources*(1-Water stress index))/agricultural land area (m3/ha)
Water R.3	% Integrated water resources management (SDG: 6.5.1)
Water R.4	% Annual freshwater extraction for domestic use/Total freshwater extraction
8 ENGINEERING AND INNOVATION	
Water I.1	Number of patents related to water treatment and purification per million population (OECD)
Water I.2	Number of patents related to water pollution reduction per million population (OECD)
Water I.3	Number of patents. Desalination of seawater per million population (OECD)
Water I.4	% of GDP allocated to Gross Domestic Expenditure on Research and Development (R&D) (OECD R&D)
Water I.5	Gross Domestic Expenditure on Research and Development (\$)/Population (OECD R&D)
Water I.6	% of GDP allocated to basic research expenditure (OECD R&D)
Water I.7	% of GDP of Private Funding for Research and Development (R&D) (OECD R&D)
Water I.8	% of GDP of Public Funding for Research and Development (R&D) (OECD R&D)
Water I.9	Digitization. Participation in new technologies. GCI Score (WEF)
Water I.10	Digitization. Information and Communication Technology Infrastructure Index. (ND Index)
Water I.11	Digitization. % of people using the internet
Water I.12	Engineering. Regulatory transparency. Services Trade Restrictiveness Index (OECD)
Water I.13	Engineering. Barriers to competition. Services Trade Restrictiveness Index (OECD)
Water I.14	Engineering. Movement restrictions. Services Trade Restrictiveness Index (OECD)
Water I.15	Engineering. Restrictions on entry of foreign engineers. Services Trade Restrictiveness Index (OECD)
Water I.16	Innovation index. ND Gain Index



4.1. Capacity

The indicators in this criterion aim to answer the question: Does the provision and capacity of the public works sector meet current demands?

To address this, the following indicators have been selected:

1 CAPACITY	
Water C.1	% of the population with access to basic drinking water services
Water C.2	% of the population with access to basic sanitation services
Water C.3	Water extracted for non-domestic use/irrigated area (m3/ha)
Water C.4	% Irrigated area/total area
Water C.5	(100-Water stress index)*available water per capita (m3)
Water C.6	% Irrigated area/agricultural land area
Water C.7	Water stress index (Water extracted from freshwater resources/(Renewable freshwater resources - Environmental flow) (%)) (SDG: 6.4)

For the evaluation of this Criterion, seven indicators have been used. The first two analyze the percentage of the population with access to basic drinking water and sanitation services; the third relates water extracted for non-domestic use to the irrigated area; the fourth indicates the percentage of irrigated area in relation to the total area, and the sixth indicates the percentage of irrigated area in relation to the agricultural land area. The fifth and seventh indicators aim to reflect water stress.

Indicator 6.4.2 of the United Nations 2030 Agenda defines water stress as the ratio of total freshwater withdrawn (Total Flow Water Withdrawn) to the total freshwater resources (Total Renewable Fresh Water Resources), after accounting for environmental flow requirements (Ambiental Environmental Flow Requirements). The mathematical definition is: Water stress (%) = $\text{TFWW} / (\text{TRWR} - \text{EFR}) * 100$ (Unit of variables: km³/year, or 109m³/year). The interpretation of values is as follows: No stress < 25%; Low stress: 25% - 50%; Medium stress: 50% - 75%; High stress: 75% - 100%; Critical stress > 100%.

Based on water stress, the indicator is also calculated: (100-Water stress index) * available water per capita (m3). This indicator is representative of the water need of countries.

In the following figure, the baseline water stress is presented, measured as the ratio of total water withdrawals compared to available renewable water supply¹ (Source: WRI (2019)). As observed, Spain, along with Italy and Greece, has the highest values in Europe. Spain exhibits extremely high risk in the southeast of the peninsula.

¹ Water withdrawals include consumptive and non-consumptive domestic, industrial, irrigation, and livestock uses. Available renewable water supplies include groundwater and surface water supplies and take into account the impact of upstream water users and large dams on the availability of downstream flowing water. Higher values indicate more competition among users.

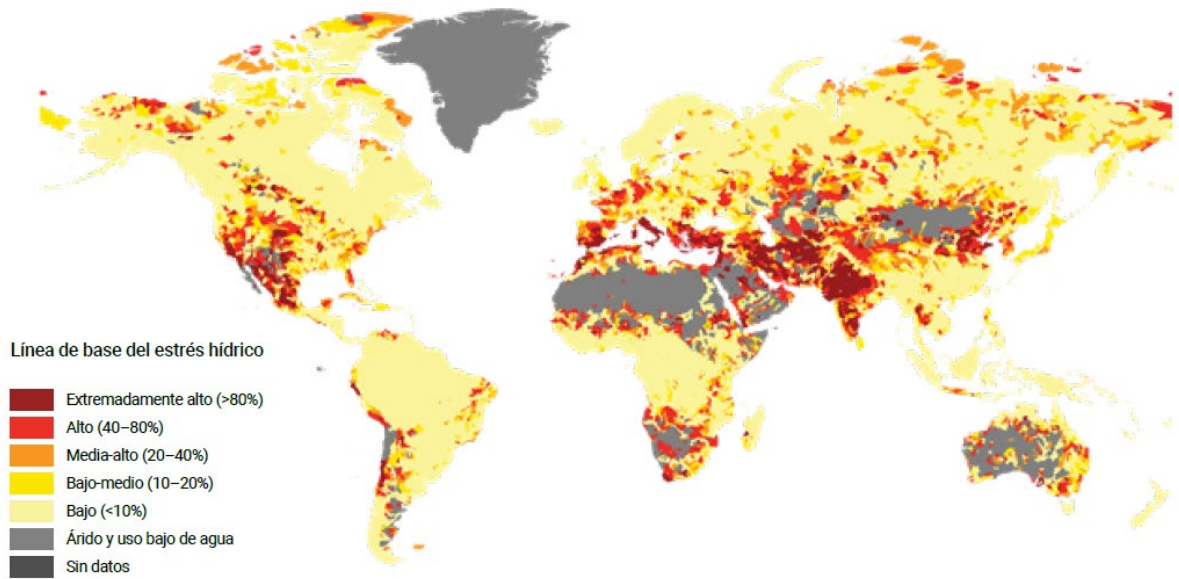


Figure 8: Baseline Water Stress



4.1.1. Capacity Indicators

4.1.1.1 Indicator WATER C.1: % of the population with access to basic drinking water services

AGUA C.1	% de la población con acceso a servicios básicos de agua potable					
	2010	2015	2016	2017	2018	2019
España		100%	100%	100%	100%	100%
Alemania		100%	100%	100%	100%	100%
Francia		100%	100%	100%	100%	100%
Reino Unido		100%	100%	100%	100%	100%
Italia		100%	100%	100%	100%	100%
Turquía		97%	97%	97%	97%	97%
EEUU		100%	100%	100%	100%	100%
México		99%	99%	99%	99%	99%
Brasil		99%	99%	99%	99%	99%
Perú		93%	93%	93%	93%	93%
Egipto		99%	99%	99%	99%	99%
Israel		99%	99%	99%	99%	99%
Arabía Saudí		99%	99%	99%	99%	99%
Japón		100%	100%	100%	100%	100%
China		95%	95%	95%	95%	95%
India		90%	90%	90%	90%	90%
Maximo:		99,90%		MAX:	100,00%	10
Mínimo:		90,00%		Percentil 10%:	93,00%	1
Media:		98,081%	Percentil 90%:	100%	0,070	9,000
Media+Factor max*Desv Estándar:		1,024	Percentil 10%:	93%	Unidad:	128,571
Media-Factor min*Desv Estándar:		0,938		Desv. Est.:	0,029	

Table 2: Indicator WATER C.1 Values: % of the population with access to basic drinking water services

AGUA C.1	% de la población con acceso a servicios básicos de agua potable						Calificación 2019	
	2010	2015	2016	2017	2018			
España		9,9	9,9	9,9	9,9	9,9	EXCELENTE	A
Alemania		9,9	9,9	9,9	9,9	9,9	EXCELENTE	A
Francia		9,9	9,9	9,9	9,9	9,9	EXCELENTE	A
Reino Unido		9,9	9,9	9,9	9,9	9,9	EXCELENTE	A
Italia		9,9	9,9	9,9	9,9	9,9	EXCELENTE	A
Turquía		6,1	6,1	6,1	6,1	6,1	SUFICIENTE ALTO	D
EEUU		9,9	9,9	9,9	9,9	9,9	EXCELENTE	A
México		8,7	8,7	8,7	8,7	8,7	MUY BIEN	B
Brasil		8,7	8,7	8,7	8,7	8,7	MUY BIEN	B
Perú		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Egipto		8,7	8,7	8,7	8,7	8,7	MUY BIEN	B
Israel		8,7	8,7	8,7	8,7	8,7	MUY BIEN	B
Arabía Saudí		8,7	8,7	8,7	8,7	8,7	MUY BIEN	B
Japón		9,9	9,9	9,9	9,9	9,9	EXCELENTE	A
China		3,6	3,6	3,6	3,6	3,6	INSUFICIENTE	FX
India		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F

Table 3: Indicator WATER C.1 Rating: % of the population with access to basic drinking water services



4.1.1.2 Indicator WATER C.2: % of the population with access to basic sanitation services

AGUA C.2	% de la población con acceso a servicios básicos de saneamiento					
	2010	2015	2016	2017	2018	2019
España		99%	99%	99%	99%	99%
Alemania		99%	99%	99%	99%	99%
Francia		99%	99%	99%	99%	99%
Reino Unido		99%	99%	99%	99%	99%
Italia		99%	99%	99%	99%	99%
Turquía		99%	99%	99%	99%	99%
EEUU		99%	99%	99%	99%	99%
México		92%	92%	92%	92%	92%
Brasil		89%	89%	89%	89%	89%
Perú		78%	78%	78%	78%	78%
Egipto		97%	97%	97%	97%	97%
Israel		99%	99%	99%	99%	99%
Arabia Saudí		99%	99%	99%	99%	99%
Japón		99%	99%	99%	99%	99%
China		75%	75%	75%	75%	75%
India		68%	68%	68%	68%	68%
Maximo:		99,00%		MAX:	100,00%	10
Mínimo:		68,00%		Percentil 10%:	75,00%	1
Media:		92,176%		Percentil 90%:	99%	9,000
Media+Factor max*Desv Estándar:		1,076		Percentil 10%:	75%	36,000
Media-Factor min*Desv Estándar:		0,767		Desv. Est.:	0,103	

Table 4: Indicator WATER C.2 Values: % of the population with access to basic sanitation services

AGUA C.2	% de la población con acceso a servicios básicos de saneamiento						Calificación 2019	
	2010	2015	2016	2017	2018			
España		9,6	9,6	9,6	9,6	9,6	EXCELENTE	A
Alemania		9,6	9,6	9,6	9,6	9,6	EXCELENTE	A
Francia		9,6	9,6	9,6	9,6	9,6	EXCELENTE	A
Reino Unido		9,6	9,6	9,6	9,6	9,6	EXCELENTE	A
Italia		9,6	9,6	9,6	9,6	9,6	EXCELENTE	A
Turquía		9,6	9,6	9,6	9,6	9,6	EXCELENTE	A
EEUU		9,6	9,6	9,6	9,6	9,6	EXCELENTE	A
México		7,1	7,1	7,1	7,1	7,1	BIEN	C
Brasil		6,0	6,0	6,0	6,0	6,0	SUFICIENTE ALTO	D
Perú		2,1	2,1	2,1	2,1	2,1	MUY INSUFICIENTE	F
Egipto		8,9	8,9	8,9	8,9	8,9	MUY BIEN	B
Israel		9,6	9,6	9,6	9,6	9,6	EXCELENTE	A
Arabia Saudí		9,6	9,6	9,6	9,6	9,6	EXCELENTE	A
Japón		9,6	9,6	9,6	9,6	9,6	EXCELENTE	A
China		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
India		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F

Table 5: Indicator WATER C.2 Rating: % of the population with access to basic sanitation services



4.1.1.3 Indicator WATER C.3: Water extracted for non-domestic use/irrigated area (m3/ha)

AGUA C.3	Recursos extraídos de agua para uso no doméstico/superficie de regadío) (m3/ha)					
	2010	2015	2016	2017	2018	2019
España		7.049	7.081	6.925	6.906	6.853
Alemania		30.602	30.734	30.683	30.760	30.721
Francia		7.519	7.521	7.527	7.537	7.547
Reino Unido		26.971	26.641	26.464	26.640	26.381
Italia		9.455	9.554	9.543	9.867	9.329
Turquía		10.059	10.118	10.215	10.258	10.282
EEUU		15.907	15.886	15.865	15.865	15.865
México		11.524	11.565	11.731	11.923	11.974
Brasil		10.898	10.865	10.832	12.131	12.131
Perú		24.944	25.201	25.124	26.641	26.881
Egipto		18.154	18.426	17.931	17.810	17.542
Israel		3.415	3.303	2.832	2.568	2.580
Arabia Saudí		11.524	11.525	11.527	11.394	11.394
Japón		24.014	24.148	24.295	24.427	24.555
China		8.105	8.107	8.107	8.107	8.107
India		9.568	9.573	9.592	9.598	9.602
Maximo:		30759,99	MAX ((Media+Factor max	Percentil 70%:	17.622,447	10,00
Mínimo:		2.568,313	MIN ((Media-Factor min *Desv.);0):		2359,318364	1
Media:		14.416,536	Percentil 70%:	17.622,447	15263,129	9,000
Media+Factor max*Desv Estándar:		26.473,754	Percentil 10%:	7.036,618	Unidad:	0,001
Media-Factor min*Desv Estándar:		2.359,318		Desv. Est.:	8.038,145	

Table 6: Indicator WATER C.3 Values: Water extracted for non-domestic use/irrigated area (m3/ha)

AGUA C.3	Recursos extraídos de agua para uso no doméstico/superficie de regadío) (m3/ha)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		3,8	3,8	3,7	3,7	3,6	INSUFICIENTE	FX
Alemania		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Francia		4,0	4,0	4,0	4,1	4,1	INSUFICIENTE	FX
Reino Unido		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Italia		5,2	5,2	5,2	5,4	5,1	SUFICIENTE	E
Turquía		5,5	5,6	5,6	5,7	5,7	SUFICIENTE	E
EEUU		9,0	9,0	9,0	9,0	9,0	EXCELENTE	A
México		6,4	6,4	6,5	6,6	6,7	SUFICIENTE ALTO	D
Brasil		6,0	6,0	6,0	6,8	6,8	SUFICIENTE ALTO	D
Perú		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Egipto		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Israel		1,6	1,6	1,3	1,1	1,1	MUY INSUFICIENTE	F
Arabia Saudí		6,4	6,4	6,4	6,3	6,3	SUFICIENTE ALTO	D
Japón		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China		4,4	4,4	4,4	4,4	4,4	INSUFICIENTE	FX
India		5,3	5,3	5,3	5,3	5,3	SUFICIENTE	E

Table 7: Indicator WATER C.3 Rating: Water extracted for non-domestic use/irrigated area (m3/ha)



4.1.1.4 Indicator WATER C.4: % Irrigated area/total area

AGUA C.4	% Superficie regada/superficie total					
	2010	2015	2016	2017	2018	2019
España		7,3%	7,3%	7,4%	7,5%	7,5%
Alemania		1,4%	1,4%	1,4%	1,4%	1,4%
Francia		5,2%	5,2%	5,2%	5,2%	5,2%
Reino Unido		0,3%	0,3%	0,3%	0,3%	0,3%
Italia		8,6%	8,5%	8,5%	8,2%	8,7%
Turquía		6,9%	6,8%	6,8%	6,7%	6,7%
EEUU		2,5%	2,5%	2,5%	2,5%	2,5%
México		3,3%	3,3%	3,2%	3,2%	3,2%
Brasil		0,5%	0,5%	0,5%	0,5%	0,5%
Perú		1,0%	1,0%	1,0%	1,0%	1,0%
Egipto		3,0%	3,0%	3,1%	3,1%	3,1%
Israel		8,2%	8,5%	9,9%	9,9%	9,8%
Arabia Saudí		0,8%	0,8%	0,8%	0,8%	0,8%
Japón		7,1%	7,1%	7,1%	7,0%	7,0%
China		6,6%	6,6%	6,6%	6,6%	6,6%
India		19,1%	19,1%	19,1%	19,1%	19,1%
Maximo:		19,130%		Percentil 95%:	19,064%	10
Mínimo:		0,317%		MIN ((Media-Factor min *Desv);0):	0,000%	1
Media:		5,169%		Percentil 95%:	19,064%	0,191
Media+Factor max*Desv Estándar:		12,200%		Percentil 10%:	0,529%	Unidad: 47,210
Media-Factor min*Desv Estándar:		-1,863%		Desv. Est.:	4,688%	

Table 8: Indicator WATER C.4 Values: % Irrigated area/total area

AGUA C.4	% Superficie regada/superficie total						
	2015	2016	2017	2018	Calificación 2019		
España	4,4	4,4	4,5	4,5	4,5	INSUFICIENTE	FX
Alemania	1,7	1,7	1,7	1,7	1,7	MUY INSUFICIENTE	F
Francia	3,5	3,5	3,5	3,5	3,5	INSUFICIENTE	FX
Reino Unido	1,1	1,2	1,2	1,2	1,2	MUY INSUFICIENTE	F
Italia	5,1	5,0	5,0	4,9	5,1	SUFICIENTE	E
Turquía	4,2	4,2	4,2	4,2	4,2	INSUFICIENTE	FX
EEUU	2,2	2,2	2,2	2,2	2,2	MUY INSUFICIENTE	F
México	2,5	2,5	2,5	2,5	2,5	MUY INSUFICIENTE	F
Brasil	1,2	1,2	1,2	1,2	1,2	MUY INSUFICIENTE	F
Perú	1,5	1,4	1,5	1,5	1,4	MUY INSUFICIENTE	F
Egipto	2,4	2,4	2,4	2,5	2,5	MUY INSUFICIENTE	F
Israel	4,9	5,0	5,7	5,7	5,6	SUFICIENTE	E
Arabia Saudí	1,4	1,4	1,4	1,4	1,4	MUY INSUFICIENTE	F
Japón	4,4	4,4	4,3	4,3	4,3	INSUFICIENTE	FX
China	4,1	4,1	4,1	4,1	4,1	INSUFICIENTE	FX
India	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A

Table 9: Indicator WATER C.4 Rating: % Irrigated area/total area



4.1.1.5 Indicator WATER C.5: (100-Water stress index)*available water per capita (m3)

AGUA C.5	(100-Índice de stress hídrico)*agua disponible per cápita (m3)					
	2010	2015	2016	2017	2018	2019
España		1.365	1.387	1.408	1.426	1.416
Alemania		1.246	1.244	1.239	1.235	1.232
Francia		2.390	2.431	2.409	2.406	2.400
Reino Unido		1.943	1.919	1.906	1.894	1.884
Italia		2.202	2.205	2.209	2.213	2.238
Turquía		1.615	1.473	1.465	1.400	1.373
EEUU		6.874	6.824	6.781	6.746	6.715
México		2.535	2.504	2.475	2.448	2.421
Brasil		41.012	40.626	40.311	40.042	39.742
Perú		58.311	57.143	55.603	54.797	53.676
Egipto		-69	-64	-248	-94	-92
Israel		3	-8	-8	9	9
Arabía Saudí		-642	-614	-621	-636	-625
Japón		2.139	2.144	2.152	2.158	2.161
China		1.160	1.160	1.144	1.144	1.144
India		489	485	478	474	467
Maximo:		58.311		Percentil 85%:	6.787,814	10,00
Mínimo:		-642,327	MIN ((Media-Factor min *Desv),0):		0	1
Media:		7.449,448	Percentil 85%:	6.787,814	6787,814	9,000
Media+Factor max*Desv Estándar:		31.157,932	Percentil 20%:	472,720	Unidad:	0,001
Media-Factor min*Desv Estándar:		-16.259,036		Desv. Est.:	15.805,656	

Table 10: Indicator WATER C.5 Values: (100-Water stress index)*available water per capita (m3)

AGUA C.5	(100-Índice de stress hídrico)*agua disponible per cápita (m3)					
	2015	2016	2017	2018	Calificación 2019	
España	2,8	2,8	2,9	2,9	2,9	MUY INSUFICIENTE F
Alemania	2,7	2,6	2,6	2,6	2,6	MUY INSUFICIENTE F
Francia	4,2	4,2	4,2	4,2	4,2	INSUFICIENTE FX
Reino Unido	3,6	3,5	3,5	3,5	3,5	INSUFICIENTE FX
Italia	3,9	3,9	3,9	3,9	4,0	INSUFICIENTE FX
Turquía	3,1	3,0	2,9	2,9	2,8	MUY INSUFICIENTE F
EEUU	10,0	10,0	10,0	9,9	9,9	EXCELENTE A
México	4,4	4,3	4,3	4,2	4,2	INSUFICIENTE FX
Brasil	10,0	10,0	10,0	10,0	10,0	EXCELENTE A
Perú	10,0	10,0	10,0	10,0	10,0	EXCELENTE A
Egipto	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE F
Israel	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE F
Arabía Saudí	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE F
Japón	3,8	3,8	3,9	3,9	3,9	INSUFICIENTE FX
China	2,5	2,5	2,5	2,5	2,5	MUY INSUFICIENTE F
India	1,6	1,6	1,6	1,6	1,6	MUY INSUFICIENTE F

Table 11: Indicator WATER C.5 Rating: (100-Water stress index)*available water per capita (m3)



4.1.1.6 Indicator WATER C.6: % Irrigated area/agricultural land area

AGUA C.6	%Superficie regada/superficie de tierras agrícolas					
	2010	2015	2016	2017	2018	2019
España		13,9%	14,0%	14,3%	14,4%	14,5%
Alemania		3,0%	3,0%	3,0%	3,0%	3,0%
Francia		10,0%	10,0%	10,0%	10,0%	10,0%
Reino Unido		0,5%	0,5%	0,5%	0,5%	0,5%
Italia		20,0%	20,0%	20,0%	20,0%	20,0%
Turquía		14,0%	14,0%	14,0%	14,0%	14,0%
EEUU		6,0%	6,0%	6,0%	6,0%	6,0%
México		6,5%	6,5%	6,5%	6,5%	6,5%
Brasil		1,9%	1,9%	1,9%	1,9%	1,9%
Perú		5,0%	5,0%	5,0%	5,0%	5,0%
Egipto		80,0%	80,0%	80,0%	80,0%	80,0%
Israel		34,0%	34,0%	34,0%	34,0%	34,0%
Arabía Saudí		1,0%	1,0%	1,0%	1,0%	1,0%
Japón		60,0%	60,0%	60,0%	60,0%	60,0%
China		12,0%	12,0%	12,0%	12,0%	12,0%
India		35,0%	35,0%	35,0%	35,0%	35,0%
Maximo:		80,000%		Percentil 70%:	20,000%	10
Mínimo:		0,450%		MIN ((Media-Factor min *Desv),0):	0,000%	1
Media:		18,942%		Percentil 70%:	20,000%	0,200
Media+Factor max*Desv Estándar:		52,269%		Percentil 10%:	1,000%	Unidad:
Media-Factor min*Desv Estándar:		-14,385%		Desv. Est.:	22,218%	45,000

Table 12: Indicator WATER C.6 Values: % Irrigated area/agricultural land area

AGUA C.6	%Superficie regada/superficie de tierras agrícolas						Calificación 2019	
	2010	2015	2016	2017	2018			
España		7,3	7,3	7,4	7,5	7,5	BIEN	C
Alemania		2,4	2,4	2,4	2,4	2,4	MUY INSUFICIENTE	F
Francia		5,5	5,5	5,5	5,5	5,5	SUFICIENTE	E
Reino Unido		1,2	1,2	1,2	1,2	1,2	MUY INSUFICIENTE	F
Italia		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Turquía		7,3	7,3	7,3	7,3	7,3	BIEN	C
EEUU		3,7	3,7	3,7	3,7	3,7	INSUFICIENTE	FX
México		3,9	3,9	3,9	3,9	3,9	INSUFICIENTE	FX
Brasil		1,9	1,9	1,9	1,9	1,9	MUY INSUFICIENTE	F
Perú		3,3	3,3	3,3	3,3	3,3	INSUFICIENTE	FX
Egipto		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Israel		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Arabía Saudí		1,5	1,5	1,5	1,5	1,5	MUY INSUFICIENTE	F
Japón		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China		6,4	6,4	6,4	6,4	6,4	SUFICIENTE ALTO	D
India		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A

Table 13: Indicator: WATER C.6 Rating: % Irrigated area/agricultural land area



4.1.1.7 Indicator WATER C.7: Water stress index (Water extracted from freshwater resources/(Renewable freshwater resources - Environmental flow) (%) (SDG: 6.4.2)

AGUA C.7	Estrés hídrico (Recursos extraídos de agua dulce/(Recursos renovables de agua dulce -Caudal ambiental) (%) (ODS: 6.4.2)					
	2010	2015	2016	2017	2018	2019
España		43,0%	42,0%	41,0%	40,0%	40,0%
Alemania		33,9%	33,5%	33,5%	33,5%	33,5%
Francia		24,6%	23,1%	23,6%	23,5%	23,5%
Reino Unido		13,9%	14,4%	14,4%	14,4%	14,4%
Italia		30,0%	30,0%	30,0%	30,0%	30,0%
Turquía		39,9%	44,3%	43,7%	45,4%	45,7%
EEUU		28,2%	28,2%	28,2%	28,2%	28,2%
México		33,0%	33,0%	33,0%	33,0%	33,0%
Brasil		3,0%	3,1%	3,1%	3,0%	3,0%
Perú		5,5%	6,0%	7,0%	6,8%	7,2%
Egipto		110,9%	110,5%	141,2%	116,0%	116,0%
Israel		98,9%	103,4%	103,6%	95,9%	96,0%
Arabía Saudí		948,9%	929,6%	956,0%	993,0%	993,0%
Japón		36,7%	36,6%	36,5%	36,4%	36,4%
China		43,2%	43,2%	43,2%	43,2%	43,2%
India		66,5%	66,5%	66,5%	66,5%	66,5%
Maximo:		993,0%		Percentil 90%:	111,437%	1,00
Mínimo:		3,0%	MIN ((Media-Factor min *Desv),0):		0,0%	10
Media:		99,1%	Percentil 90%:	111,4%	1,114	-9,000
Media+Factor max*Desv Estándar:		439,4%	Percentil 10%:	7,0%	Unidad:	-8,076
Media-Factor min*Desv Estándar:		-241,1%		Desv. Est.:	226,8%	

Table 14: Indicator WATER C.7 Values: Water stress index (Water extracted from freshwater resources/(Renewable freshwater resources - Environmental flow) (%) (SDG: 6.4.2)

AGUA C.7	Estrés hídrico (Recursos extraídos de agua dulce/(Recursos renovables de agua dulce -Caudal ambiental) (%) (ODS: 6.4.2)						
	2015	2016	2017	2018	Calificación 2019		
España	6,5	6,6	6,7	6,8	6,8	SUFICIENTE ALTO	D
Alemania	7,3	7,3	7,3	7,3	7,3	BIEN	C
Francia	8,0	8,1	8,1	8,1	8,1	MUY BIEN	B
Reino Unido	8,9	8,8	8,8	8,8	8,8	MUY BIEN	B
Italia	7,6	7,6	7,6	7,6	7,6	BIEN	C
Turquía	6,8	6,4	6,5	6,3	6,3	SUFICIENTE ALTO	D
EEUU	7,7	7,7	7,7	7,7	7,7	BIEN	C
México	7,3	7,3	7,3	7,3	7,3	BIEN	C
Brasil	9,8	9,7	9,7	9,8	9,8	EXCELENTE	A
Perú	9,6	9,5	9,4	9,5	9,4	EXCELENTE	A
Egipto	1,0	1,1	1,0	1,0	1,0	MUY INSUFICIENTE	F
Israel	2,0	1,6	1,6	2,3	2,2	MUY INSUFICIENTE	F
Arabía Saudí	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Japón	7,0	7,0	7,1	7,1	7,1	BIEN	C
China	6,5	6,5	6,5	6,5	6,5	SUFICIENTE ALTO	D
India	4,6	4,6	4,6	4,6	4,6	INSUFICIENTE	FX

Table 15: Indicator WATER C.7 Rating: Water stress index (Water extracted from freshwater resources/(Renewable freshwater resources - Environmental flow) (%) (SDG: 6.4.2)



4.1.2. Capacity Indicator

	Índice de Capacidad						Max valor 2019
	2010	2015	2016	2017	2018	2019	
España		115,4	115,7	116,4	116,8	116,9	153
Alemania		105,3	105,4	105,4	105,4	105,4	153
Francia		116,4	116,8	116,7	116,7	116,6	153
Reino Unido		108,2	108,0	108,0	107,9	107,9	153
Italia		129,5	129,4	129,4	129,2	129,6	153
Turquía		106,8	105,4	105,5	104,9	104,7	153
EEUU		124,6	124,6	124,6	124,5	124,4	153
México		100,1	100,0	100,0	100,0	100,0	153
Brasil		107,0	107,0	107,0	107,8	107,8	153
Perú		78,8	78,6	78,4	78,5	78,3	153
Egipto		95,3	95,4	95,2	95,3	95,3	153
Israel		99,4	98,6	100,3	102,0	101,9	153
Arabia Saudí		73,5	73,5	73,5	73,4	73,4	153
Japón		130,4	130,4	130,4	130,4	130,3	153
China		67,9	67,9	67,8	67,8	67,8	153
India		78,4	78,4	78,4	78,4	78,4	153
Maximo:		130,414		Máxima puntuación:	153	10	
Mínimo:		67,821		Mínima puntuación:	0	0	
Media:		102,332		Dif:	153,000	10,000	
					Unidad:	0,065	

Table 16: Capacity Indicator Values

	Evaluación de Capacidad						Subindicadores considerados	
	2015	2016	2017	2018	Calificación 2019			
España	7,5	7,6	7,6	7,6	7,6	BIEN	C	7
Alemania	6,9	6,9	6,9	6,9	6,9	SUFICIENTE ALTO	D	7
Francia	7,6	7,6	7,6	7,6	7,6	BIEN	C	7
Reino Unido	7,1	7,1	7,1	7,1	7,1	BIEN	C	7
Italia	8,5	8,5	8,5	8,4	8,5	MUY BIEN	B	7
Turquía	7,0	6,9	6,9	6,9	6,8	SUFICIENTE ALTO	D	7
EEUU	8,1	8,1	8,1	8,1	8,1	MUY BIEN	B	7
México	6,5	6,5	6,5	6,5	6,5	SUFICIENTE ALTO	D	7
Brasil	7,0	7,0	7,0	7,0	7,0	BIEN	C	7
Perú	5,1	5,1	5,1	5,1	5,1	SUFICIENTE	E	7
Egipto	6,2	6,2	6,2	6,2	6,2	SUFICIENTE ALTO	D	7
Israel	6,5	6,4	6,6	6,7	6,7	SUFICIENTE ALTO	D	7
Arabia Saudí	4,8	4,8	4,8	4,8	4,8	INSUFICIENTE	FX	7
Japón	8,5	8,5	8,5	8,5	8,5	MUY BIEN	B	7
China	4,4	4,4	4,4	4,4	4,4	INSUFICIENTE	FX	7
India	5,1	5,1	5,1	5,1	5,1	SUFICIENTE	E	7

Table 17: Capacity Criterion Rating

Subindicadores de Capacidad		Pesos	Total Max puntuación
AGUA C.1	% de la población con acceso a servicios básicos de agua potable	3	30
AGUA C.2	% de la población con acceso a servicios básicos de saneamiento	3	30
AGUA C.3	Recursos extraídos de agua para uso no doméstico/superficie de regadío) (m3/ha)	1	10
AGUA C.4	% Superficie regada/superficie total	3	30
AGUA C.5	(100-Índice de stress hídrico)*agua disponible per cápita (m3)	2	20
AGUA C.6	% Superficie regada/superficie de tierras agrícolas	2	20
AGUA C.7	Estrés hídrico (Recursos extraídos de agua dulce/(Recursos renovables de agua dulce - Caudal ambiental) (%) (ODS: 6.4.2)	3	30
		17	170
		90% Valorado de la Max. Puntuación del Criterio	153

Table 18: Weights and maximum reduced scores of the Capacity Indicators



It can be observed that the indicator "% of the population with access to basic potable water services" presents high values. More developed countries have very high percentages (between 99% and 100%), developing countries range between 95% and 97%, and less developed countries between 90% and 95%. India has the lowest value (90%) and China 95%. All European countries (except Turkey), the USA, and Japan have a 100%.

The indicator "% of the population with access to basic sanitation services" also presents high values, although lower than the first indicator. India has the lowest percentage (68%), China 75%, and Peru 78%. Similar to the previous indicator, European countries, the USA, and Japan have 99%.

These two indicators are considered essential for human development, as recognized by all international organizations, and are a priority for development aid.

The indicator "Water extracted for non-domestic use/irrigated area) (m3/ha)" is representative for analyzing available water for irrigation. Naturally, drier countries have a lower available volume, but it's also necessary to consider water extraction and the area under irrigation. Thus, Germany, the United Kingdom, Peru, Egypt, and Japan have high ratios; however, Israel, Spain, France, China, and India have low values.

Regarding the percentage of Irrigated Area/Total Area, India stands out (19.1%), followed by Israel (9.8%), Italy (8.7%), and Spain (7.5%). Naturally, countries with higher rainfall have less need for irrigated area.

The indicator of water stress is important². Countries without water stress (values below 25%) are Brazil, Peru, the United Kingdom, and France. Countries with critical stress (values above 100%) are Saudi Arabia, Egypt, and Israel. The rest of the countries fall into intermediate values.

Spain has a favorable ratio in relation to the "Percentage of Irrigated Area/Total Area" indicator (14.5%), surpassed by Egypt, Japan, India, and Italy.

Overall, Japan has the best rating in the Capacity Criterion, closely followed by Italy and the USA. Saudi Arabia and China have the lowest ratings.

² Indicator 6.4.2 of the United Nations' 2030 Agenda defines water stress as the relationship between the total flow of withdrawn freshwater (Total Flow Water Withdrawn) and the total renewable resources of freshwater (Total Renewable Fresh Water Resources), considering environmental flow requirements (Ambiental Environmental Flow Requirements). The mathematical definition is: $\text{Water stress (\%)} = \frac{\text{TFWW}}{\text{(TRWR - EFR)}} * 100$ (Unit of variables: km³/year, or 109m³/year). The interpretation of the values is as follows: No stress < 25%; Low stress: 25% - 50%; Medium stress: 50% - 75%; High stress: 75% - 100%; Critical stress > 100%.



4.2. Performance

This criterion addresses the question: Are the current performance and physical conditions of the public infrastructure sector adequate to meet the current expectations of users?

The selected indicators are as follows:

2 PERFORMANCE	
Water P.1	Percentage of population using safely managed drinking water services
Water P.2	Percentage of population using safely managed sanitation services
Water P.3	Water use efficiency (USD/m ³)/(GDP*10,000) (SDG: 6.4.1) UN
Water P.4	Percentage of wastewater collected in sewer systems
Water P.5	% of population connected to a wastewater treatment plant - primary treatment - (OECD)
Water P.6	% of population connected to a wastewater treatment plant - secondary treatment - (OECD)
Water P.7	% of population connected to a wastewater treatment plant - tertiary treatment - (OECD)

These indicators analyze the performance, the level of development of the network, the extent of wastewater treatment, and the needs of the water supply and sanitation system in countries.

Unfortunately, not all countries have been evaluated for all indicators. Some databases come from EUROSTAT, which is why data from non-EU countries are not available.



4.2.1. Performance Indicators

4.2.1.1 Indicator WATER P.1: Percentage of population using safely managed drinking water services

AGUAP.1	Porcentaje de la población que utiliza agua potable gestionada de forma segura					
	2010	2015	2016	2017	2018	2019
España		99,6%	99,6%	99,6%	99,6%	99,6%
Alemania		100,0%	99,2%	99,2%	99,2%	99,2%
Francia		98,7%	99,2%	99,2%	99,2%	99,2%
Reino Unido		99,9%	99,8%	99,8%	99,8%	99,8%
Italia		95,8%	95,8%	95,8%	95,8%	95,8%
Turquía		95,0%	95,0%	95,0%	95,0%	95,0%
EEUU		96,4%	97,3%	97,3%	97,3%	97,3%
México		42,3%	43,0%	43,0%	43,0%	43,0%
Brasil		82,0%	85,8%	85,8%	85,8%	85,8%
Perú		49,9%	51,3%	51,3%	51,3%	51,3%
Egipto		90,0%	90,0%	90,0%	90,0%	90,0%
Israel		99,5%	99,3%	99,3%	99,3%	99,3%
Arabía Saudí		99,0%	99,0%	99,0%	99,0%	99,0%
Japón		98,4%	98,6%	98,6%	98,6%	98,6%
China		90,0%	90,0%	90,0%	90,0%	90,0%
India		85,0%	85,0%	85,0%	85,0%	85,0%
Maximo:		100,0%		Maximo:	100,0%	10
Mínimo:		42,3%	MIN ((Media-Factor min *Desv),0):		63,9%	1
Media:		89,2%	Percentil 90%:	99,6%	0,361	9,000
Media+Factor max*Desv Estándar:		114,5%	Percentil 10%:	51,3%	Unidad:	24,910
Media-Factor min*Desv Estándar:		63,9%		Desv. Est.:	16,9%	

Table 19: Indicator WATER P.1 Values: Percentage of population using safely managed drinking water services

AGUAP.1	Porcentaje de la población que utiliza agua potable gestionada de forma segura						Calificación 2019	
	2010	2015	2016	2017	2018			
España		9,9	9,9	9,9	9,9	9,9	EXCELENTE	A
Alemania		10,0	9,8	9,8	9,8	9,8	EXCELENTE	A
Francia		9,7	9,8	9,8	9,8	9,8	EXCELENTE	A
Reino Unido		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Italia		9,0	9,0	9,0	9,0	9,0	MUY BIEN	B
Turquía		8,8	8,8	8,8	8,8	8,8	MUY BIEN	B
EEUU		9,1	9,3	9,3	9,3	9,3	EXCELENTE	A
México		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Brasil		5,5	6,5	6,5	6,5	6,5	SUFICIENTE ALTO	D
Perú		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Egipto		7,5	7,5	7,5	7,5	7,5	BIEN	C
Israel		9,9	9,8	9,8	9,8	9,8	EXCELENTE	A
Arabía Saudí		9,8	9,8	9,8	9,8	9,8	EXCELENTE	A
Japón		9,6	9,7	9,7	9,7	9,7	EXCELENTE	A
China		7,5	7,5	7,5	7,5	7,5	BIEN	C
India		6,3	6,3	6,3	6,3	6,3	SUFICIENTE ALTO	D

Table 20: Indicator WATER P.1 Rating: Percentage of population using safely managed drinking water services



4.2.1.2 Indicator WATER P.2: Percentage of population using safely managed sanitation services

AGUAP.2	Porcentaje de la población que utiliza servicios de saneamiento gestionada de forma segura					
	2010	2015	2016	2017	2018	2019
España		95,5%	95,7%	95,7%	95,7%	95,7%
Alemania		96,9%	97,1%	97,1%	97,1%	97,1%
Francia		78,7%	78,6%	78,6%	78,6%	78,6%
Reino Unido		98,0%	98,1%	98,1%	98,1%	98,1%
Italia		95,7%	95,8%	95,8%	95,8%	95,8%
Turquía		74,2%	78,4%	78,4%	78,4%	78,4%
EEUU		98,3%	98,3%	98,3%	98,3%	98,3%
México		45,4%	57,3%	57,3%	57,3%	57,3%
Brasil		43,9%	48,7%	48,7%	48,7%	48,7%
Perú		40,7%	52,8%	52,8%	52,8%	52,8%
Egipto		62,9%	67,1%	67,1%	67,1%	67,1%
Israel		91,2%	95,0%	95,0%	95,0%	95,0%
Arabia Saudí		53,0%	59,1%	59,1%	59,1%	59,1%
Japón		79,4%	81,4%	81,4%	81,4%	81,4%
China		52,5%	69,7%	69,7%	69,7%	69,7%
India		35,7%	37,0%	39,0%	41,0%	45,9%
Maximo:		98,3%		Maximo:	100,0%	10
Mínimo:		35,7%	MIN ((Media-Factor min *Desv):0):		44,7%	1
Media:		75,0%	Percentil 90%:	98,1%	0,553	9,000
Media+Factor max*Desv Estándar:		105,2%	Percentil 10%:	48,4%	Unidad:	16,288
Media-Factor min*Desv Estándar:		44,7%		Desv. Est.:	20,1%	

Table 21: Indicator WATER P.2 Values: Percentage of population using safely managed sanitation services

AGUAP.2	Porcentaje de la población que utiliza servicios de saneamiento gestionada de forma segura						Calificación 2019	
	2010	2015	2016	2017	2018			
España		9,3	9,3	9,3	9,3	9,3	EXCELENTE	A
Alemania		9,5	9,5	9,5	9,5	9,5	EXCELENTE	A
Francia		6,5	6,5	6,5	6,5	6,5	SUFICIENTE ALTO	D
Reino Unido		9,7	9,7	9,7	9,7	9,7	EXCELENTE	A
Italia		9,3	9,3	9,3	9,3	9,3	EXCELENTE	A
Turquía		5,8	6,5	6,5	6,5	6,5	SUFICIENTE ALTO	D
EEUU		9,7	9,7	9,7	9,7	9,7	EXCELENTE	A
México		1,1	3,0	3,0	3,0	3,0	INSUFICIENTE	FX
Brasil		1,0	1,6	1,6	1,6	1,6	MUY INSUFICIENTE	F
Perú		1,0	2,3	2,3	2,3	2,3	MUY INSUFICIENTE	F
Egipto		4,0	4,6	4,6	4,6	4,6	INSUFICIENTE	FX
Israel		8,6	9,2	9,2	9,2	9,2	EXCELENTE	A
Arabia Saudí		2,3	3,3	3,3	3,3	3,3	INSUFICIENTE	FX
Japón		6,6	7,0	7,0	7,0	7,0	BIEN	C
China		2,3	5,1	5,1	5,1	5,1	SUFICIENTE	E
India		1,0	1,0	1,0	1,0	1,2	MUY INSUFICIENTE	F

Table 22: Indicator WATER P.2 Rating: Percentage of population using safely managed sanitation services



4.2.1.3 Indicator WATER P.3: Water use efficiency (USD/m3)/(GDP*10,000) (SDG: 6.4.1) UN

AGUAP.3	Eficiencia en el uso del agua (USD/m3)/(PIB*10.000) (ODS: 6.4.1) UN					
	2010	2015	2016	2017	2018	2019
España		15	15	15	15	15
Alemania		21	20	21	22	20
Francia		23	25	24	24	23
Reino Unido		78	85	89	89	87
Italia		17	17	17	17	16
Turquía		13	13	15	18	17
EEUU		8	8	8	8	8
México		15	16	16	16	15
Brasil		29	28	25	29	27
Perú		10	10	9	9	8
Egipto		14	17	25	21	14
Israel		39	37	35	37	34
Arabia Saudí		14	15	15	14	13
Japón		17	15	16	17	16
China		26	27	28	29	27
India		17	17	16	17	17
Maximo:		89,39	MAX ((Media+Factor max*Desv Est.):		49,60	1
Mínimo:		7,682	Percentil 10%:		9,648	10
Media:		22,897	Percentil 90%:		34,867	39,953
Media+Factor max*Desv Estándar:		49,601	Percentil 10%:		9,648	Unidad:
Media-Factor min*Desv Estándar:		-3,806	Desv. Est.:		17,802	-9,000
						-0,225

Table 23: Indicator WATER P.3 Values: Water use efficiency (USD/m3)/(GDP*10,000) (SDG: 6.4.1) UN

AGUAP.3	Eficiencia en el uso del agua (USD/m3)/(PIB*10.000) (ODS: 6.4.1) UN					
	2015	2016	2017	2018	Calificación 2019	
España	8,9	8,9	8,8	8,7	8,8	MUY BIEN B
Alemania	7,4	7,8	7,5	7,3	7,6	BIEN C
Francia	7,0	6,6	6,8	6,8	6,9	SUFICIENTE ALTO D
Reino Unido	1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE F
Italia	8,2	8,3	8,3	8,4	8,5	MUY BIEN B
Turquía	9,2	9,2	8,8	8,2	8,4	MUY BIEN B
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE A
México	8,9	8,5	8,6	8,6	8,9	MUY BIEN B
Brasil	5,6	6,0	6,5	5,6	6,2	SUFICIENTE ALTO D
Perú	9,9	10,0	10,0	10,0	10,0	EXCELENTE A
Egipto	9,0	8,3	6,6	7,4	9,1	EXCELENTE A
Israel	3,4	3,9	4,4	3,8	4,5	INSUFICIENTE FX
Arabia Saudí	9,0	8,7	8,7	9,1	9,1	EXCELENTE A
Japón	8,3	8,7	8,5	8,4	8,6	MUY BIEN B
China	6,4	6,1	6,0	5,7	6,0	SUFICIENTE ALTO D
India	8,4	8,4	8,5	8,3	8,4	MUY BIEN B

Table 24: Indicator WATER P.3 Rating: Water use efficiency (USD/m3)/(GDP*10,000) (SDG: 6.4.1) UN



4.2.1.4 Indicator WATER P.4: Percentage of wastewater collected in sewer systems

AGUAP.4	Porcentaje de agua residual recogida en sistemas de alcantarillado					
	2010	2015	2016	2017	2018	2019
España		96,5%	96,5%	96,5%	96,5%	96,5%
Alemania		96,8%	97,1%	97,1%	97,1%	97,1%
Francia		82,0%	82,0%	82,0%	82,0%	82,0%
Reino Unido		96,8%	97,1%	97,1%	97,1%	97,1%
Italia		87,8%	87,8%	87,8%	87,8%	87,8%
Turquía		69,9%	87,6%	74,2%	88,5%	73,9%
EEUU		96,5%	96,5%	96,5%	96,5%	96,5%
México		56,9%	58,2%	63,0%	63,8%	65,7%
Brasil		57,1%	57,1%	57,1%	57,1%	57,1%
Perú						
Egipto						
Israel		99,0%	99,0%	99,0%	99,0%	99,2%
Arabía Saudí						
Japón		77,8%	78,3%	78,8%	79,3%	79,7%
China						
India						
Maximo:		99,2%	MAX		100,0%	10
Mínimo:		56,9%	MIN ((Media-Factor min *Desv);0):		63,6%	1
Media:		85,1%	Percentil 90%:	97,1%	0,364	9,000
Media+Factor max*Desv Estándar:		106,6%	Percentil 10%:	57,4%	Unidad:	24,745
Media-Factor min*Desv Estándar:		63,6%		Desv. Est.:	14,3%	

Table 25: Indicator WATER P.4 Values: Percentage of wastewater collected in sewer systems

AGUAP.4	Porcentaje de agua residual recogida en sistemas de alcantarillado						Calificación 2019	
	2010	2015	2016	2017	2018			
España		9,1	9,1	9,1	9,1	9,1	EXCELENTE	A
Alemania		9,2	9,3	9,3	9,3	9,3	EXCELENTE	A
Francia		5,5	5,5	5,5	5,5	5,5	SUFICIENTE	E
Reino Unido		9,2	9,3	9,3	9,3	9,3	EXCELENTE	A
Italia		7,0	7,0	7,0	7,0	7,0	BIEN	C
Turquía		2,6	6,9	3,6	7,2	3,5	INSUFICIENTE	FX
EEUU		9,1	9,1	9,1	9,1	9,1	EXCELENTE	A
México		1,0	1,0	1,0	1,0	10,0	EXCELENTE	A
Brasil		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Perú								
Egipto								
Israel		9,8	9,8	9,8	9,8	9,8	EXCELENTE	A
Arabía Saudí								
Japón		4,5	4,6	4,8	4,9	5,0	SUFICIENTE	E
China								
India								

Table 26: Indicator WATER P.4 Rating: Percentage of wastewater collected in sewer systems



4.2.1.5 Indicator WATER P.5: % of population connected to a wastewater treatment plant - primary treatment - (OECD)

AGUAP.5	% de la población conectada a una estación depuradora de aguas residuales -tratamiento primario- (OCDE)					
	2010	2015	2016	2017	2018	2019
España		1,660	1,660	1,660	1,660	1,660
Alemania		0,015	0,015	0,015	0,015	0,015
Francia		0,058	0,058	0,058	0,058	0,058
Reino Unido						
Italia		2,900	2,900	2,900	2,900	2,900
Turquía		14,505	14,400	13,761	13,657	12,901
EEUU						
México						
Brasil						
Perú						
Egipto						
Israel		5,000	4,900	4,800	4,600	4,400
Arabía Saudí						
Japón						
China						
India						
Maximo:		14,51		Percentil 80%:	4,920	10
Mínimo:		0,015	MIN ((Media-Factor min *Desv);0):		0	1
Media:		3,870	Percentil 80%:	4,920	4,920	9,000
Media+Factor max*Desv Estándar:		11,129	Percentil 10%:	0,015	Unidad:	1,829
Media-Factor min*Desv Estándar:		-3,390		Desv. Est.:	4,840	

Table 27: Indicator WATER P.5 Values: % of population connected to a wastewater treatment plant - primary treatment - (OECD)

AGUAP.5	% de la población conectada a una estación depuradora de aguas residuales -tratamiento primario- (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		4,0	4,0	4,0	4,0	4,0	INSUFICIENTE	FX
Alemania		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Francia		1,1	1,1	1,1	1,1	1,1	MUY INSUFICIENTE	F
Reino Unido								
Italia		6,3	6,3	6,3	6,3	6,3	SUFICIENTE ALTO	D
Turquía		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
EEUU								
México								
Brasil								
Perú								
Egipto								
Israel		10,0	10,0	9,8	9,4	9,0	EXCELENTE	A
Arabía Saudí								
Japón								
China								
India								

Table 28: Indicator WATER P.5 Rating: % of population connected to a wastewater treatment plant - primary treatment - (OECD)



4.2.1.6 Indicator WATER P.6: % of population connected to a wastewater treatment plant - secondary treatment - (OECD)

AGUAP.6	% de la población conectada a una estación depuradora de aguas residuales -tratamiento secundario- (OCDE)					
	2010	2015	2016	2017	2018	2019
España		29,410	29,410	29,410	29,410	29,410
Alemania		2,261	2,141	2,141	2,141	2,141
Francia		14,253	12,486	10,686	11,066	10,959
Reino Unido						
Italia		18,700	18,700	18,700	18,700	18,700
Turquía		23,685	23,883	24,215	24,203	22,515
EEUU						
México						
Brasil						
Perú						
Egipto						
Israel		37,600	37,000	37,100	36,800	36,600
Arabia Saudí						
Japón		50,800	50,400	49,300	49,100	46,500
China						
India						
Maximo:		50,80		Percentil 80%:	29,410	10
Mínimo:		2,141	MIN ((Media-Factor min *Desv.);0):		2,393055129	1
Media:		24,586	Percentil 80%:	29,410	27,017	9,000
Media+Factor max*Desv Estándar:		46,780	Percentil 10%:	2,189	Unidad:	0,333
Media-Factor min*Desv Estándar:		2,393		Desv. Est.:	14,796	

Table 29: WATER P.6 Values: % of population connected to a wastewater treatment plant - secondary treatment - (OECD)

AGUAP.6	% de la población conectada a una estación depuradora de aguas residuales -tratamiento secundario- (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Alemania		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Francia		5,0	4,4	3,8	3,9	3,9	INSUFICIENTE	FX
Reino Unido								
Italia		6,4	6,4	6,4	6,4	6,4	SUFICIENTE ALTO	D
Turquía		8,1	8,2	8,3	8,3	7,7	BIEN	C
EEUU								
México								
Brasil								
Perú								
Egipto								
Israel		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Arabia Saudí								
Japón		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China								
India								

Table 30: WATER P.6 Rating: % of population connected to a wastewater treatment plant - secondary treatment - (OECD)



4.2.1.7 *Indicator WATER P.7: % of population connected to a wastewater treatment plant - tertiary treatment - (OECD)*

AGUAP.7	% de la población conectada a una estación depuradora de aguas residuales -tratamiento terciario- (OCDE)					
	2010	2015	2016	2017	2018	2019
España		57,210	57,210	57,210	57,210	57,210
Alemania		93,505	93,833	93,833	93,833	93,833
Francia		66,086	67,970	69,746	69,125	69,057
Reino Unido						
Italia		40,900	40,900	40,900	40,900	40,900
Turquía		31,729	32,417	36,265	36,586	38,515
EEUU						
México						
Brasil						
Perú						
Egipto						
Israel		52,700	53,400	53,400	53,900	54,500
Arabía Saudí						
Japón		27,000	27,900	29,500	30,200	33,200
China						
India						
Maximo:		93,83	MAX ((Media+Factor max*Desv Est.):		85,26	10
Mínimo:		27,000	MIN ((Media-Factor min *Desv);0):		22,89164519	1
Media:		54,074	Percentil 90%:	93,538	62,364	9,000
Media+Factor max*Desv Estándar:		85,256	Percentil 10%:	30,812	Unidad:	0,144
Media-Factor min*Desv Estándar:		22,892	Desv. Est.:		20,788	

Table 31: Indicator WATER P.7 Values: % of population connected to a wastewater treatment plant - tertiary treatment - (OECD)

AGUAP.7	% de la población conectada a una estación depuradora de aguas residuales -tratamiento terciario- (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		6,0	6,0	6,0	6,0	6,0	SUFICIENTE	E
Alemania		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Francia		7,2	7,5	7,8	7,7	7,7	BIEN	C
Reino Unido								
Italia		3,6	3,6	3,6	3,6	3,6	INSUFICIENTE	FX
Turquía		2,3	2,4	2,9	3,0	3,3	INSUFICIENTE	FX
EEUU								
México								
Brasil								
Perú								
Egipto								
Israel		5,3	5,4	5,4	5,5	5,6	SUFICIENTE	E
Arabía Saudí								
Japón		1,6	1,7	2,0	2,1	2,5	MUY INSUFICIENTE	F
China								
India								

Table 32: Indicator WATER P.7 Rating: % of population connected to a wastewater treatment plant - tertiary treatment - (OECD)



4.2.2. Performance Indicator

	Índice de Prestaciones						Max valor 2019
	2010	2015	2016	2017	2018	2019	
España		123,1	123,1	123,1	123,0	123,0	135
Alemania		118,6	118,7	118,4	118,2	118,5	135
Francia		105,8	105,3	105,0	104,9	104,8	135
Reino Unido		49,5	49,6	49,6	49,6	49,6	54
Italia		93,7	93,8	93,8	93,9	94,0	135
Turquía		77,6	84,0	83,3	86,5	82,8	135
EEUU		56,8	57,2	57,2	57,2	57,2	54
México		14,1	17,6	17,7	17,7	26,9	54
Brasil		19,6	23,2	23,7	22,8	23,4	54
Perú		13,9	16,6	16,6	16,6	16,6	45
Egipto		31,9	32,6	30,9	31,7	33,4	45
Israel		107,5	109,8	110,4	110,6	112,0	135
Arabía Saudí		33,2	34,9	34,9	35,3	35,3	45
Japón		83,2	85,2	86,2	86,8	89,3	126
China		26,0	31,2	31,1	30,8	31,2	45
India		23,0	22,9	23,0	22,8	23,4	45
Maximo:		123,149		Máxima puntuación:	117	10	
Mínimo:		13,904		Mínima puntuación:	0	0	
Media:		62,725		Dif:	117,000	10,000	
				Unidad:		0,085	

Table 33: Performance Indicator Values

	Evaluación de Prestaciones						Subindicadores considerados	
	2015	2016	2017	2018	Calificación 2019			
España	9,1	9,1	9,1	9,1	9,1	EXCELENTE	A	7
Alemania	8,8	8,8	8,8	8,8	8,8	MUY BIEN	B	7
Francia	7,8	7,8	7,8	7,8	7,8	BIEN	C	7
Reino Unido	9,2	9,2	9,2	9,2	9,2	EXCELENTE	A	4
Italia	6,9	6,9	7,0	7,0	7,0	BIEN	C	7
Turquía	5,7	6,2	6,2	6,4	6,1	SUFICIENTE ALTO	D	7
EEUU	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	4
México	2,6	3,3	3,3	3,3	5,0	SUFICIENTE	E	4
Brasil	3,6	4,3	4,4	4,2	4,3	INSUFICIENTE	FX	4
Perú	3,1	3,7	3,7	3,7	3,7	INSUFICIENTE	FX	3
Egipto	7,1	7,2	6,9	7,0	7,4	BIEN	C	3
Israel	8,0	8,1	8,2	8,2	8,3	MUY BIEN	B	7
Arabía Saudí	7,4	7,7	7,8	7,8	7,9	BIEN	C	3
Japón	6,6	6,8	6,8	6,9	7,1	BIEN	C	6
China	5,8	6,9	6,9	6,9	6,9	SUFICIENTE ALTO	D	3
India	5,1	5,1	5,1	5,1	5,2	SUFICIENTE	E	3

Table 34: Performance Criterion Rating

Subindicadores de Prestaciones		Pesos	Punt. Max.	Total Max puntuación
AGUA P.1	Porcentaje de la población que utiliza agua potable gestionada de forma segura	2	10	20
AGUA P.2	Porcentaje de la población que utiliza servicios de saneamiento gestionada de forma segura	2	10	20
AGUA P.3	Eficiencia en el uso del agua (USD/m3)/(PIB*10.000) (ODS: 6.4.1) UN	1	10	10
AGUA P.4	Porcentaje de agua residual recogida en sistemas de alcantarillado	1	10	10
AGUA P.5	% de la población conectada a una estación depuradora de aguas residuales -tratamiento primario- (OCDE)	1	10	10
AGUA P.6	% de la población conectada a una estación depuradora de aguas residuales -tratamiento secundario- (OCDE)	3	10	30
AGUA P.7	% de la población conectada a una estación depuradora de aguas residuales -tratamiento terciario- (OCDE)	5	10	50
		15		150
		90% Valorado de la Max. Puntuación del Criterio	90,0%	135

Table 35: Weights and maximum reduced score of the Performance Sub-Indicators



In the "Percentage of the population using safely managed potable WATER" indicator, the same trend observed in the Capacity Indicators is evident: more developed countries show very good ratios, while less developed ones have significantly lower values. The worst-rated countries are Mexico and Peru, followed by India, China, and Egypt.

The "Percentage of the population using safely managed sanitation services" indicator follows the same trend as the previous indicator, but with lower values.

The "Efficiency in WATER use (USD/m³)/(GDP*10,000) (SDG: 6.4.1) UN" indicator refers to the price of per cubic meter of WATER paid by users. The United Kingdom stands out with the highest price (87 USD/m³). The lowest prices are seen in the United States and Peru (8 USD/m³). Spain, along with Italy and Turkey, has the lowest prices among the analyzed European countries.

Indicators analyzing the treatment of wastewater also display the same differences between developed and developing countries. The percentage of wastewater collected in sewer systems is high in all European countries, the United States, and Israel (ranging from 97% to 80%). It's notable that France only collects 82% of wastewater for treatment, possibly due to the presence of septic tanks in many of its municipalities.

Indicators related to wastewater treatment (primary, secondary, and tertiary) are presented to detail the quality of treatment, with varying and more significant weights allocated to more complex treatment methods: "% of the population connected to a wastewater treatment plant - tertiary treatment- (OECD)".

The overall assessment of the Performance Criterion is excellent in the United States, the United Kingdom, and Spain, followed by other European countries, Israel, and Japan.



4.3. Financing

The question that this criterion aims to answer is: How much investment is allocated to funding the public works sector? How much is applied to infrastructure creation? And how much to operation and maintenance?

The financing of infrastructure is a critical criterion for evaluating the quality of the infrastructure and encompasses two distinct elements: investment in infrastructure creation and investment in conservation, operation, and maintenance. In countries where the Complete Water Cycle infrastructure is mature, there is less overall investment allocated compared to countries where it is still being developed. Consequently, a significant percentage is allocated to conservation in relation to creation. On the other hand, in countries where the infrastructure is under development and creation, the investment directed towards infrastructure creation is much more substantial compared to investment in conservation. Unfortunately, separating investment in creation from investment in conservation is not straightforward.

For the purposes of this report, the following seven indicators have been considered:

3 FINANCING	
Water F.1	$(\text{Total Expenditure Water Cycle Sector} / \text{population}) * \text{Investment Needs}$
Water F.2	$(\text{Total Expenditure Water Cycle Sector} / \text{real GDP}) * \text{Investment Needs} * 1,000,000$
Water F.3	$(\text{Maintenance expenditure} / \text{Total expenditure}) * \text{Investment Needs}$
Water F.4	$\text{Total Expenditure Water Cycle Sector} / \text{population}$
Water F.5	$\text{Total Expenditure Water Cycle Sector} / \text{real GDP}$
Water F.6	$\text{Operation and maintenance expenditure} / \text{Total expenditure}$
Water F.7	Investment Needs

One of the most representative indicators is investment in the Complete Water Cycle relative to the national GDP. The evolution of this indicator over the years provides valuable information about the level of infrastructure development in the country and the state of its conservation. A high percentage of GDP (above 0.7% or 0.8%) indicates that the Complete Water Cycle is in the process of being created. In general terms, if this percentage falls below 0.4%, it suggests that new infrastructure is not being created. Additionally, if this percentage drops below 0.2-0.3%, it indicates that the investment also inadequately covers the needs for conservation, maintenance, and management of the infrastructure.

The "Investment Needs" ratio is defined as the percentage of the population without safe drinking water multiplied by the percentage of the population without safe sanitation. This ratio has been used to apply it to the total expenditure of the water cycle as a share of GDP and the total expenditure per capita to consider the effect of the level of development of the complete cycle network in assessing investment.

The data for "Total Expenditure of the Water Cycle" and "Operation and Maintenance Expenses" have been collected from the organization "GLOBAL WATER INTELLIGENCE" (GWI), albeit indirectly (via the Confederation of Danish Industry, an organization linked to GWI that utilizes GWI's data).



4.3.1. Financing Indicators

4.3.1.1 Indicator WATER F.1: (Total Expenditure Water Cycle Sector / population)*Investment Needs

AGUA F.1	(Gasto total Sector Ciclo del Agua / habitantes) * Necesidades de inversión					
	2010	2015	2016	2017	2018	2019
España		1,936	1,997	2,119	2,135	2,156
Alemania		3,953	4,784	4,529	4,741	4,663
Francia		35,664	35,507	36,652	37,793	39,266
Reino Unido		3,244	3,129	3,380	3,348	3,258
Italia		4,893	4,876	5,165	5,420	5,701
Turquía		11,108	10,061	10,382	10,538	10,727
EEUU		7,172	6,104	6,279	6,479	6,666
México		22,523	20,916	21,592	22,341	23,121
Brasil		19,225	16,906	20,025	20,799	21,609
Perú						
Egipto		3,506	3,955	6,124	8,962	10,914
Israel						
Arabía Saudí		64,212	50,042	45,150	45,526	52,547
Japón		54,548	48,951	49,152	51,432	52,689
China		19,713	14,556	15,239	16,237	17,342
India		5,253	5,572	5,889	6,311	6,509
Maximo:		64,21		Percentil 80%:	35,54	1,00
Mínimo:		1,936	MIN ((Media-Factor min *Desv);0):		0	10
Media:		17,360	Percentil 80%:	35,539	35,539	-9,000
Media+Factor max*Desv Estándar:		42,760	Percentil 10%:	3,257	Unidad:	-0,253
Media-Factor min*Desv Estándar:		-8,039		Desv. Est.:	16,933	

Table 36: Indicator WATER F.1 Values: (Total Expenditure Water Cycle Sector / population)*Investment Needs

AGUA F.1	(Gasto total Sector Ciclo del Agua / habitantes) * Necesidades de inversión						Calificación 2019	
	2010	2015	2016	2017	2018			
España		9,5	9,5	9,5	9,5	9,5	EXCELENTE	A
Alemania		9,0	8,8	8,9	8,8	8,8	MUY BIEN	B
Francia		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Reino Unido		9,2	9,2	9,1	9,2	9,2	EXCELENTE	A
Italia		8,8	8,8	8,7	8,6	8,6	MUY BIEN	B
Turquía		7,2	7,5	7,4	7,3	7,3	BIEN	C
EEUU		8,2	8,5	8,4	8,4	8,3	MUY BIEN	B
México		4,3	4,7	4,5	4,3	4,1	INSUFICIENTE	FX
Brasil		5,1	5,7	4,9	4,7	4,5	INSUFICIENTE	FX
Perú								
Egipto		9,1	9,0	8,4	7,7	7,2	BIEN	C
Israel								
Arabía Saudí		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Japón		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
China		5,0	6,3	6,1	5,9	5,6	SUFICIENTE	E
India		8,7	8,6	8,5	8,4	8,4	MUY BIEN	B

Table 37: Indicator WATER F.1 Rating: (Total Expenditure Water Cycle Sector / population)*Investment Needs



4.3.1.2 Indicator WATER F.2: (Total Expenditure Water Cycle Sector / real GDP) * Investment Needs * 1,000,000

AGUA F.2	(Gasto total Sector Ciclo del Agua / PIB real) * Necesidades de inversión*1000000					
	2010	2015	2016	2017	2018	2019
España		75,21	75,28	75,21	70,32	72,95
Alemania		96,18	113,53	101,42	98,82	99,65
Francia		973,03	958,04	945,10	908,63	967,65
Reino Unido		71,44	75,39	82,73	76,71	75,64
Italia		161,80	157,50	159,38	156,54	169,31
Turquía		1.009,25	923,45	980,40	1.114,59	1.176,06
EEUU		126,35	105,48	104,81	103,17	102,40
México		2.342,10	2.391,87	2.324,73	2.306,31	2.323,63
Brasil		2.181,21	1.940,95	2.016,86	2.272,82	2.434,54
Perú						
Egipto		984,08	1.123,57	2.505,31	3.532,51	3.614,92
Israel						
Arabia Saudí		3.112,88	2.517,37	2.170,40	1.878,98	2.240,76
Japón		1.560,28	1.243,19	1.265,68	1.294,64	1.302,32
China		2.477,09	1.801,11	1.745,40	1.647,68	1.712,39
India		3.271,18	3.204,96	2.976,32	3.152,01	3.149,45
Maximo:		3614,92		Percentil 80%:	2950,33	1,00
Mínimo:		70,325		MIN ((Media-Factor min *Desv);0):	0	10
Media:		1.294,042		Percentil 80%:	2.328,202	-9,000
Media+Factor max*Desv Estándar:		2.950,327		Percentil 10%:	75,618	Unidad: -0,003
Media-Factor min*Desv Estándar:		-362,244		Desv. Est.:	1.104,191	

Table 38: Indicator WATER F.2 Values: (Total Expenditure Water Cycle Sector / real GDP) * Investment Needs * 1,000,000

AGUA F.2	(Gasto total Sector Ciclo del Agua / PIB real) * Necesidades de inversión*1000000						Calificación 2019	
	2010	2015	2016	2017	2018			
España		9,8	9,8	9,8	9,8	9,8	EXCELENTE	A
Alemania		9,7	9,7	9,7	9,7	9,7	EXCELENTE	A
Francia		7,0	7,1	7,1	7,2	7,0	BIEN	C
Reino Unido		9,8	9,8	9,7	9,8	9,8	EXCELENTE	A
Italia		9,5	9,5	9,5	9,5	9,5	EXCELENTE	A
Turquía		6,9	7,2	7,0	6,6	6,4	SUFICIENTE ALTO	D
EEUU		9,6	9,7	9,7	9,7	9,7	EXCELENTE	A
México		2,9	2,7	2,9	3,0	2,9	MUY INSUFICIENTE	F
Brasil		3,3	4,1	3,8	3,1	2,6	MUY INSUFICIENTE	F
Perú								
Egipto		7,0	6,6	2,4	1,0	1,0	MUY INSUFICIENTE	F
Israel								
Arabia Saudí		1,0	2,3	3,4	4,3	3,2	INSUFICIENTE	FX
Japón		5,2	6,2	6,1	6,1	6,0	SUFICIENTE ALTO	D
China		2,4	4,5	4,7	5,0	4,8	INSUFICIENTE	FX
India		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F

Table 39: Indicator WATER F.2 Rating: (Total Expenditure Water Cycle Sector / real GDP) * Investment Needs * 1,000,000



4.3.1.3 Indicator WATER F.3: (Maintenance expenditure / Total expenditure) * Investment Needs

AGUA F.3	(Gasto en mantenimiento / Gasto total) * Necesidades de inversión					
	2010	2015	2016	2017	2018	2019
España		0,223	0,213	0,217	0,237	0,249
Alemania		0,051	0,057	0,063	0,057	0,061
Francia		0,575	0,571	0,560	0,549	0,535
Reino Unido		0,022	0,023	0,021	0,022	0,023
Italia		0,230	0,237	0,234	0,235	0,236
Turquía		0,238	0,203	0,203	0,206	0,210
EEUU		0,138	0,112	0,109	0,107	0,108
México		1,076	1,011	0,983	0,958	0,931
Brasil		1,649	1,568	1,340	1,310	1,279
Perú						
Egipto		0,980	0,733	0,478	0,331	0,276
Israel						
Arabía Saudí		0,449	0,468	0,556	0,596	0,558
Japón		0,398	0,359	0,354	0,335	0,324
China		0,459	0,331	0,331	0,329	0,327
India		0,457	0,441	0,416	0,388	0,347
Maximo:		1,65	MAX ((Media+Factor max*Desv Est.):		1,00	10,00
Mínimo:		0,021	MIN ((Media-Factor min *Desv.);0):		0	1
Media:		0,432	Percentil 90%:	0,986	1,004	9,000
Media+Factor max*Desv Estándar:		1,004	Percentil 10%:	0,057	Unidad:	8,967
Media-Factor min*Desv Estándar:		-0,139		Desv. Est.:	0,381	

Table 40: Indicator WATER F.3 Values: (Maintenance expenditure / Total expenditure) * Investment Needs

AGUA F.3	(Gasto en mantenimiento / Gasto total) * Necesidades de inversión						Calificación 2019	
	2010	2015	2016	2017	2018			
España		3,0	2,9	2,9	3,1	3,2	INSUFICIENTE	FX
Alemania		1,5	1,5	1,6	1,5	1,6	MUY INSUFICIENTE	F
Francia		6,2	6,1	6,0	5,9	5,8	SUFICIENTE	E
Reino Unido		1,2	1,2	1,2	1,2	1,2	MUY INSUFICIENTE	F
Italia		3,1	3,1	3,1	3,1	3,1	INSUFICIENTE	FX
Turquía		3,1	2,8	2,8	2,9	2,9	MUY INSUFICIENTE	F
EEUU		2,2	2,0	2,0	2,0	2,0	MUY INSUFICIENTE	F
México		10,0	10,0	9,8	9,6	9,3	EXCELENTE	A
Brasil		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Perú								
Egipto		9,8	7,6	5,3	4,0	3,5	INSUFICIENTE	FX
Israel								
Arabía Saudí		5,0	5,2	6,0	6,3	6,0	SUFICIENTE ALTO	D
Japón		4,6	4,2	4,2	4,0	3,9	INSUFICIENTE	FX
China		5,1	4,0	4,0	4,0	3,9	INSUFICIENTE	FX
India		5,1	5,0	4,7	4,5	4,1	INSUFICIENTE	FX

Table 41: Indicator WATER F.3 Rating: (Maintenance expenditure / Total expenditure) * Investment Needs



4.3.1.4 Indicator WATER F.4: Total Expenditure Water Cycle Sector / population

AGUA F.4	Gasto total Sector Ciclo del Agua / habitantes					
	2010	2015	2016	2017	2018	2019
España		40	43	45	46	46
Alemania		128	130	123	129	127
Francia		160	161	166	172	178
Reino Unido		155	149	161	160	155
Italia		59	59	63	66	69
Turquía		38	39	41	41	42
EEUU		137	140	144	149	153
México		28	28	29	30	31
Brasil		30	29	34	36	37
Perú						
Egipto		8	10	15	23	28
Israel						
Arabía Saudí		135	121	109	110	127
Japón		249	248	249	261	267
China		37	39	41	44	47
India		8	8	9	10	11
Maximo:		266,92	MAX ((Media+Factor max*Desv Est.):		195,69	10,00
Mínimo:		7,541	MIN ((Media-Factor min *Desv):0):		0	1
Media:		89,075	Percentil 90%:	166,900	195,687	9,000
Media+Factor max*Desv Estándar:		195,687	Percentil 10%:	14,981	Unidad:	0,046
Media-Factor min*Desv Estándar:		-17,537		Desv. Est.:	71,075	

Table 42: Indicator WATER F.4 Values: Total Expenditure Water Cycle Sector / population

AGUA F.4	Gasto total Sector Ciclo del Agua / habitantes						Calificación 2019	
	2010	2015	2016	2017	2018			
España		2,8	3,0	3,1	3,1	3,1	INSUFICIENTE	FX
Alemania		6,9	7,0	6,7	6,9	6,8	SUFICIENTE ALTO	D
Francia		8,3	8,4	8,7	8,9	9,2	EXCELENTE	A
Reino Unido		8,1	7,9	8,4	8,3	8,1	MUY BIEN	B
Italia		3,7	3,7	3,9	4,0	4,2	INSUFICIENTE	FX
Turquía		2,7	2,8	2,9	2,9	2,9	MUY INSUFICIENTE	F
EEUU		7,3	7,4	7,6	7,8	8,0	MUY BIEN	B
México		2,3	2,3	2,3	2,4	2,4	MUY INSUFICIENTE	F
Brasil		2,4	2,3	2,6	2,6	2,7	MUY INSUFICIENTE	F
Perú								
Egipto		1,4	1,5	1,7	2,0	2,3	MUY INSUFICIENTE	F
Israel								
Arabía Saudí		7,2	6,5	6,0	6,0	6,8	SUFICIENTE ALTO	D
Japón		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China		2,7	2,8	2,9	3,0	3,1	INSUFICIENTE	FX
India		1,3	1,4	1,4	1,4	1,5	MUY INSUFICIENTE	F

Table 43: Indicator WATER F.4 Rating: Total Expenditure Water Cycle Sector / population



4.3.1.5 Indicator WATER F.5: Total Expenditure Water Cycle Sector / real GDP

AGUA F.5	% Gasto total Sector Ciclo del Agua / PIB real					
	2010	2015	2016	2017	2018	2019
España		0,15%	0,16%	0,16%	0,15%	0,16%
Alemania		0,31%	0,31%	0,28%	0,27%	0,27%
Francia		0,44%	0,43%	0,43%	0,41%	0,44%
Reino Unido		0,34%	0,36%	0,39%	0,37%	0,36%
Italia		0,19%	0,19%	0,19%	0,19%	0,21%
Turquía		0,34%	0,36%	0,38%	0,44%	0,46%
EEUU		0,24%	0,24%	0,24%	0,24%	0,24%
México		0,29%	0,32%	0,31%	0,31%	0,31%
Brasil		0,34%	0,33%	0,35%	0,39%	0,42%
Perú						
Egipto		0,23%	0,28%	0,63%	0,89%	0,91%
Israel						
Arabía Saudí		0,65%	0,61%	0,52%	0,45%	0,54%
Japón		0,71%	0,63%	0,64%	0,66%	0,66%
China		0,47%	0,48%	0,47%	0,44%	0,46%
India		0,47%	0,47%	0,45%	0,48%	0,52%
Maximo:		0,91%		Percentil 90%:	0,63%	10,00
Mínimo:		0,15%	MIN ((Media-Factor min *Desv.):0):		0,14%	1
Media:		0,39%	Percentil 90%:	0,63%	0,005	9,000
Media+Factor max*Desv Estándar:		0,64%	Percentil 10%:	0,19%	Unidad:	1830,761
Media-Factor min*Desv Estándar:		0,14%		Desv. Est.:	0,17%	

Table 44: Indicator WATER F.5 Values: Total Expenditure Water Cycle Sector / real GDP

AGUA F.5	% Gasto total Sector Ciclo del Agua / PIB real						Calificación 2019	
	2010	2015	2016	2017	2018			
España		1,2	1,3	1,3	1,2	1,3	MUY INSUFICIENTE	F
Alemania		4,1	4,1	3,5	3,3	3,4	INSUFICIENTE	FX
Francia		6,4	6,4	6,3	6,0	6,4	SUFICIENTE ALTO	D
Reino Unido		4,6	5,0	5,6	5,1	5,0	SUFICIENTE	E
Italia		2,0	1,9	2,0	1,9	2,2	MUY INSUFICIENTE	F
Turquía		4,7	5,0	5,4	6,4	6,8	SUFICIENTE ALTO	D
EEUU		2,8	2,8	2,8	2,7	2,7	MUY INSUFICIENTE	F
México		3,7	4,2	4,1	4,0	4,0	INSUFICIENTE	FX
Brasil		4,6	4,5	4,7	5,6	6,1	SUFICIENTE ALTO	D
Perú								
Egipto		2,6	3,6	10,0	10,0	10,0	EXCELENTE	A
Israel								
Arabía Saudí		10,0	9,5	8,0	6,7	8,3	MUY BIEN	B
Japón		10,0	9,9	10,0	10,0	10,0	EXCELENTE	A
China		7,0	7,3	7,0	6,5	6,8	SUFICIENTE ALTO	D
India		7,0	7,0	6,6	7,3	7,9	BIEN	C

Table 45: Indicator WATER F.5 Rating: Total Expenditure Water Cycle Sector / real GDP



4.3.1.6 Indicator WATER F.6: Operation and maintenance expenditure / Total expenditure

AGUA F.6	Gasto en operación y mantenimiento / Gasto total					
	2010	2015	2016	2017	2018	2019
España		4,571	4,559	4,634	5,056	5,307
Alemania		1,640	1,546	1,703	1,542	1,672
Francia		2,576	2,590	2,541	2,494	2,431
Reino Unido		1,042	1,093	1,024	1,047	1,091
Italia		2,770	2,879	2,851	2,854	2,870
Turquía		0,807	0,796	0,795	0,809	0,822
EEUU		2,642	2,566	2,495	2,465	2,475
México		1,332	1,341	1,304	1,272	1,235
Brasil		2,577	2,694	2,302	2,251	2,196
Perú						
Egipto		2,260	1,850	1,208	0,836	0,696
Israel						
Arabia Saudí		0,945	1,128	1,340	1,436	1,345
Japón		1,820	1,816	1,792	1,695	1,643
China		0,869	0,887	0,889	0,883	0,878
India		0,657	0,643	0,622	0,596	0,569
Maximo:		5,31	MAX ((Media+Factor max*Desv Est.):		3,49	10,00
Mínimo:		0,569	MIN ((Media-Factor min *Desv.):0):		0,19	1
Media:		1,841	Percentil 90%:	2,856	3,305	9,000
Media+Factor max*Desv Estándar:		3,494	Percentil 10%:	0,796	Unidad:	2,723
Media-Factor min*Desv Estándar:		0,188		Desv. Est.:	1,102	

Table 46: Indicator WATER F.6 Values: Operation and maintenance expenditure / Total expenditure

AGUA F.6	Gasto en operación y mantenimiento / Gasto total						Calificación 2019	
	2010	2015	2016	2017	2018			
España		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Alemania		5,0	4,7	5,1	4,7	5,0	SUFICIENTE	E
Francia		7,5	7,5	7,4	7,3	7,1	BIEN	C
Reino Unido		3,3	3,5	3,3	3,3	3,5	INSUFICIENTE	FX
Italia		8,0	8,3	8,3	8,3	8,3	MUY BIEN	B
Turquía		2,7	2,7	2,7	2,7	2,7	MUY INSUFICIENTE	F
EEUU		7,7	7,5	7,3	7,2	7,2	BIEN	C
México		4,1	4,1	4,0	4,0	3,9	INSUFICIENTE	FX
Brasil		7,5	7,8	6,8	6,6	6,5	SUFICIENTE ALTO	D
Perú								
Egipto		6,6	5,5	3,8	2,8	2,4	MUY INSUFICIENTE	F
Israel								
Arabia Saudí		3,1	3,6	4,1	4,4	4,1	INSUFICIENTE	FX
Japón		5,4	5,4	5,4	5,1	5,0	SUFICIENTE	E
China		2,9	2,9	2,9	2,9	2,9	MUY INSUFICIENTE	F
India		2,3	2,2	2,2	2,1	2,0	MUY INSUFICIENTE	F

Table 47: Indicator WATER F.6 Rating: Operation and maintenance expenditure / Total expenditure



4.3.1.7 Indicador WATER F.7: Investment Needs

AGUA F.7	Necesidades de inversión					
	2010	2015	2016	2017	2018	2019
España		0,049	0,047	0,047	0,047	0,047
Alemania		0,031	0,037	0,037	0,037	0,037
Francia		0,223	0,220	0,220	0,220	0,220
Reino Unido		0,021	0,021	0,021	0,021	0,021
Italia		0,083	0,082	0,082	0,082	0,082
Turquía		0,295	0,255	0,255	0,255	0,255
EEUU		0,052	0,044	0,044	0,044	0,044
México		0,808	0,754	0,754	0,754	0,754
Brasil		0,640	0,582	0,582	0,582	0,582
Perú		0,797	0,729	0,729	0,729	0,729
Egipto		0,434	0,396	0,396	0,396	0,396
Israel		0,093	0,057	0,057	0,057	0,057
Arabía Saudí		0,475	0,415	0,415	0,415	0,415
Japón		0,219	0,197	0,197	0,197	0,197
China		0,528	0,373	0,373	0,373	0,373
India		0,697	0,686	0,669	0,652	0,610
Maximo:		0,81	MAX ((Media+Factor max*Desv Est.):		0,70	1,00
Mínimo:		0,021	MIN ((Media-Factor min *Desv);0):		0	10
Media:		0,311	Percentil 90%:	0,729	0,701	-9,000
Media+Factor max*Desv Estándar:		0,701	Percentil 10%:	0,037	Unidad:	-12,830
Media-Factor min*Desv Estándar:		-0,079		Desv. Est.:	0,260	

Table 48: Indicator WATER F.7 Values: Investment Needs

AGUA F.7	Necesidades de inversión						Calificación 2019	
	2010	2015	2016	2017	2018			
España		9,4	9,4	9,4	9,4	9,4	EXCELENTE	A
Alemania		9,6	9,5	9,5	9,5	9,5	EXCELENTE	A
Francia		7,1	7,2	7,2	7,2	7,2	BIEN	C
Reino Unido		9,7	9,7	9,7	9,7	9,7	EXCELENTE	A
Italia		8,9	8,9	8,9	8,9	8,9	MUY BIEN	B
Turquía		6,2	6,7	6,7	6,7	6,7	SUFICIENTE ALTO	D
EEUU		9,3	9,4	9,4	9,4	9,4	EXCELENTE	A
México		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Brasil		1,8	2,5	2,5	2,5	2,5	MUY INSUFICIENTE	F
Perú		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Egipto		4,4	4,9	4,9	4,9	4,9	INSUFICIENTE	FX
Israel		8,8	9,3	9,3	9,3	9,3	EXCELENTE	A
Arabía Saudí		3,9	4,7	4,7	4,7	4,7	INSUFICIENTE	FX
Japón		7,2	7,5	7,5	7,5	7,5	BIEN	C
China		3,2	5,2	5,2	5,2	5,2	SUFICIENTE	E
India		1,1	1,2	1,4	1,6	2,2	MUY INSUFICIENTE	F

Table 49: Indicator WATER F.7 Rating: Investment Needs



4.3.2. Financing Indicator

	Índice de Financiación						Max valor 2019
	2010	2015	2016	2017	2018	2019	
España		52,8	53,1	53,4	53,4	53,8	90
Alemania		58,1	57,8	56,6	56,2	56,6	90
Francia		64,4	64,6	64,6	64,2	65,2	90
Reino Unido		59,9	60,3	62,4	61,3	60,9	90
Italia		52,7	53,1	53,3	53,4	54,2	90
Turquía		44,1	45,3	46,0	47,6	48,5	90
EEUU		59,5	59,6	59,6	59,8	60,1	90
México		44,3	45,5	44,8	44,2	43,5	90
Brasil		51,8	53,8	52,7	53,3	53,6	90
Perú		1,0	1,0	1,0	1,0	1,0	9
Egipto		54,6	51,3	53,5	48,4	47,0	90
Israel		8,8	9,3	9,3	9,3	9,3	9
Arabía Saudí		53,4	54,1	53,1	52,5	55,2	90
Japón		68,0	68,4	68,3	67,6	67,3	90
China		43,2	47,0	46,6	45,9	46,3	90
India		39,9	39,6	38,5	39,5	40,5	90
Maximo:		68,409		Máxima puntuación:	90	10	
Mínimo:		1,000		Mínima puntuación:	0	0	
Media:		47,560		Dif:	90,000	10,000	
					Unidad:	0,111	

Table 50: Financing Indicator Values

Subindicadores de Financiación		Pesos	Punt. Max.	Total Max puntuación
AGUA F.1	(Gasto total Sector Ciclo del Agua / habitantes) * Necesidades de inversión	1	10	10
AGUA F.2	(Gasto total Sector Ciclo del Agua / PIB real) * Necesidades de inversión*1000000	1	10	10
AGUA F.3	(Gasto en mantenimiento / Gasto total) * Necesidades de inversión	2	10	20
AGUA F.4	Gasto total Sector Ciclo del Agua / habitantes	2	10	20
AGUA F.5	% Gasto total Sector Ciclo del Agua / PIB real	2	10	20
AGUA F.6	Gasto en operación y mantenimiento / Gasto total	1	10	10
AGUA F.7	Necesidades de inversión	1	10	10
		10		100
		90% Valorado de la Max. Puntuación del Criterio	90,0%	90

Table 51: Financing Indicator Weights

	Evaluación de Financiación						Calificación 2019		Subindicadores considerados
	2010	2015	2016	2017	2018				
España		5,9	5,9	5,9	5,9	6,0	SUFICIENTE ALTO	D	7
Alemania		6,5	6,4	6,3	6,2	6,3	SUFICIENTE ALTO	D	7
Francia		7,2	7,2	7,2	7,1	7,2	BIEN	C	7
Reino Unido		6,7	6,7	6,9	6,8	6,8	SUFICIENTE ALTO	D	7
Italia		5,9	5,9	5,9	5,9	6,0	SUFICIENTE ALTO	D	7
Turquía		4,9	5,0	5,1	5,3	5,4	SUFICIENTE	E	7
EEUU		6,6	6,6	6,6	6,6	6,7	SUFICIENTE ALTO	D	7
México		4,9	5,1	5,0	4,9	4,8	INSUFICIENTE	FX	7
Brasil		5,8	6,0	5,9	5,9	6,0	SUFICIENTE ALTO	D	7
Perú		1,1	1,1	1,1	1,1	1,1	MUY INSUFICIENTE	F	1
Egipto		6,1	5,7	5,9	5,4	5,2	SUFICIENTE	E	7
Israel		9,8	10,0	10,0	10,0	10,0	EXCELENTE	A	1
Arabía Saudí		5,9	6,0	5,9	5,8	6,1	SUFICIENTE ALTO	D	7
Japón		7,6	7,6	7,6	7,5	7,5	BIEN	C	7
China		4,8	5,2	5,2	5,1	5,1	SUFICIENTE	E	7
India		4,4	4,4	4,3	4,4	4,5	INSUFICIENTE	FX	7

Table 52: Evaluation on a scale of 0 to 10 of the Financing Criterion



As mentioned, the most relevant indicator is the investment in the Complete Water Cycle as a percentage of GDP. The average value for the countries and years analyzed is 0.39%, with a maximum of 0.91% reached in 2019 by Egypt. Spain has a low value, 0.16% of GDP in 2019, the lowest among the analyzed European countries. The highest value in 2019 is held by Egypt and Japan (0.91% and 0.66% respectively). Among the European countries, Turkey (0.46%), France (0.44%), and the United Kingdom (0.36%) are the highest investors.

Some interesting insights derived from the used indicators are reflected in the following table:

Indicator	Average	Minimum Value	Maximum Value
Percentage of total expenditure of the water cycle in relation to GDP	0,39%	0,15%	0,91%
Total expenditure of the Water Cycle sector per capita	89\$	11\$	267\$
Investment needs	0,311	0,021	0,81

The significant dispersion of the results shown in the previous table reflects a reality: countries that, during the analyzed years in the report (2015-2019), are creating new infrastructure or undergoing significant transformations in their networks, exhibit higher values. This indicates a substantial commitment to the development and improvement of the Complete Water Cycle network.

The "Investment Needs" ³ ratio displays very diverse values among the analyzed countries. For instance, it highlights that Mexico, Peru, and India require significant investments. Conversely, both Germany and the United Kingdom, along with Israel, the United States, and Spain, require less investment.

Spain receives a relatively high rating in this Criterion (6.0), similar to the scores of other European countries (with France standing out at 7.2). Israel achieves the highest rating (10), while Mexico, Peru, and India receive the lowest ratings.

³ Investment Needs = % of population without safe drinking water management X % of population without safe sanitation management



4.4. Adaptation to the Future and Sustainability

The questions addressed in this criterion are: Is the capacity and performance of the public infrastructure sector prepared to meet future expectations and demands? Are the resources and investments considered sufficient to cover the future needs of the sector? How are actions promoting environmental sustainability being implemented? Are active measures being taken to achieve the established goals for decarbonizing public infrastructure and transportation?

The selected Indicators are as follows:

4 Adaptation to the Future and Sustainability	
Water A.1	Freshwater resources (long-term average) - Evapotranspiration - (m3/person) (OECD)
Water A.2	Freshwater resources (long-term average) - Total renewable per capita (m3/person) - (OECD)
Water A.3	Freshwater extraction (long-term average) (millions m3) - Gross extraction per capita (m3/person) - (OECD)
Water A.4	Projected change in annual runoff (ND-GAIN Water Index)
Water A.5	Projected change in annual groundwater recharge (ND-GAIN Water Index)
Water A.6	Fresh water withdrawal rate (ND-GAIN Water Index)
Water A.7	Water dependency ratio (ND-GAIN Water Index)
Water A.8	Dam capacity (ND-GAIN Water Index)
Water A.9	% Technologies related to water treatment and purification (OECD)
Water A.10	% Gross extraction of freshwater per capita / total renewable freshwater per capita

The OECD has data related to the freshwater resources of countries. Among these, the following have been selected: evapotranspiration (m3/person), renewable freshwater (m3/person), and gross freshwater extraction (average annual long-term) (m3/person). With these values, the percentage of gross freshwater extraction in relation to total renewable freshwater has been calculated. This last indicator shows the vulnerability of countries in relation to freshwater.

To analyze how countries are adapting to climate change and environmental sustainability in relation to water use, the University of Notre Dame (Indiana, USA) has been developing an indicator known as the "ND-Gain"⁴. This indicator assesses a country's vulnerability⁵ to climate change and also evaluates its readiness⁶ to utilize public and private sector investment for implementing climate change adaptation actions. The ND-Gain index compiles over 74 variables to create 45 fundamental indicators for measuring vulnerability and readiness for 192 United Nations countries from 1995 to the present (due to data availability, ND-Gain measures the vulnerability of 182 countries and the readiness of 184 countries).

Among these indicators, five related to water have been selected:

⁴ Please refer to the detailed information in the corresponding Annex.

⁵ ND-Gain defines the concept of Vulnerability as: The propensity or predisposition of human societies to be negatively impacted by climate threats.

⁶ ND-Gain defines the concept of Readiness as: The willingness to effectively utilize investments for adaptation actions through a secure and efficient business and governmental environment..



Proyección del cambio en la escorrentía anual (ND-GAIN Water Index.)
Proyección del cambio en la recarga anual de aguas subterráneas. (ND-GAIN Water Index.)
Tasa de extracción de agua dulce. (ND-GAIN Water Index. Fresh water withdrawal rate)
Ratio de dependencia del agua originada en el exterior de sus fronteras. (ND-GAIN Water Index)
Capacidad de presas. (ND-GAIN Water Index. Dam capacity)

The first one indicates the effects that climate change will bring to runoff natural water resources by mid-century. It is expressed as the percentage change in annual runoff from the reference projection (1990-2009) to the future projection (2040-2069).

The second one shows how climate change will affect annual groundwater resources.

The third relates to the assessment of total real renewable water resources (including desalinated water).

The fourth assesses the dependence on total renewable water resources originating from outside the country.

The fifth assesses the capacity to adapt to changes in water distribution (both temporal and geographical). It measures the per capita storage capacity of dams within a country in response to changes in freshwater resources, including effects due to climate change (including incoming surface and groundwater or resources secured by bilateral treaties).



4.4.1. Adaptation to the future and Sustainability Indicators

4.4.1.1 Indicator WATER A.1: Freshwater resources (long-term average) - Evapotranspiration - (m3/person) (OECD)

AGUA A.1	Recursos de agua dulce (promedio anual a largo plazo) -Evapotranspiración- (m3/Habit.) (OCDE)					
	2010	2015	2016	2017	2018	2019
España						4.805
Alemania						2.287
Francia						4.718
Reino Unido						1.905
Italia						2.468
Turquía						3.305
EEUU						12.122
México						8.204
Brasil						
Perú						
Egipto						
Israel						431
Arabía Saudí						
Japón						1.816
China						
India						
Maximo:		12121,95		Percentil 90%:	8.595,586	1,00
Mínimo:		430,749	MIN ((Media-Factor min *Desv),0):		0	10
Media:		4.206,004	Percentil 90%:	8.595,586	8595,586	-9,000
Media+Factor max*Desv Estándar:		9.498,536	Percentil 10%:	1.677,720	Unidad:	-0,001
Media-Factor min*Desv Estándar:		-1.086,529		Desv. Est.:	3.528,355	

Table 53: Indicator WATER A.1 Values: Freshwater resources (long-term average) - Evapotranspiration - (m3/person) (OECD)

AGUA A.1	Recursos de agua dulce (promedio anual a largo plazo) -Evapotranspiración- (m3/Habit.) (OCDE)					
	2010	2015	2016	2017	2018	Calificación 2019
España					5,0	SUFICIENTE E
Alemania					7,6	BIEN C
Francia					5,1	SUFICIENTE E
Reino Unido					8,0	MUY BIEN B
Italia					7,4	BIEN C
Turquía					6,5	SUFICIENTE ALTO D
EEUU					1,0	MUY INSUFICIENTE F
México					1,4	MUY INSUFICIENTE F
Brasil						
Perú						
Egipto						
Israel					9,5	EXCELENTE A
Arabía Saudí						
Japón					8,1	MUY BIEN B
China						
India						

Table 54: Indicator WATER A.1 Rating: Freshwater resources (long-term average) - Evapotranspiration - (m3/person) (OECD)



4.4.1.2 Indicator WATER A.2: Freshwater resources (long-term average) - Total renewable per capita (m3/person) - (OECD)

AGUA A.2	Recursos de agua dulce (promedio anual a largo plazo) -Total renewable per cápita (m3/Habit.)- (OCDE)					
	2010	2015	2016	2017	2018	2019
España						2.264
Alemania						2.261
Francia						3.062
Reino Unido						2.502
Italia						2.725
Turquía						2.810
EEUU						7.521
México						3.531
Brasil						
Perú						
Egipto						
Israel						307
Arabía Saudí						
Japón						3.341
China						
India						
Maximo:		7520,80		Percentil 90%:	3.930,160	10,00
Mínimo:		307,100	MIN ((Media-Factor min *Desv);0):		315,259135	1
Media:		3.032,330	Percentil 90%:	3.930,160	3614,901	9,000
Media+Factor max*Desv Estándar:		5.749,401	Percentil 10%:	2.065,340	Unidad:	0,002
Media-Factor min*Desv Estándar:		315,259		Desv. Est.:	1.811,381	

Table 55: Indicator WATER A.2 Values: Freshwater resources (long-term average) - Total renewable per capita (m3/person) - (OECD)

AGUA A.2	Recursos de agua dulce (promedio anual a largo plazo) -Total renewable per cápita (m3/Habit.)- (OCDE)					
	2010	2015	2016	2017	2018	Calificación 2019
España						5,9 SUFICIENTE E
Alemania						5,8 SUFICIENTE E
Francia						7,8 BIEN C
Reino Unido						6,4 SUFICIENTE ALTO D
Italia						7,0 BIEN C
Turquía						7,2 BIEN C
EEUU						10,0 EXCELENTE A
México						9,0 EXCELENTE A
Brasil						
Perú						
Egipto						
Israel					1,0	MUY INSUFICIENTE F
Arabía Saudí						
Japón					8,5	MUY BIEN B
China						
India						

Table 56: Indicator WATER A.2 Rating: Freshwater resources (long-term average) - Total renewable per capita (m3/person) - (OECD)



4.4.1.3 Indicator WATER A.3: Freshwater extraction (long-term average) (millions m3) - Gross extraction per capita (m3/person) - (OECD)

AGUA A.3	Extracción de agua dulce (promedio anual a largo plazo) (millones de m3) -Extracción bruta per cápita (m3/Habit.)- (OCDE)					
	2010	2015	2016	2017	2018	2019
España						633
Alemania						297
Francia						391
Reino Unido						
Italia						
Turquía						751
EEUU						1.207
México						706
Brasil						
Perú						
Egipto						
Israel						129
Arabía Saudí						
Japón						625
China						
India						
Maximo:		1207,30		Percentil 90%:	887,540	1,00
Mínimo:		128,600		Percentil 10%:	246,340	10
Media:		592,325		Percentil 90%:	887,540	641,200
Media+Factor max*Desv Estándar:		1.087,172		Percentil 10%:	246,340	Unidad: -9,000
Media-Factor min*Desv Estándar:		97,478		Desv. Est.:	329,898	-0,014

Table 57: Indicator WATER A.3 Values: Freshwater extraction (long-term average) (millions m3) - Gross extraction per capita (m3/person) - (OECD)

AGUA A.3	Extracción de agua dulce (promedio anual a largo plazo) (millones de m3) -Extracción bruta per cápita (m3/Habit.)- (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España						4,6	INSUFICIENTE	FX
Alemania						9,3	EXCELENTE	A
Francia						8,0	MUY BIEN	B
Reino Unido								
Italia								
Turquía						2,9	MUY INSUFICIENTE	F
EEUU						1,0	MUY INSUFICIENTE	F
México						3,5	INSUFICIENTE	FX
Brasil								
Perú								
Egipto								
Israel						10,0	EXCELENTE	A
Arabía Saudí								
Japón						4,7	INSUFICIENTE	FX
China								
India								

Table 58: Indicator WATER A.3 Rating: Freshwater extraction (long-term average) (millions m3) - Gross extraction per capita (m3/person) - (OECD)



4.4.1.4 Indicator WATER A.4: Projected change in annual runoff (ND-GAIN Water Index)

AGUA A.4	Proyección del cambio en la escorrentía anual (ND-GAIN Water Index. Projected change of annual runoff)					
	2010	2015	2016	2017	2018	2019
España		0,453	0,453	0,453	0,453	0,453
Alemania		0,492	0,492	0,492	0,492	0,492
Francia		0,414	0,414	0,414	0,414	0,414
Reino Unido		0,790	0,790	0,790	0,790	0,790
Italia		0,396	0,396	0,396	0,396	0,396
Turquía		0,490	0,490	0,490	0,490	0,490
EEUU		0,793	0,793	0,793	0,793	0,793
México		0,608	0,608	0,608	0,608	0,608
Brasil		0,696	0,696	0,696	0,696	0,696
Perú		0,588	0,588	0,588	0,588	0,588
Egipto						
Israel						
Arabia Saudí						
Japón		0,868	0,868	0,868	0,868	0,868
China		0,666	0,666	0,666	0,666	0,666
India		0,648	0,648	0,648	0,648	0,648
Maximo:		0,87		Percentil 90%:	0,793	1
Mínimo:		0,396		MIN:	0	10
Media:		0,608		Percentil 90%:	0,793	-9,000
Media+Factor max*Desv Estándar:		0,831		Percentil 10%:	0,414	Unidad: -11,346
Media-Factor min*Desv Estándar:		0,385		Desv. Est.:	0,149	

Table 59: Indicator WATER A.4 Values: Projected change in annual runoff (ND-GAIN Water Index)

AGUA A.4	Proyección del cambio en la escorrentía anual (ND-GAIN Water Index. Projected change of annual runoff)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		4,9	4,9	4,9	4,9	4,9	INSUFICIENTE	FX
Alemania		4,4	4,4	4,4	4,4	4,4	INSUFICIENTE	FX
Francia		5,3	5,3	5,3	5,3	5,3	SUFICIENTE	E
Reino Unido		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Italia		5,5	5,5	5,5	5,5	5,5	SUFICIENTE	E
Turquía		4,4	4,4	4,4	4,4	4,4	INSUFICIENTE	FX
EEUU		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
México		3,1	3,1	3,1	3,1	3,1	INSUFICIENTE	FX
Brasil		2,1	2,1	2,1	2,1	2,1	MUY INSUFICIENTE	F
Perú		3,3	3,3	3,3	3,3	3,3	INSUFICIENTE	FX
Egipto								
Israel								
Arabia Saudí								
Japón		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
China		2,4	2,4	2,4	2,4	2,4	MUY INSUFICIENTE	F
India		2,6	2,6	2,6	2,6	2,6	MUY INSUFICIENTE	F

Table 60: Indicator WATER A.4 Rating: Projected change in annual runoff (ND-GAIN Water Index)



4.4.1.5 *Indicator WATER A.5: Projected change in annual groundwater recharge (ND-GAIN Water Index)*

AGUA A.5	Proyección del cambio en la recarga anual de aguas subterráneas . (ND-GAIN Water Index. Projected change of annual groundwater recharge)					
	2010	2015	2016	2017	2018	2019
España		0,186	0,186	0,186	0,186	0,186
Alemania		0,293	0,293	0,293	0,293	0,293
Francia		0,256	0,256	0,256	0,256	0,256
Reino Unido		0,310	0,310	0,310	0,310	0,310
Italia		0,234	0,234	0,234	0,234	0,234
Turquía		0,190	0,190	0,190	0,190	0,190
EEUU		0,299	0,299	0,299	0,299	0,299
México		0,200	0,200	0,200	0,200	0,200
Brasil		0,262	0,262	0,262	0,262	0,262
Perú		0,275	0,275	0,275	0,275	0,275
Egipto						
Israel		0,126	0,126	0,126	0,126	0,126
Arabía Saudí						
Japón		0,290	0,290	0,290	0,290	0,290
China		0,296	0,296	0,296	0,296	0,296
India		0,324	0,324	0,324	0,324	0,324
Maximo:		0,32		Percentil 90%:	0,310	1
Mínimo:		0,126		MIN :	0	10
Media:		0,253		Percentil 90%:	0,310	-9,000
Media+Factor max*Desv Estándar:		0,337		Percentil 10%:	0,186	Unidad: -29,061
Media-Factor min*Desv Estándar:		0,169		Desv. Est.:	0,056	

Table 61: Indicator WATER A.5 Values: Projected change in annual groundwater recharge (ND-GAIN Water Index)

AGUA A.5	Proyección del cambio en la recarga anual de aguas subterráneas . (ND-GAIN Water Index. Projected change of annual groundwater recharge)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		4,6	4,6	4,6	4,6	4,6	INSUFICIENTE	FX
Alemania		1,5	1,5	1,5	1,5	1,5	MUY INSUFICIENTE	F
Francia		2,6	2,6	2,6	2,6	2,6	MUY INSUFICIENTE	F
Reino Unido		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Italia		3,2	3,2	3,2	3,2	3,2	INSUFICIENTE	FX
Turquía		4,5	4,5	4,5	4,5	4,5	INSUFICIENTE	FX
EEUU		1,3	1,3	1,3	1,3	1,3	MUY INSUFICIENTE	F
México		4,2	4,2	4,2	4,2	4,2	INSUFICIENTE	FX
Brasil		2,4	2,4	2,4	2,4	2,4	MUY INSUFICIENTE	F
Perú		2,0	2,0	2,0	2,0	2,0	MUY INSUFICIENTE	F
Egipto								
Israel		6,3	6,3	6,3	6,3	6,3	SUFICIENTE ALTO	D
Arabía Saudí								
Japón		1,6	1,6	1,6	1,6	1,6	MUY INSUFICIENTE	F
China		1,4	1,4	1,4	1,4	1,4	MUY INSUFICIENTE	F
India		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F

Table 62: Indicator WATER A.5 Rating: Projected change in annual groundwater recharge (ND-GAIN Water Index)



4.4.1.6 Indicator WATER A.6: Fresh water withdrawal rate (ND-GAIN Water Index)

AGUA A.6	Tasa de extracción de agua dulce. (ND-GAIN Water Index. Fresh water withdrawal rate)					
	2010	2015	2016	2017	2018	2019
España		0,254	0,246	0,237	0,237	0,237
Alemania		0,204	0,198	0,193	0,193	0,193
Francia		0,114	0,113	0,112	0,112	0,112
Reino Unido		0,048	0,048	0,049	0,049	0,049
Italia		0,157	0,158	0,158	0,158	0,158
Turquía		0,209	0,216	0,223	0,223	0,223
EEUU		0,131	0,132	0,133	0,133	0,133
México		0,177	0,179	0,181	0,181	0,181
Brasil		0,010	0,010	0,010	0,010	0,010
Perú		0,008	0,008	0,008	0,008	0,008
Egipto		1,000	1,000	1,000	1,000	1,000
Israel		1,000	1,000	1,000	1,000	1,000
Arabia Saudí		1,000	1,000	1,000	1,000	1,000
Japón		0,160	0,160	0,160	0,160	0,160
China		0,179	0,178	0,178	0,178	0,178
India		0,378	0,378	0,378	0,378	0,378
Maximo:		1,00		Percentil 90%:	1,000	1
Mínimo:		0,008		MIN:	0	10
Media:		0,314		Percentil 90%:	1,000	-9,000
Media+Factor max*Desv Estándar:		0,828		Percentil 10%:	0,010	Unidad: -9,000
Media-Factor min*Desv Estándar:		-0,201		Desv. Est.:	0,343	

Table 63: Indicator WATER A.6 Values: Fresh water withdrawal rate (ND-GAIN Water Index)

AGUA A.6	Tasa de extracción de agua dulce. (ND-GAIN Water Index. Fresh water withdrawal rate)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		7,7	7,8	7,9	7,9	7,9	BIEN	C
Alemania		8,2	8,2	8,3	8,3	8,3	MUY BIEN	B
Francia		9,0	9,0	9,0	9,0	9,0	EXCELENTE	A
Reino Unido		9,6	9,6	9,6	9,6	9,6	EXCELENTE	A
Italia		8,6	8,6	8,6	8,6	8,6	MUY BIEN	B
Turquía		8,1	8,1	8,0	8,0	8,0	MUY BIEN	B
EEUU		8,8	8,8	8,8	8,8	8,8	MUY BIEN	B
México		8,4	8,4	8,4	8,4	8,4	MUY BIEN	B
Brasil		9,9	9,9	9,9	9,9	9,9	EXCELENTE	A
Perú		9,9	9,9	9,9	9,9	9,9	EXCELENTE	A
Egipto		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Israel		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Arabia Saudí		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Japón		8,6	8,6	8,6	8,6	8,6	MUY BIEN	B
China		8,4	8,4	8,4	8,4	8,4	MUY BIEN	B
India		6,6	6,6	6,6	6,6	6,6	SUFICIENTE ALTO	D

Table 64: Indicator WATER A.6 Rating: Fresh water withdrawal rate (ND-GAIN Water Index)



4.4.1.7 Indicator WATER A.7: Water dependency ratio (ND-GAIN Water Index)

AGUA A.7	Ratio de dependencia del agua originada en el exterior de sus fronteras. (ND-GAIN Water Index)					
	2010	2015	2016	2017	2018	2019
España		0,003	0,003	0,003	0,003	0,003
Alemania		0,305	0,305	0,305	0,305	0,305
Francia		0,052	0,052	0,052	0,052	0,052
Reino Unido		0,014	0,014	0,014	0,014	0,014
Italia		0,046	0,046	0,046	0,046	0,046
Turquía		0,015	0,015	0,015	0,015	0,015
EEUU		0,082	0,082	0,082	0,082	0,082
México		0,115	0,115	0,115	0,115	0,115
Brasil		0,345	0,345	0,345	0,345	0,345
Perú		0,127	0,127	0,127	0,127	0,127
Egipto		0,983	0,983	0,983	0,983	0,983
Israel		0,579	0,579	0,579	0,579	0,579
Arabía Saudí						
Japón						
China		0,010	0,010	0,010	0,010	0,010
India		0,305	0,305	0,305	0,305	0,305
Maximo:		0,98		Percentil 90%:	0,579	1
Mínimo:		0,003		MIN:	0	10
Media:		0,213		Percentil 90%:	0,579	-9,000
Media+Factor max*Desv Estándar:		0,619		Percentil 10%:	0,010	Unidad: -15,553
Media-Factor min*Desv Estándar:		-0,194		Desv. Est.:	0,271	

Table 65: Indicator WATER A.7 Values: Water dependency ratio (ND-GAIN Water Index)

AGUA A.7	Ratio de dependencia del agua originada en el exterior de sus fronteras. (ND-GAIN Water Index)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Alemania		5,3	5,3	5,3	5,3	5,3	SUFICIENTE	E
Francia		9,2	9,2	9,2	9,2	9,2	EXCELENTE	A
Reino Unido		9,8	9,8	9,8	9,8	9,8	EXCELENTE	A
Italia		9,3	9,3	9,3	9,3	9,3	EXCELENTE	A
Turquía		9,8	9,8	9,8	9,8	9,8	EXCELENTE	A
EEUU		8,7	8,7	8,7	8,7	8,7	MUY BIEN	B
México		8,2	8,2	8,2	8,2	8,2	MUY BIEN	B
Brasil		4,6	4,6	4,6	4,6	4,6	INSUFICIENTE	FX
Perú		8,0	8,0	8,0	8,0	8,0	MUY BIEN	B
Egipto		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Israel		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Arabía Saudí								
Japón								
China		9,9	9,9	9,9	9,9	9,9	EXCELENTE	A
India		5,3	5,3	5,3	5,3	5,3	SUFICIENTE	E

Table 66: Indicator WATER A.7 Rating: Water dependency ratio (ND-GAIN Water Index)



4.4.1.8 Indicator WATER A.8: Dam capacity (ND-GAIN Water Index)

AGUA A.8	Capacidad de presas. (ND-GAIN Water Index. Dam capacity)					
	2010	2015	2016	2017	2018	2019
España		0,716	0,715	0,715	0,715	0,715
Alemania		0,988	0,988	0,988	0,988	0,988
Francia		0,962	0,962	0,962	0,962	0,962
Reino Unido		0,980	0,980	0,980	0,981	0,981
Italia		0,959	0,959	0,959	0,959	0,959
Turquía		0,503	0,511	0,519	0,526	0,526
EEUU		0,432	0,436	0,440	0,444	0,444
México		0,690	0,694	0,698	0,702	0,702
Brasil		0,152	0,159	0,167	0,173	0,173
Perú		0,953	0,954	0,955	0,955	0,955
Egipto		0,549	0,559	0,569	0,577	0,577
Israel						
Arabia Saudí		0,992	0,992	0,992	0,993	0,993
Japón		0,939	0,939	0,939	0,939	0,939
China		0,868	0,863	0,859	0,859	0,859
India		0,954	0,954	0,954	0,955	0,955
Maximo:		0,99		Percentil 90%:	0,988	1
Mínimo:		0,152		Percentil 10%:	0,442	10
Media:		0,779		Percentil 90%:	0,988	-9,000
Media+Factor max*Desv Estándar:		1,151		Percentil 10%:	0,442	Unidad: -16,471
Media-Factor min*Desv Estándar:		0,408		Desv. Est.:	0,248	

Table 67: Indicator WATER A.8 Values: Dam capacity (ND-GAIN Water Index)

AGUA A.8	Capacidad de presas. (ND-GAIN Water Index. Dam capacity)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		5,5	5,5	5,5	5,5	5,5	SUFICIENTE	E
Alemania		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Francia		1,4	1,4	1,4	1,4	1,4	MUY INSUFICIENTE	F
Reino Unido		1,1	1,1	1,1	1,1	1,1	MUY INSUFICIENTE	F
Italia		1,5	1,5	1,5	1,5	1,5	MUY INSUFICIENTE	F
Turquía		9,0	8,9	8,7	8,6	8,6	MUY BIEN	B
EEUU		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México		5,9	5,8	5,8	5,7	5,7	SUFICIENTE	E
Brasil		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Perú		1,6	1,6	1,6	1,5	1,5	MUY INSUFICIENTE	F
Egipto		8,2	8,1	7,9	7,8	7,8	BIEN	C
Israel								
Arabia Saudí		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Japón		1,8	1,8	1,8	1,8	1,8	MUY INSUFICIENTE	F
China		3,0	3,1	3,1	3,1	3,1	INSUFICIENTE	FX
India		1,6	1,6	1,6	1,5	1,5	MUY INSUFICIENTE	F

Table 68: Indicator WATER A.8 Rating: Dam capacity (ND-GAIN Water Index)



4.4.1.9 Indicator WATER A.9: % Technologies related to water treatment and purification (OECD)

AGUA A.9	%Tecnologías relacionadas con el tratamiento de aguas y su depuración (OCDE)						
	2010	2015	2016	2017	2018	2019	
España		0,640	0,890	0,580	0,910	0,840	
Alemania		0,300	0,330	0,230	0,330	0,350	
Francia		0,520	0,410	0,510	0,510	0,580	
Reino Unido		0,390	0,420	0,410	0,470	0,440	
Italia		0,730	0,600	0,700	0,610	0,870	
Turquía		0,470	0,570	1,010	0,720	0,740	
EEUU		0,410	0,410	0,380	0,400	0,400	
México		0,720	0,890	1,510	2,280	1,830	
Brasil		1,480	2,260	1,960	2,660	1,360	
Perú				1,460	1,130		
Egipto		2,140	0,460				
Israel		0,530	0,410	0,320	0,300	0,300	
Arabía Saudí							
Japón		0,180	0,160	0,250	0,300	0,250	
China		0,250	0,270	0,270	0,290	0,300	
India		0,510	0,540	0,450	0,450	0,460	
Maximo:		2,66	MAX ((Media+Factor max*Desv Est.):			1,53	10,00
Mínimo:		0,160	MIN ((Media-Factor min *Desv);0):			0	1

Table 69: Indicator WATER A.9 Values: % Technologies related to water treatment and purification (OECD)

AGUA A.9	%Tecnologías relacionadas con el tratamiento de aguas y su depuración (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		4,8	6,2	4,4	6,3	5,9	SUFICIENTE	E
Alemania		2,8	2,9	2,3	2,9	3,1	INSUFICIENTE	FX
Francia		4,0	3,4	4,0	4,0	4,4	INSUFICIENTE	FX
Reino Unido		3,3	3,5	3,4	3,8	3,6	INSUFICIENTE	FX
Italia		5,3	4,5	5,1	4,6	6,1	SUFICIENTE ALTO	D
Turquía		3,8	4,3	6,9	5,2	5,3	SUFICIENTE	E
EEUU		3,4	3,4	3,2	3,3	3,3	INSUFICIENTE	FX
México		5,2	6,2	9,9	10,0	10,0	EXCELENTE	A
Brasil		9,7	10,0	10,0	10,0	9,0	EXCELENTE	A
Perú				9,6	7,6			
Egipto		10,0	3,7					
Israel		4,1	3,4	2,9	2,8	2,8	MUY INSUFICIENTE	F
Arabía Saudí								
Japón		2,1	1,9	2,5	2,8	2,5	MUY INSUFICIENTE	F
China		2,5	2,6	2,6	2,7	2,8	MUY INSUFICIENTE	F
India		4,0	4,2	3,6	3,6	3,7	INSUFICIENTE	FX

Table 70: Indicator WATER A.9 Rating: % Technologies related to water treatment and purification (OECD)



4.4.1.10 Indicator WATER A.10: % Gross extraction of freshwater per capita / total renewable freshwater per capita

AGUA A.10	% Extracción bruta de agua dulce por habitante / total agua dulce renovable por habitante					
	2010	2015	2016	2017	2018	2019
España						27,98%
Alemania						13,13%
Francia						12,76%
Reino Unido						
Italia						
Turquía						26,71%
EEUU						16,05%
México						19,99%
Brasil						
Perú						
Egipto						
Israel						41,88%
Arabia Saudí						
Japón						18,71%
China						
India						
Maximo:		41,88%	MAX ((Media+Factor max*Desv Est.):		36,79%	1,00
Mínimo:		12,76%	MIN ((Media-Factor min *Desv);0):		7,51%	10
Media:		22,15%	Percentil 90%:	32,15%	0,293	-9,000
Media+Factor max*Desv Estándar:		36,79%	Percentil 10%:	13,02%	Unidad:	-30,734
Media-Factor min*Desv Estándar:		7,51%		Desv. Est.:	9,76%	

Table 71: Indicator WATER A.10 Values: % Gross extraction of freshwater per capita / total renewable freshwater per capita

AGUA A.10	% Extracción bruta de agua dulce por habitante / total agua dulce renovable por habitante						Calificación 2019	
	2010	2015	2016	2017	2018			
España						3,7	INSUFICIENTE	FX
Alemania						8,3	MUY BIEN	B
Francia						8,4	MUY BIEN	B
Reino Unido								
Italia								
Turquía						4,1	INSUFICIENTE	FX
EEUU						7,4	BIEN	C
México						6,2	SUFICIENTE ALTO	D
Brasil								
Perú								
Egipto								
Israel						1,0	MUY INSUFICIENTE	F
Arabia Saudí								
Japón						6,6	SUFICIENTE ALTO	D
China								
India								

Table 72: Indicator WATER A.10 Rating: % Gross extraction of freshwater per capita / total renewable freshwater per capita

4.4.2. Adaptation to the future and Sustainability Indicator

	Índice de Adaptación al futuro y Desarrollo Sost.						Max valor 2019
	2010	2015	2016	2017	2018	2019	
España		102,6	107,3	102,1	107,9	148,5	225
Alemania		63,3	64,0	62,4	64,1	134,8	225
Francia		86,7	84,8	86,6	86,6	154,7	225
Reino Unido		75,4	75,9	75,7	76,8	105,1	180
Italia		91,3	89,0	90,8	89,2	122,6	180
Turquía		109,7	110,9	118,0	112,6	158,6	225
EEUU		97,4	97,4	96,9	97,1	143,2	225
México		97,8	100,6	111,2	111,5	157,9	225
Brasil		111,6	112,6	112,6	112,6	109,5	144
Perú		69,2	69,2	97,9	92,0	69,1	117
Egipto		60,7	41,3	29,7	29,3	29,3	108
Israel		31,0	28,9	27,3	27,0	71,1	180
Arabia Saudí		6,0	6,0	6,0	6,0	6,0	108
Japón		42,4	42,1	43,7	44,6	106,0	198
China		78,8	79,4	79,6	79,9	80,1	144
India		59,5	60,0	58,4	58,4	58,6	144
Maximo:		158,562		Máxima puntuación:	225	10	
Mínimo:		6,000		Mínima puntuación:	0	0	
Media:		80,025		Dif:	225,000	10,000	
					Unidad:	0,044	

Table 73: Adaptation to the Future and Sustainability Indicator Values

	Evaluación de Adaptación al futuro y Desarrollo Sost.						Subindicadores considerados		
	2010	2015	2016	2017	2018	Calificación 2019			
España		7,1	7,4	7,1	7,5	6,6	SUFICIENTE ALTO	D	10
Alemania		4,4	4,4	4,3	4,5	6,0	SUFICIENTE ALTO	D	10
Francia		6,0	5,9	6,0	6,0	6,9	SUFICIENTE ALTO	D	10
Reino Unido		5,2	5,3	5,3	5,3	5,8	SUFICIENTE	E	8
Italia		6,3	6,2	6,3	6,2	6,8	SUFICIENTE ALTO	D	8
Turquía		7,6	7,7	8,2	7,8	7,0	BIEN	C	10
EEUU		6,8	6,8	6,7	6,7	6,4	SUFICIENTE ALTO	D	10
México		6,8	7,0	7,7	7,7	7,0	BIEN	C	10
Brasil		7,8	7,8	7,8	7,8	7,6	BIEN	C	6
Perú		5,9	5,9	6,8	6,4	5,9	SUFICIENTE	E	5
Egipto		5,6	3,8	2,8	2,7	2,7	MUY INSUFICIENTE	F	3
Israel		2,9	2,7	2,5	2,5	3,9	INSUFICIENTE	FX	8
Arabia Saudí		0,6	0,6	0,6	0,6	0,6	MUY INSUFICIENTE	F	2
Japón		3,6	3,6	3,7	3,8	5,4	SUFICIENTE	E	9
China		5,5	5,5	5,5	5,5	5,6	SUFICIENTE	E	6
India		4,1	4,2	4,1	4,1	4,1	INSUFICIENTE	FX	6

Table 74: Adaptation to the Future and Sustainability Criterion Rating

Subindicadores de Adaptación al futuro y Desarrollo Sost.		Pesos	Punt. Max.	Total Max puntuación
AGUA A.1	Recursos de agua dulce (promedio anual a largo plazo) -Evapotranspiración- (m3/Habit.) (OCDE)	2	10	20
AGUA A.2	Recursos de agua dulce (promedio anual a largo plazo) -Total renovable per cápita (m3/Habit.)- (OCDE)	2	10	20
AGUA A.3	Extracción de agua dulce (promedio anual a largo plazo) (millones de m3) -Extracción bruta per cápita (m3/Habit.)- (OCDE)	2	10	20
AGUA A.4	Proyección del cambio en la escorrentía anual (ND-GAIN Water Index. Projected change of annual runoff)	2	10	20
AGUA A.5	Proyección del cambio en la recarga anual de aguas subterráneas . (ND-GAIN Water Index. Projected change of annual groundwater recharge)	2	10	20
AGUA A.6	Tasa de extracción de agua dulce. (ND-GAIN Water Index. Fresh water withdrawal rate)	3	10	30
AGUA A.7	Ratio de dependencia del agua originada en el exterior de sus fronteras. (ND-GAIN Water Index)	3	10	30
AGUA A.8	Capacidad de presas. (ND-GAIN Water Index. Dam capacity)	3	10	30
AGUA A.9	% Tecnologías relacionadas con el tratamiento de aguas y su depuración (OCDE)	3	10	30
AGUA A.10	% Extracción bruta de agua dulce por habitante / total agua dulce renovable por habitante	3	10	30
		25		250
		90% Valorado de la Max. Puntuación del Criterio	90,0%	225

Table 75: Weights and reduced maximum scores of the Indicators for Future Adaptation and Sustainability



In the Indicator that measures evapotranspiration per capita, Israel stands out with a ratio of 431 m³/person, much lower than the rest of the countries for which data is available (Brazil, Peru, Egypt, Saudi Arabia, China, and India are not evaluated), most likely due to storage being carried out in tanks or areas protected from solar exposure that causes evapotranspiration. Spain has the highest evapotranspiration among the analyzed European countries (4,805 m³/person).

Renewable freshwater resources per capita (in long-term annual average) show similar results across all European countries (around 2,400 m³/person). The United States stands out with 7,521 m³/person. Israel faces the most challenging situation with only 307 m³/person.

In the Indicator measuring freshwater extraction per capita, Spain is unfavorably high (633 m³/person); the United States has the highest ratio (1,207 m³/person), double that of European countries. Israel extracts the least amount (129 m³/person), and Egypt and Saudi Arabia are likely in similar situations, although data is not available.

Regarding the University of Notre Dame (ND-GAIN) Indicators, they indicate a high vulnerability for most countries, but with different ratings based on the Indicator. The following table shows the results of these Indicators in comparison to those obtained by Spain:

ND-Gain Vulnerability Indicator	Max (1,00 worst)	Min (0,00 best)	Spain
Projection of Change in Annual Runoff	0,87	0,40	0,45
Projection of Change in Annual Groundwater Recharge	0,32	0,13	0,19
Freshwater Extraction Rate	1,00	0,01	0,24
Dependency Ratio of Externally Sourced Freshwater	0,98	0,00	0,00
Dam Capacity	0,99	0,15	0,72

Spain stands out in the freshwater dependency ratio and dam capacity indicators. It is evident that Spain generates all of its freshwater resources within its own borders, without depending on any rivers originating outside its territory. In terms of dam capacity, the indicator shows a favorable result, ranking behind only Brazil (due to the dams in the Amazon), Egypt (the Nile River dams, especially the Aswan Dam), and the United States (due to the high regulation capacity of its major rivers).

In the percentage of technologies related to water treatment and purification, Spain achieves a moderate rating. The highest ratings are obtained by Mexico and Brazil.

In the indicator measuring the percentage of freshwater extraction compared to renewable freshwater resources, Spain (along with Turkey) has a relatively high ratio (27%), surpassed only by Israel (41.9%). This result has significant implications, suggesting that Spain's ability to extract more freshwater than it has available is limited compared to other countries. Therefore, it should pay great attention to and manage its water consumption in the future.

In the final index of adaptation to the future and sustainable development, the highest-rated country is Brazil (7.8). Spain's rating is similar to the analyzed European countries (6.6 within the range of 5.8-7.0). The lowest ratings are achieved by countries in Africa: Saudi Arabia (0.6), Egypt (2.7), and Israel (3.9). India also receives an insufficient rating (4.1).



4.5. Operation and Maintenance

The questions addressed in this criterion are: Is the public infrastructure being operated and maintained according to its needs? Is the necessary investment being made to ensure proper conservation and maintenance?

The selected indicators are as follows:

5 OPERATION AND MAINTENANCE	
Water O.1	Expenditure on water sector operation and maintenance / population
Water O.2	% Expenditure on water sector operation and maintenance / real GDP
Water O.3	Reliability of water supply. GCI Index (WEF)

It should be noted that separating investment in operation and maintenance is very challenging: budget allocations are not always well-defined, and sometimes the national accounting of certain countries does not distinguish this separation, making the data unreliable.

The investment needs for operation, conservation, and maintenance are linked to the state of the infrastructure and the requirements for adapting to new technical, functional, and technological demands. There has been extensive debate among experts about the necessary investment for proper maintenance. While there is no widespread consensus on an exact percentage, it is generally considered that the required investment for conservation should range between 2% and 4% of the asset value of the infrastructure, depending on its condition. This would also need to cover the operating costs of systems related to the water cycle, which can be substantial. Calculating the asset value requires establishing consensus criteria that can reflect reality. Some attempts have been made to determine asset value, but they are not standardized, and verifiable and comparable data are lacking.

Similarly to what has been discussed regarding the Financing Criterion, the percentage of GDP allocated to conservation serves as an indicator that can provide guidance on the adequacy of investment for maintenance needs. To further specify and supplement this indicator, investment per capita has also been considered. The reliability of water supply is linked to good conservation and maintenance practices. To assess this parameter, the "Water Supply Reliability" indicator from the World Economic Forum's Global Competitiveness Index (GCI) has been utilized.



4.5.1. Operation and maintenance Indicators

4.5.1.1 Indicator WATER O.1: Expenditure on water sector operation and maintenance / population

AGUA O.1	Gastos en operación y mantenimiento sector del agua / habitantes					
	2010	2015	2016	2017	2018	2019
España		181	194	210	231	244
Alemania		209	201	210	199	212
Francia		412	417	423	428	433
Reino Unido		161	163	165	167	170
Italia		163	171	179	188	199
Turquía		30	31	32	33	35
EEUU		362	360	360	367	379
México		37	37	37	38	38
Brasil		77	78	79	80	82
Perú						
Egipto		18	18	19	19	19
Israel						
Arabía Saudí		128	136	146	158	170
Japón		454	450	446	442	439
China		32	35	36	38	41
India		5	5	5	6	6
Maximo:		453,83	MAX ((Media+Factor max*Desv Est.):		387,70	10,00
Mínimo:		4,953	MIN ((Media-Factor min *Desv);0):		0	1
Media:		168,213	Percentil 90%:	423,345	387,698	9,000
Media+Factor max*Desv Estándar:		387,698	Percentil 10%:	18,654	Unidad:	0,023
Media-Factor min*Desv Estándar:		-51,272		Desv. Est.:	146,323	

Table 76: Indicator WATER O.1 Values: Expenditure on water sector operation and maintenance / population

AGUA O.1	Gastos en operación y mantenimiento sector del agua / habitantes						Calificación 2019			
	2010	2015	2016	2017	2018					
España		5,2	5,5	5,9	6,4	6,7	6,7	SUFICIENTE ALTO	D	
Alemania		5,9	5,7	5,9	5,6	5,9	5,9	SUFICIENTE	E	
Francia		10,0	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	
Reino Unido		4,7	4,8	4,8	4,9	4,9	4,9	INSUFICIENTE	FX	
Italia		4,8	5,0	5,2	5,4	5,6	5,6	SUFICIENTE	E	
Turquía		1,7	1,7	1,8	1,8	1,8	1,8	MUY INSUFICIENTE	F	
EEUU		9,4	9,3	9,4	9,5	9,8	9,8	EXCELENTE	A	
México		1,9	1,9	1,9	1,9	1,9	1,9	MUY INSUFICIENTE	F	
Brasil		2,8	2,8	2,8	2,9	2,9	2,9	MUY INSUFICIENTE	F	
Perú										
Egipto		1,4	1,4	1,4	1,4	1,4	1,4	MUY INSUFICIENTE	F	
Israel										
Arabía Saudí		4,0	4,2	4,4	4,7	5,0	5,0	INSUFICIENTE	FX	
Japón		10,0	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	
China		1,8	1,8	1,8	1,9	1,9	1,9	MUY INSUFICIENTE	F	
India		1,1	1,1	1,1	1,1	1,1	1,1	MUY INSUFICIENTE	F	

Table 77: Indicator WATER O.1 Rating: Expenditure on water sector operation and maintenance / population



4.5.1.2 Indicator WATER O.2: % Expenditure on water sector operation and maintenance / real GDP

AGUA O.2	%Gastos operación y mantenimiento sector del agua / PIB real					
	2010	2015	2016	2017	2018	2019
España		0,70%	0,73%	0,74%	0,76%	0,83%
Alemania		0,51%	0,48%	0,47%	0,41%	0,45%
Francia		1,12%	1,13%	1,09%	1,03%	1,07%
Reino Unido		0,35%	0,39%	0,40%	0,38%	0,39%
Italia		0,54%	0,55%	0,55%	0,54%	0,59%
Turquía		0,28%	0,29%	0,31%	0,35%	0,38%
EEUU		0,64%	0,62%	0,60%	0,58%	0,58%
México		0,39%	0,43%	0,40%	0,39%	0,38%
Brasil		0,88%	0,90%	0,80%	0,88%	0,92%
Perú						
Egipto		0,51%	0,52%	0,76%	0,75%	0,63%
Israel						
Arabia Saudí		0,62%	0,68%	0,70%	0,65%	0,73%
Japón		1,30%	1,14%	1,15%	1,11%	1,08%
China		0,41%	0,43%	0,42%	0,39%	0,40%
India		0,31%	0,30%	0,28%	0,29%	0,29%
Maximo:		1,30%	MAX ((Media+Factor max*Desv Est.):		1,02%	10,00
Mínimo:		0,28%	MIN ((Media-Factor min *Desv);0):		0,21%	1
Media:		0,62%	Percentil 90%:	1,08%	0,008	9,000
Media+Factor max*Desv Estándar:		1,02%	Percentil 10%:	0,31%	Unidad:	1118,202
Media-Factor min*Desv Estándar:		0,21%		Desv. Est.:	0,27%	

Table 78: Indicator WATER O.2 Values: % Expenditure on water sector operation and maintenance / real GDP

AGUA O.2	%Gastos operación y mantenimiento sector del agua / PIB real						Calificación 2019		
	2010	2015	2016	2017	2018				
España		6,5	6,8	6,9	7,1	7,9	7,9	BIEN	C
Alemania		4,3	4,0	3,9	3,3	3,7	3,7	INSUFICIENTE	FX
Francia		10,0	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Reino Unido		2,6	3,0	3,1	2,9	3,0	3,0	INSUFICIENTE	FX
Italia		4,6	4,8	4,8	4,7	5,2	5,2	SUFICIENTE	E
Turquía		1,7	1,8	2,0	2,6	2,9	2,9	MUY INSUFICIENTE	F
EEUU		5,7	5,6	5,3	5,1	5,1	5,1	SUFICIENTE	E
México		2,9	3,4	3,1	3,0	2,9	2,9	MUY INSUFICIENTE	F
Brasil		8,4	8,7	7,5	8,4	8,9	8,9	MUY BIEN	B
Perú									
Egipto		4,3	4,5	7,2	7,0	5,7	5,7	SUFICIENTE	E
Israel									
Arabia Saudí		5,5	6,3	6,5	5,9	6,7	6,7	SUFICIENTE ALTO	D
Japón		10,0	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China		3,2	3,4	3,3	3,0	3,1	3,1	INSUFICIENTE	FX
India		2,1	2,0	1,7	1,8	1,9	1,9	MUY INSUFICIENTE	F

Table 79: Indicator WATER O.2 Rating: % Expenditure on water sector operation and maintenance / real GDP



4.5.1.3 Indicator WATER O.3: Reliability of water supply. GCI Index (WEF)

AGUA O.3	Fiabilidad en el suministro de agua. Índice GCI (WEF)					
	2010	2015	2016	2017	2018	2019
España					90,4	93,6
Alemania					83,2	84,9
Francia					97,2	90,9
Reino Unido					94,9	90,7
Italia					81,5	81,8
Turquía					57,5	64,8
EEUU					84,6	86,1
México					62,4	63,7
Brasil					59,8	62,1
Perú					95,3	83,1
Egipto					64,6	63,3
Israel					95,1	93,8
Arabía Saudí						
Japón					93,9	94,6
China					64,9	64,9
India					60,9	55,9
Maximo:		97,2		max:	100,0	10
Mínimo:		55,9		MIN ((Media-Factor min *Desv);0):	56,9	1
Media:		78,7		Percentil 90%:	94,9	43,106
Media+Factor max*Desv Estándar:		100,5		Percentil 10%:	60,8	Unidad:
Media-Factor min*Desv Estándar:		56,9		Desv. Est.:	1452,41%	

Table 80: Indicator WATER O.3 Values: Reliability of water supply. GCI Index (WEF)

AGUA O.3	Fiabilidad en el suministro de agua. Índice GCI (WEF)						Calificación 2019		
	2010	2015	2016	2017	2018				
España					8,0	8,7	8,7	MUY BIEN	B
Alemania					6,5	6,8	6,8	SUFICIENTE ALTO	D
Francia					9,4	8,1	8,1	MUY BIEN	B
Reino Unido					8,9	8,1	8,1	MUY BIEN	B
Italia					6,1	6,2	6,2	SUFICIENTE ALTO	D
Turquía					1,1	2,7	2,7	MUY INSUFICIENTE	F
EEUU					6,8	7,1	7,1	BIEN	C
México					2,1	2,4	2,4	MUY INSUFICIENTE	F
Brasil					1,6	2,1	2,1	MUY INSUFICIENTE	F
Perú					9,0	6,5	6,5	SUFICIENTE ALTO	D
Egipto					2,6	2,3	2,3	MUY INSUFICIENTE	F
Israel					9,0	8,7	8,7	MUY BIEN	B
Arabía Saudí									
Japón					8,7	8,9	8,9	MUY BIEN	B
China					2,7	2,7	2,7	MUY INSUFICIENTE	F
India					1,8	1,0	1,0	MUY INSUFICIENTE	F

Table 81: Indicator WATER O.3 Rating: Reliability of water supply. GCI Index (WEF)



4.5.2. Operation and Maintenance Indicator

	Índice de Operación y mantenimiento						Max valor 2019
	2010	2015	2016	2017	2018	2019	
España		11,7	12,3	12,8	21,5	23,2	27
Alemania		10,2	9,6	9,7	15,4	16,5	27
Francia		20,0	20,0	20,0	29,4	28,1	27
Reino Unido		7,3	7,8	8,0	16,7	16,0	27
Italia		9,4	9,7	10,0	16,2	17,0	27
Turquía		3,4	3,6	3,8	5,5	7,3	27
EEUU		15,1	14,9	14,7	21,5	22,0	27
México		4,8	5,2	5,0	7,0	7,2	27
Brasil		11,2	11,5	10,4	12,9	13,9	27
Perú					9,0	6,5	9
Egipto		5,8	5,9	8,6	11,0	9,5	27
Israel					9,0	8,7	9
Arabia Saudí		9,5	10,4	10,8	10,5	11,7	18
Japón		20,0	20,0	20,0	28,7	28,9	27
China		4,9	5,2	5,1	7,5	7,8	27
India		3,2	3,1	2,8	4,8	4,0	27
Maximo:		29,415		Máxima puntuación:	27	10	
Mínimo:		2,841		Mínima puntuación:	0	0	
Media:		11,791		Dif:	27,000	10,000	
					Unidad:	0,370	

Table 82: Operation and Maintenance Indicator Values

Subindicadores de Operación y mantenimiento		Pesos	Punt. Max.	Total Max puntuación
AGUA O.1	Gastos en operación y mantenimiento sector del agua / habitantes	1	10	10
AGUA O.2	Gastos operación y mantenimiento sector del agua / PIB real	1	10	10
AGUA O.3	Fiabilidad en el suministro de agua. Índice GCI (WEF)	1	10	10
		3		30
		90% Valorado de la Max. Puntuación del Criterio	90,0%	27

Table 83: Operation and Maintenance Indicator Weights

	Evaluación de Operación y mantenimiento						Calificación 2019		
	2010	2015	2016	2017	2018				
España		6,5	6,8	7,1	7,9	8,6	8,6	MUY BIEN	B
Alemania		5,6	5,3	5,4	5,7	6,1	6,1	SUFICIENTE ALTO	D
Francia		10,0	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Reino Unido		4,1	4,3	4,4	6,2	5,9	5,9	SUFICIENTE	E
Italia		5,2	5,4	5,5	6,0	6,3	6,3	SUFICIENTE ALTO	D
Turquía		1,9	2,0	2,1	2,0	2,7	2,7	MUY INSUFICIENTE	F
EEUU		8,4	8,3	8,2	7,9	8,2	8,2	MUY BIEN	B
México		2,7	2,9	2,8	2,6	2,7	2,7	MUY INSUFICIENTE	F
Brasil		6,2	6,4	5,8	4,8	5,1	5,1	SUFICIENTE	E
Perú					10,0	7,2	7,2	BIEN	C
Egipto		3,2	3,3	4,8	4,1	3,5	3,5	INSUFICIENTE	FX
Israel					10,0	9,7	9,7	EXCELENTE	A
Arabia Saudí		5,3	5,8	6,0	5,9	6,5	6,5	SUFICIENTE ALTO	D
Japón		10,0	10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China		2,7	2,9	2,8	2,8	2,9	2,9	MUY INSUFICIENTE	F
India		1,8	1,7	1,6	1,8	1,5	1,5	MUY INSUFICIENTE	F

Table 84: Operation and Maintenance Criterion Rating



As previously mentioned, the most significant ratio for evaluating the Operations and Maintenance Criterion is the percentage of investment in operation and maintenance relative to asset value. However, obtaining this value for the entire water cycle infrastructure is not feasible. Therefore, the investment in operation and maintenance relative to GDP has been used, although it could not be obtained for all countries. The average value of the ratio "% Operating and Maintenance Expenses in the Water Sector / Real GDP" is 0.62%, with a maximum of 1.3% and a minimum of 0.28%, which corresponds to India. Spain's percentage is 0.83%.

Another indicative ratio is the percentage of investment in operation and maintenance relative to the population. The resulting average value is \$168, with a maximum of \$453 and a minimum of \$5. Spain's value is \$244.

Regarding the "Water Supply Reliability" indicator from the World Economic Forum's Global Competitiveness Index (GCI), Spain, France, the United Kingdom, Israel, and Japan have the best results (over 90 out of 100).

In the overall Operations and Maintenance Criterion, Spain is rated as very good (8.6). The countries with the highest ratings are France and Japan (10), while the countries with the lowest ratings are India, China, and Mexico.



4.6. Safety

Within this criterion, the safety of the service provided by the entire water cycle is evaluated. The questions that this criterion aims to answer are: Is the public works sector safe for users? Are effective measures implemented to ensure safe performance and operation?

The chosen indicators are:

6 SECURITY	
Water S.1	Premature deaths, per million inhabitants (unsafe water source) (OECD)
Water S.2	Premature deaths, per million inhabitants (Unsafe sanitation) (OECD)
Water S.3	Premature deaths, per million inhabitants (Lack of safe handwashing facilities) (OECD)

For the assessment of this criterion, OECD indicators related to premature deaths per million inhabitants due to unsafe water supply, inadequate sanitation, and lack of access to a safe handwashing facility have been utilized.

As mentioned in the methodological notes, the minimum value for evaluation in the indicators of this criterion has been set at zero, as society considers it an indispensable goal to eliminate deaths resulting from inadequate water supply and sanitation.



4.6.1. Safety Indicators

4.6.1.1 Indicator WATER S.1: Premature deaths, per million inhabitants (unsafe water source) (OECD)

AGUA S.1	Muertes prematuras, por millón de habitantes (fuente de agua insegura) (OCDE)					
	2010	2015	2016	2017	2018	2019
España		1,15	1,16	1,13	1,13	1,11
Alemania		1,44	1,40	1,33	1,29	1,27
Francia		1,18	1,21	1,26	1,30	1,35
Reino Unido		0,62	0,59	0,57	0,59	0,59
Italia		0,91	0,94	0,85	0,81	0,78
Turquía		6,61	6,36	6,11	5,85	5,64
EEUU		1,23	1,19	1,15	1,16	1,16
México		19,76	19,31	19,02	18,88	18,78
Brasil		22,95	22,34	21,50	20,90	20,43
Perú		23,92	23,48	23,05	22,81	22,54
Egipto		55,57	47,40	41,87	36,95	33,10
Israel		1,65	1,60	1,54	1,52	1,50
Arabia Saudí		5,17	4,94	4,73	4,54	4,41
Japón		4,09	4,18	4,19	4,23	4,28
China		2,82	2,87	2,70	2,42	2,28
India		419,56	399,31	396,63	384,99	372,09
Maximo:		419,56		Percentil 70%:	18,807	1
Mínimo:		0,571	MIN ((Media-Factor min *Desv);0):		0	10
Media:		32,940	Percentil 70%:	18,807	18,807	-9,000
Media+Factor max*Desv Estándar:		175,096	Percentil 10%:	0,902	Unidad:	-0,479
Media-Factor min*Desv Estándar:		-109,216		Desv. Est.:	94,771	

Table 85: Indicator WATER S.1 Values: Premature deaths, per million inhabitants (unsafe water source) (OECD)

AGUA S.1	Muertes prematuras, por millón de habitantes (fuente de agua insegura) (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		9,4	9,4	9,5	9,5	9,5	EXCELENTE	A
Alemania		9,3	9,3	9,4	9,4	9,4	EXCELENTE	A
Francia		9,4	9,4	9,4	9,4	9,4	EXCELENTE	A
Reino Unido		9,7	9,7	9,7	9,7	9,7	EXCELENTE	A
Italia		9,6	9,5	9,6	9,6	9,6	EXCELENTE	A
Turquía		6,8	7,0	7,1	7,2	7,3	BIEN	C
EEUU		9,4	9,4	9,4	9,4	9,4	EXCELENTE	A
México		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Brasil		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Perú		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Egipto		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Israel		9,2	9,2	9,3	9,3	9,3	EXCELENTE	A
Arabia Saudí		7,5	7,6	7,7	7,8	7,9	BIEN	C
Japón		8,0	8,0	8,0	8,0	8,0	BIEN	C
China		8,7	8,6	8,7	8,8	8,9	MUY BIEN	B
India		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F

Table 86: Indicator WATER S.1 Rating: Premature deaths, per million inhabitants (unsafe water source) (OECD)



4.6.1.2 *Indicator WATER S.2: Premature deaths, per million inhabitants (Unsafe sanitation) (OECD)*

AGUA S.2	Muertes prematuras, por millón de habitantes (Saneamiento Inseguro) (OCDE)					
	2010	2015	2016	2017	2018	2019
España		0,33	0,32	0,30	0,29	0,27
Alemania		0,73	0,71	0,66	0,63	0,61
Francia		0,50	0,51	0,53	0,54	0,55
Reino Unido		0,12	0,12	0,11	0,12	0,12
Italia		0,53	0,54	0,49	0,46	0,44
Turquía		1,86	1,71	1,56	1,42	1,30
EEUU		2,21	2,11	2,05	2,07	2,07
México		8,64	8,28	7,97	7,71	7,48
Brasil		13,66	13,11	12,50	12,01	11,61
Perú		16,75	16,20	15,72	15,36	15,01
Egipto		46,88	38,33	32,55	27,55	23,85
Israel		1,42	1,35	1,29	1,25	1,22
Arabia Saudí		0,85	0,77	0,71	0,64	0,60
Japón		0,81	0,82	0,81	0,81	0,81
China		1,78	1,82	1,66	1,44	1,33
India		281,35	260,13	250,27	232,20	213,10
Maximo:		281,35		Percentil 70%:	7,546	1
Mínimo:		0,114	MIN ((Media-Factor min *Desv),0):		0	10
Media:		20,491	Percentil 70%:	7,546	7,546	-9,000
Media+Factor max*Desv Estándar:		110,377	Percentil 10%:	0,318	Unidad:	-1,193
Media-Factor min*Desv Estándar:		-69,396		Desv. Est.:	59,924	
			Percent. 90<Media+Factor*Desv. Est.			

Table 87: Indicator WATER S.2 Values: Premature deaths, per million inhabitants (Unsafe sanitation) (OECD)

AGUA S.2	Muertes prematuras, por millón de habitantes (Saneamiento Inseguro) (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		9,6	9,6	9,6	9,7	9,7	EXCELENTE	A
Alemania		9,1	9,2	9,2	9,2	9,3	EXCELENTE	A
Francia		9,4	9,4	9,4	9,4	9,3	EXCELENTE	A
Reino Unido		9,9	9,9	9,9	9,9	9,9	EXCELENTE	A
Italia		9,4	9,4	9,4	9,5	9,5	EXCELENTE	A
Turquía		7,8	8,0	8,1	8,3	8,4	MUY BIEN	B
EEUU		7,4	7,5	7,6	7,5	7,5	BIEN	C
México		1,0	1,0	1,0	1,0	1,1	MUY INSUFICIENTE	F
Brasil		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Perú		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Egipto		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Israel		8,3	8,4	8,5	8,5	8,5	MUY BIEN	B
Arabia Saudí		9,0	9,1	9,2	9,2	9,3	EXCELENTE	A
Japón		9,0	9,0	9,0	9,0	9,0	EXCELENTE	A
China		7,9	7,8	8,0	8,3	8,4	MUY BIEN	B
India		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F

Table 88: Indicator WATER S.2 Rating: Premature deaths, per million inhabitants (Unsafe sanitation) (OECD)



4.6.1.3 *Indicator WATER S.3: Premature deaths, per million inhabitants (Lack of safe handwashing facilities) (OECD)*

AGUA S.3	Muertes prematuras, por millón de habitantes (Sin acceso a lavado de manos seguro) (OCDE)					
	2010	2015	2016	2017	2018	2019
España		3,33	3,35	3,40	3,49	3,56
Alemania		3,75	3,75	3,70	3,71	3,76
Francia		3,57	3,63	3,77	3,90	4,03
Reino Unido		6,41	6,35	6,37	6,52	6,57
Italia		2,27	2,29	2,28	2,32	2,35
Turquía		11,83	12,11	12,01	11,49	11,10
EEUU		2,86	2,85	2,86	2,93	3,00
México		12,21	12,15	12,22	12,10	12,11
Brasil		29,35	29,93	29,40	28,98	28,92
Perú		51,15	50,54	49,96	49,32	48,74
Egipto		19,34	17,07	15,56	14,31	13,34
Israel		2,84	2,83	2,79	2,81	2,82
Arabia Saudí		6,86	6,71	6,58	6,46	6,39
Japón		16,68	16,97	17,02	17,92	18,61
China		6,20	6,24	5,83	5,45	5,29
India		149,87	140,22	137,31	132,74	127,33
Maximo:		149,87		Percentil 70%:	13,628	1
Mínimo:		2,266	MIN ((Media-Factor min *Desv);0):		0	10
Media:		19,486		Percentil 70%:	13,628	-9,000
Media+Factor max*Desv Estándar:		69,076		Percentil 10%:	2,824	Unidad: -0,660
Media-Factor min*Desv Estándar:		-30,104		Desv. Est.:	33,060	

Table 89: Indicator WATER S.3 Values: Premature deaths, per million inhabitants (Lack of safe handwashing facilities) (OECD)

AGUA S.3	Muertes prematuras, por millón de habitantes (Sin acceso a lavado de manos seguro) (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		7,8	7,8	7,8	7,7	7,7	BIEN	C
Alemania		7,5	7,5	7,6	7,5	7,5	BIEN	C
Francia		7,6	7,6	7,5	7,4	7,3	BIEN	C
Reino Unido		5,8	5,8	5,8	5,7	5,7	SUFICIENTE	E
Italia		8,5	8,5	8,5	8,5	8,4	MUY BIEN	B
Turquía		2,2	2,0	2,1	2,4	2,7	MUY INSUFICIENTE	F
EEUU		8,1	8,1	8,1	8,1	8,0	MUY BIEN	B
México		1,9	2,0	1,9	2,0	2,0	MUY INSUFICIENTE	F
Brasil		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Perú		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Egipto		1,0	1,0	1,0	1,0	1,2	MUY INSUFICIENTE	F
Israel		8,1	8,1	8,2	8,1	8,1	MUY BIEN	B
Arabia Saudí		5,5	5,6	5,7	5,7	5,8	SUFICIENTE	E
Japón		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
China		5,9	5,9	6,2	6,4	6,5	SUFICIENTE ALTO	D
India		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F

Table 90: Indicator WATER S.3 Rating: Premature deaths, per million inhabitants (Lack of safe handwashing facilities) (OECD)



4.6.2. Safety Indicator

	Índice de Seguridad						Max valor 2019
	2010	2015	2016	2017	2018	2019	
España		26,9	26,9	26,9	26,8	26,8	30
Alemania		26,0	26,0	26,1	26,2	26,2	30
Francia		26,5	26,4	26,3	26,2	26,0	30
Reino Unido		25,3	25,4	25,4	25,3	25,2	30
Italia		27,4	27,4	27,5	27,5	27,6	30
Turquía		16,8	16,9	17,3	17,9	18,4	30
EEUU		24,9	25,0	25,1	25,0	25,0	30
México		3,9	4,0	3,9	4,0	4,1	30
Brasil		3,0	3,0	3,0	3,0	3,0	30
Perú		3,0	3,0	3,0	3,0	3,0	30
Egipto		3,0	3,0	3,0	3,0	3,2	30
Israel		25,6	25,8	25,9	25,9	26,0	30
Arabia Saudí		22,0	22,3	22,6	22,8	23,0	30
Japón		18,1	18,0	18,0	18,0	18,0	30
China		22,4	22,3	22,9	23,5	23,8	30
India		3,0	3,0	3,0	3,0	3,0	30
Maximo:		27,550		Máxima puntuación:	30	10	
Mínimo:		3,000		Mínima puntuación:	0	0	
Media:		17,493		Dif:	30,000	10,000	
					Unidad:	0,333	

Table 91: Safety Indicator Values

Subindicadores de Seguridad		Pesos	Punt. Max.	Total Max puntuación
AGUA S.1	Muertes prematuras, por millón de habitantes (fuente de agua insegura) (OCDE)	1	10	10
AGUA S.2	Muertes prematuras, por millón de habitantes (Saneamiento inseguro) (OCDE)	1	10	10
AGUA S.3	Muertes prematuras, por millón de habitantes (Sin acceso a lavado de manos seguro) (OCDE)	1	10	10
		3		30
		90% Valorado de la Max. Puntuación del Criterio	100,0%	30

Table 92: Safety Indicators Weights

	Evaluación de Seguridad						Subindicadores considerados	Max valor 2019		
	2010	2015	2016	2017	2018	Calificación 2019				
España		9,0	9,0	9,0	8,9	8,9	MUY BIEN	B	3	30
Alemania		8,7	8,7	8,7	8,7	8,7	MUY BIEN	B	3	30
Francia		8,8	8,8	8,8	8,7	8,7	MUY BIEN	B	3	30
Reino Unido		8,4	8,5	8,5	8,4	8,4	MUY BIEN	B	3	30
Italia		9,1	9,1	9,2	9,2	9,2	EXCELENTE	A	3	30
Turquía		5,6	5,6	5,8	6,0	6,1	SUFICIENTE ALTO	D	3	30
EEUU		8,3	8,3	8,4	8,3	8,3	MUY BIEN	B	3	30
México		1,3	1,3	1,3	1,3	1,4	MUY INSUFICIENTE	F	3	30
Brasil		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F	3	30
Perú		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F	3	30
Egipto		1,0	1,0	1,0	1,0	1,1	MUY INSUFICIENTE	F	3	30
Israel		8,5	8,6	8,6	8,6	8,7	MUY BIEN	B	3	30
Arabia Saudí		7,3	7,4	7,5	7,6	7,7	BIEN	C	3	30
Japón		6,0	6,0	6,0	6,0	6,0	SUFICIENTE ALTO	D	3	30
China		7,5	7,4	7,6	7,8	7,9	BIEN	C	3	30
India		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F	3	30

Table 93: Safety Criterion Rating



The indicator "Premature deaths per million inhabitants (unsafe water source) (OECD)" has an average of 33 fatalities, with significant variations among countries: ranging from a minimum of 2 in all European countries, the US, and Israel, to a maximum of 372 in India. Spain's figure is 1.11, which places it among the better-performing countries.

The second sub-indicator analyzed, "Premature deaths per million inhabitants (unsafe sanitation) (OECD)," presents values that are in line with the first indicator. Notable performers are the UK (0.12) and Spain (0.27), while India has the highest figure (213). A similar situation is seen in the third indicator, "Premature deaths per million inhabitants (lack of access to safe handwashing) (OECD)."

Overall, the best-rated countries are European nations, the US, and Israel, with slight variations between them. India stands out as the worst-performing country, with a significant gap compared to the rest. Following India, there is a considerable distance, and countries like Mexico, Brazil, Peru, and Egypt also fare worse than the better-performing countries.



4.7. Resilience

Resilience is the ability of a system to recover its initial state when disruptions that have altered the system have ceased. The question posed is as follows: When threats and adverse incidents occur, what is the capacity of public infrastructure to prevent, protect, and minimize consequences for users, the environment, the economy, and national security? Is public infrastructure prepared to recover its initial state within a reasonable time after the threat or adverse incident has ceased? Are there alternatives to maintain the service it provides?

The chosen indicators are:

7 RESILIENCE	
Water R.1	Available water per capita (Renewable freshwater resources/Population) (m3/year)
Water R.2	(Renewable freshwater resources*(1-Water stress index))/agricultural land area (m3/ha)
Water R.3	% Integrated water resources management (SDG: 6.5.1)
Water R.4	% Annual freshwater extraction for domestic use/Total freshwater extraction

To adequately address the posed question, data related to the technical characteristics of the design of the entire water cycle infrastructure would be required. This would include information on soil conditions and vulnerability to adverse phenomena, drainage capacity of the infrastructure (to assess if flood return periods are appropriate for flood prevention), stability of slopes and cuttings within the infrastructure, organization and equipment of maintenance teams to efficiently and rapidly respond to any eventuality, and more.

As it's not feasible to gather all these data points for the entire water cycle infrastructure (which would be a labor-intensive task), the approach has been to consider indicators that, indirectly, can provide some insight into the resilience of the entire water cycle sector.

Per capita available water indicates vulnerability and the ability to respond to water supply issues during drought or water scarcity situations.

The evaluation of renewable freshwater resources per agricultural land area of the country, corrected for water stress, also provides information about the agriculture sector's ability to respond to freshwater scarcity phenomena.

The Sustainable Development Goal 6.5.1 indicator "% of integrated water resources management" helps verify whether centralized management can address adverse events. Centralized management allows for contingency plans and comprehensive actions in emergency situations affecting all processes within the water cycle; overly decentralized management may hinder a coordinated response.

The last considered indicator is the percentage of freshwater extraction for domestic use in relation to the total freshwater extraction. This indicator allows for the evaluation of available resources for domestic use during scarcity situations.



4.7.1. Resilience Indicators

4.7.1.1 Indicator WATER R.1: Available water per capita (Renewable freshwater resources/Population) (m3/year)

AGUA R.1	Agua disponible per cápita (Recursos renovables de agua dulce/Población) (m3/año)					
	2010	2015	2016	2017	2018	2019
España		2.394	2.392	2.387	2.376	2.359
Alemania		1.885	1.870	1.863	1.858	1.853
Francia		3.171	3.162	3.153	3.144	3.138
Reino Unido		2.258	2.240	2.225	2.212	2.199
Italia		3.145	3.150	3.155	3.161	3.198
Turquía		2.687	2.643	2.601	2.563	2.529
EEUU		9.569	9.499	9.440	9.390	9.347
México		3.783	3.738	3.695	3.653	3.614
Brasil		42.289	41.943	41.605	41.281	40.971
Perú		61.699	60.790	59.788	58.770	57.828
Egipto		627	614	601	589	578
Israel		239	234	230	225	221
Arabia Saudí		76	74	73	71	70
Japón		3.382	3.384	3.387	3.391	3.396
China		2.043	2.043	2.014	2.014	2.014
India		1.458	1.447	1.425	1.415	1.394
Maximo:		61698,54		Percentil 70%:	3.382,591	10,00
Mínimo:		70,035	MIN ((Media-Factor min *Desv.);0):		0	1
Media:		8.604,900	Percentil 70%:	3.382,591	3382,591	9,000
Media+Factor max*Desv Estándar:		33.305,327	Percentil 10%:	233,578	Unidad:	0,003
Media-Factor min*Desv Estándar:		-16.095,526		Desv. Est.:	16.466,951	

Table 94: Indicator WATER R.1 Values: Available water per capita (Renewable freshwater resources/Population) (m3/year)

AGUA R.1	Agua disponible per cápita (Recursos renovables de agua dulce/Población) (m3/año)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		7,4	7,4	7,4	7,3	7,3	BIEN	C
Alemania		6,0	6,0	6,0	5,9	5,9	SUFICIENTE	E
Francia		9,4	9,4	9,4	9,4	9,3	EXCELENTE	A
Reino Unido		7,0	7,0	6,9	6,9	6,9	SUFICIENTE ALTO	D
Italia		9,4	9,4	9,4	9,4	9,5	EXCELENTE	A
Turquía		8,1	8,0	7,9	7,8	7,7	BIEN	C
EEUU		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Brasil		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Perú		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Egipto		2,7	2,6	2,6	2,6	2,5	MUY INSUFICIENTE	F
Israel		1,6	1,6	1,6	1,6	1,6	MUY INSUFICIENTE	F
Arabia Saudí		1,2	1,2	1,2	1,2	1,2	MUY INSUFICIENTE	F
Japón		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China		6,4	6,4	6,4	6,4	6,4	SUFICIENTE ALTO	D
India		4,9	4,8	4,8	4,8	4,7	INSUFICIENTE	FX

Table 95: Indicator WATER R.1 Rating: Available water per capita (Renewable freshwater resources/Population) (m3/year)



4.7.1.2 Indicator WATER R.2: (Renewable freshwater resources*(1-Water stress index))/agricultural land area (m3/ha)

AGUA R.2	(Recursos renovables de agua dulce*(1-Estrés hídrico))/superficie agrícola (m3/ha)					
	2010	2015	2016	2017	2018	2019
España		2.770	2.855	2.911	2.977	2.978
Alemania		6.271	6.338	6.327	6.343	6.335
Francia		6.153	6.275	6.242	6.258	6.266
Reino Unido		7.418	7.290	7.241	7.289	7.218
Italia		12.910	13.044	13.030	13.472	12.737
Turquía		3.826	3.567	3.640	3.545	3.532
EEUU		5.795	5.788	5.780	5.780	5.780
México		3.348	3.359	3.407	3.423	3.437
Brasil		36.308	36.152	36.054	36.095	36.095
Perú		75.734	76.104	75.064	74.708	75.040
Egipto		-8.364	-8.132	-31.109	-12.011	-11.831
Israel		64	-189	-170	192	190
Arabia Saudí		-119	-116	-120	-125	-125
Japón		151.256	152.342	153.703	154.756	155.566
China		3.466	3.467	3.467	3.467	3.467
India		5.480	5.483	5.494	5.497	5.500
Maximo:		155565,73		Percentil 70%:	7.225,175	10,00
Mínimo:		-31.108,932	MIN ((Media-Factor min *Desv),0):		0	1
Media:		19.259,435	Percentil 70%:	7.225,175	7225,175	9,000
Media+Factor max*Desv Estándar:		79.291,312	Percentil 10%:	-124,706	Unidad:	0,001
Media-Factor min*Desv Estándar:		-40.772,442		Desv. Est.:	40.021,251	

Table 96: Indicator WATER R.2 Values: (Renewable freshwater resources*(1-Water stress index))/agricultural land area (m3/ha)

AGUA R.2	(Recursos renovables de agua dulce*(1-Estrés hídrico))/superficie agrícola (m3/ha)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		4,5	4,6	4,6	4,7	4,7	INSUFICIENTE	FX
Alemania		8,8	8,9	8,9	8,9	8,9	MUY BIEN	B
Francia		8,7	8,8	8,8	8,8	8,8	MUY BIEN	B
Reino Unido		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Italia		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Turquía		5,8	5,4	5,5	5,4	5,4	SUFICIENTE	E
EEUU		8,2	8,2	8,2	8,2	8,2	MUY BIEN	B
México		5,2	5,2	5,2	5,3	5,3	SUFICIENTE	E
Brasil		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Perú		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Egipto		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Israel		1,1	1,0	1,0	1,2	1,2	MUY INSUFICIENTE	F
Arabia Saudí		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Japón		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China		5,3	5,3	5,3	5,3	5,3	SUFICIENTE	E
India		7,8	7,8	7,8	7,8	7,9	BIEN	C

Table 97: Indicator WATER R.2 Rating: (Renewable freshwater resources*(1-Water stress index))/agricultural land area (m3/ha)



4.7.1.3 Indicator WATER R.3: % Integrated water resources management (SDG: 6.5.1)

AGUA R.3	% de gestión integrada de los recursos hídricos (ODS: 6.5.1)					
	2010	2015	2016	2017	2018	2019
España		82%	82%	82%	82%	82%
Alemania		88%	88%	88%	88%	88%
Francia		100%	100%	100%	100%	100%
Reino Unido		77%	77%	77%	77%	77%
Italia		55%	55%	55%	55%	55%
Turquía		70%	70%	70%	70%	70%
EEUU						
México		49%	49%	49%	49%	49%
Brasil		51%	51%	51%	51%	51%
Perú		30%	30%	30%	30%	30%
Egipto		40%	40%	40%	40%	40%
Israel		85%	85%	85%	85%	85%
Arabía Saudí		57%	57%	57%	57%	57%
Japón		94%	94%	94%	94%	94%
China		75%	75%	75%	75%	75%
India						
Maximo:		100,00%	MAX ((Media+Factor max*Desv Est.):		99,05%	10,00
Mínimo:		30,00%	MIN ((Media-Factor min *Desv.):0):		37,09%	1
Media:		68,07%	Percentil 90%:	94,00%	0,620	9,000
Media+Factor max*Desv Estándar:		99,05%	Percentil 10%:	40,00%	Unidad:	14,525
Media-Factor min*Desv Estándar:		37,09%		Desv. Est.:	20,65%	

Table 98: Indicator WATER R.3 Values: % Integrated water resources management (SDG: 6.5.1)

AGUA R.3	% de gestión integrada de los recursos hídricos (ODS: 6.5.1)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		7,5	7,5	7,5	7,5	7,5	BIEN	C
Alemania		8,4	8,4	8,4	8,4	8,4	MUY BIEN	B
Francia		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Reino Unido		6,8	6,8	6,8	6,8	6,8	SUFICIENTE ALTO	D
Italia		3,6	3,6	3,6	3,6	3,6	INSUFICIENTE	FX
Turquía		5,8	5,8	5,8	5,8	5,8	SUFICIENTE	E
EEUU								
México		2,7	2,7	2,7	2,7	2,7	MUY INSUFICIENTE	F
Brasil		3,0	3,0	3,0	3,0	3,0	INSUFICIENTE	FX
Perú		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Egipto		1,4	1,4	1,4	1,4	1,4	MUY INSUFICIENTE	F
Israel		8,0	8,0	8,0	8,0	8,0	MUY BIEN	B
Arabía Saudí		3,9	3,9	3,9	3,9	3,9	INSUFICIENTE	FX
Japón		9,3	9,3	9,3	9,3	9,3	EXCELENTE	A
China		6,5	6,5	6,5	6,5	6,5	SUFICIENTE ALTO	D
India								

Table 99: Indicator WATER R.3 Rating: % Integrated water resources management (SDG: 6.5.1)



4.7.1.4 Indicator WATER R.4: % Annual freshwater extraction for domestic use/Total freshwater extraction

AGUA R.4	% Extracción anual de agua dulce para uso doméstico/Extracción total de agua dulce					
	2010	2015	2016	2017	2018	2019
España		16%	16%	16%	16%	16%
Alemania		36%	36%	36%	36%	36%
Francia		20%	20%	20%	20%	20%
Reino Unido		74%	74%	74%	74%	74%
Italia		28%	28%	28%	28%	28%
Turquía		11%	11%	11%	11%	11%
EEUU		13%	13%	13%	13%	13%
México		16%	16%	16%	15%	15%
Brasil		25%	25%	25%	16%	16%
Perú		12%	12%	12%	6%	6%
Egipto		14%	14%	14%	14%	14%
Israel		38%	38%	38%	44%	44%
Arabia Saudí		13%	13%	13%	14%	14%
Japón		18%	18%	18%	18%	18%
China		13%	13%	13%	13%	13%
India		7%	7%	7%	7%	7%
Maximo:		74,00%	MAX ((Media+Factor max*Desv Est.):		46,38%	1,00
Mínimo:		6,00%	MIN ((Media-Factor min *Desv);0):		0,00%	10
Media:		21,90%	Percentil 90%:	38,00%	0,464	-9,000
Media+Factor max*Desv Estándar:		46,38%	Percentil 10%:	11,00%	Unidad:	-19,404
Media-Factor min*Desv Estándar:		-2,58%		Desv. Est.:	16,32%	

Table 100: Indicator WATER R.4 Values: % Annual freshwater extraction for domestic use/Total freshwater extraction

AGUA R.4	% Extracción anual de agua dulce para uso doméstico/Extracción total de agua dulce						Calificación 2019	
	2010	2015	2016	2017	2018			
España		6,9	6,9	6,9	6,9	6,9	SUFICIENTE ALTO	D
Alemania		3,0	3,0	3,0	3,0	3,0	INSUFICIENTE	FX
Francia		6,1	6,1	6,1	6,1	6,1	SUFICIENTE ALTO	D
Reino Unido		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Italia		4,6	4,6	4,6	4,6	4,6	INSUFICIENTE	FX
Turquía		7,9	7,9	7,9	7,9	7,9	BIEN	C
EEUU		7,5	7,5	7,5	7,5	7,5	BIEN	C
México		6,9	6,9	6,9	7,1	7,1	BIEN	C
Brasil		5,1	5,1	5,1	6,9	6,9	SUFICIENTE ALTO	D
Perú		7,7	7,7	7,7	8,8	8,8	MUY BIEN	B
Egipto		7,3	7,3	7,3	7,3	7,3	BIEN	C
Israel		2,6	2,6	2,6	1,5	1,5	MUY INSUFICIENTE	F
Arabia Saudí		7,5	7,5	7,5	7,3	7,3	BIEN	C
Japón		6,5	6,5	6,5	6,5	6,5	SUFICIENTE ALTO	D
China		7,5	7,5	7,5	7,5	7,5	BIEN	C
India		8,6	8,6	8,6	8,6	8,6	MUY BIEN	B

Table 101: Indicator WATER R.4 Rating: % Annual freshwater extraction for domestic use/Total freshwater extraction



4.7.2. Resilience Indicator

	Índice de Resiliencia						Max valor 2019
	2010	2015	2016	2017	2018	2019	
España		30,7	30,9	31,0	31,2	31,1	45
Alemania		35,0	35,2	35,1	35,2	35,1	45
Francia		42,9	43,2	43,1	43,1	43,1	45
Reino Unido		34,8	34,8	34,7	34,7	34,6	45
Italia		37,5	37,6	37,6	37,6	37,7	45
Turquía		33,3	32,6	32,6	32,3	32,2	45
EEUU		33,9	33,9	33,9	33,9	33,9	36
México		30,0	30,0	30,1	30,3	30,4	45
Brasil		38,2	38,2	38,2	39,9	39,9	45
Perú		38,7	38,7	38,7	39,8	39,8	45
Egipto		13,4	13,3	13,3	13,3	13,2	45
Israel		14,4	14,2	14,2	13,5	13,5	45
Arabía Saudí		14,6	14,6	14,6	14,4	14,4	45
Japón		45,8	45,8	45,8	45,8	45,8	45
China		31,1	31,1	31,0	31,0	31,0	45
India		29,2	29,2	29,1	29,1	29,1	36
Maximo:		45,773		Máxima puntuación:	45	10	
Mínimo:		13,243		Mínima puntuación:	0	0	
Media:		31,485		Dif:	45,000	10,000	
					Unidad:	0,222	

Table 102: Resilience Indicator Values

Subindicadores de Resiliencia		Pesos	Punt. Max.	Total Max puntuación
AGUA R.1	Agua disponible per cápita (Recursos renovables de agua dulce/Población) (m3/año)	1	10	10
AGUA R.2	(Recursos renovables de agua dulce*(1-Estrés hídrico))/superficie agrícola (m3/ha)	2	10	20
AGUA R.3	% de gestión integrada de los recursos hídricos (ODS: 6.5.1)	1	10	10
AGUA R.4	% Extracción anual de agua dulce para uso doméstico/Extracción total de agua dulce	1	10	10
		5		50
		90% Valorado de la Max. Puntuación del Criterio	90,0%	45

Table 103: Resilience Indicators Weights

	Evaluación de Resiliencia						Subindicadores considerados		
	2010	2015	2016	2017	2018	Calificación 2019			
España		6,8	6,9	6,9	6,9	6,9	SUFICIENTE ALTO	D	4
Alemania		7,8	7,8	7,8	7,8	7,8	BIEN	C	4
Francia		9,5	9,6	9,6	9,6	9,6	EXCELENTE	A	4
Reino Unido		7,7	7,7	7,7	7,7	7,7	BIEN	C	4
Italia		8,3	8,3	8,3	8,4	8,4	MUY BIEN	B	4
Turquía		7,4	7,2	7,3	7,2	7,1	BIEN	C	4
EEUU		9,4	9,4	9,4	9,4	9,4	EXCELENTE	A	3
México		6,7	6,7	6,7	6,7	6,8	SUFICIENTE ALTO	D	4
Brasil		8,5	8,5	8,5	8,9	8,9	MUY BIEN	B	4
Perú		8,6	8,6	8,6	8,9	8,9	MUY BIEN	B	4
Egipto		3,0	3,0	3,0	2,9	2,9	MUY INSUFICIENTE	F	4
Israel		3,2	3,2	3,2	3,0	3,0	INSUFICIENTE	FX	4
Arabía Saudí		3,2	3,2	3,2	3,2	3,2	INSUFICIENTE	FX	4
Japón		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A	4
China		6,9	6,9	6,9	6,9	6,9	SUFICIENTE ALTO	D	4
India		8,1	8,1	8,1	8,1	8,1	MUY BIEN	B	3

Table 104: Resilience Criterion Rating

The highest overall rating for this indicator is achieved by Japan (10.0), followed by France (9.6) and the USA (9.4), with European countries, including Spain, also ranking well (6.9). The lowest-rated countries are Egypt, Israel, and Saudi Arabia.



4.8. Engineering and Innovation

The evaluation of innovation through indicators aims to answer the following questions: Are the resources allocated to engineering in the design, construction, maintenance, management, and operation of the public works sector adequate? Is the investment in innovation appropriate? What new techniques, materials, technologies, and operational methods are being implemented to improve public works? Is there progress in digitalization, monitoring, and sensorization throughout the entire lifecycle of public works? Is the information provided to users adequate?

The selected indicators are:

8 ENGINEERING AND INNOVATION	
Water I.1	Number of patents related to water treatment and purification per million population (OECD)
Water I.2	Number of patents related to water pollution reduction per million population (OECD)
Water I.3	Number of patents. Desalination of seawater per million population (OECD)
Water I.4	% of GDP allocated to Gross Domestic Expenditure on Research and Development (R&D) (OECD R&D)
Water I.5	Gross Domestic Expenditure on Research and Development (\$)/Population (OECD R&D)
Water I.6	% of GDP allocated to basic research expenditure (OECD R&D)
Water I.7	% of GDP of Private Funding for Research and Development (R&D) (OECD R&D)
Water I.8	% of GDP of Public Funding for Research and Development (R&D) (OECD R&D)
Water I.9	Digitization. Participation in new technologies. GCI Score (WEF)
Water I.10	Digitization. Information and Communication Technology Infrastructure Index. (ND Index)
Water I.11	Digitization. % of people using the internet
Water I.12	Engineering. Regulatory transparency. Services Trade Restrictiveness Index (OECD)
Water I.13	Engineering. Barriers to competition. Services Trade Restrictiveness Index (OECD)
Water I.14	Engineering. Movement restrictions. Services Trade Restrictiveness Index (OECD)
Water I.15	Engineering. Restrictions on entry of foreign engineers. Services Trade Restrictiveness Index (OECD)
Water I.16	Innovation index. ND Gain Index

To comprehensively analyze engineering and innovation in the Complete Water Cycle, a deep understanding of new techniques, materials, and technologies applied in the water cycle, as well as implemented innovations, the state of water cycle engineering, advancements in digitization, and resources allocated to engineering and innovation are required.

Regarding innovation, three OECD patent indicators have been identified: the number of patents related to treatment and purification, pollution reduction in water, and desalination, all per million inhabitants. Despite efforts to gather more specific data on the Complete Water Cycle infrastructure sector, no further reliable and verifiable data has been found. In the absence of such data, the overall state of R&D and innovation in various countries has been analyzed, assuming these data to reflect the state of the water cycle. For this purpose, a database and indicators from the report "Main Science and Technology Indicators, Volume 2021," published by the OECD in 2022, have been selected. This comprehensive report provides a set of indicators reflecting the level and structure of efforts made by OECD⁷ member countries and other non-member countries (Argentina, People's Republic of China, Romania, Russian Federation, Singapore, and South Africa) in the field of science and technology. These indicators cover resources dedicated to research and development, patent families, and international trade in R&D-intensive industries.

The University of Notre Dame's Innovation Index (ND Gain index) has also been considered.

⁷ [Main Science and Technology Indicators, Volume 2021 Issue 2 | READ online \(oecd-ilibrary.org\)](https://www.oecd-ilibrary.org/science-and-technology/main-science-and-technology-indicators-volume-2021-issue-2)



To analyze the progress of digitization, three indicators have been included: participation in new technologies (GCI - WEF), the ICT Infrastructure Index (ND Gain Index), and the number of internet users.

For assessing the state of engineering in the water cycle sector, having precise information about the training of water cycle engineers, the number of engineers involved in design, construction, maintenance, and management per unit of economic investment would have been valuable. It would have been particularly interesting to have economic data related to engineering investment in comparison to investment in construction, maintenance, operation, and management of water cycle networks. Unfortunately, this data was not available. Therefore, four OECD indicators related to engineering as a whole have been considered: regulatory transparency, barriers to competition, restrictions on the movement of engineers, and restrictions on the entry of foreign engineers. These indicators are included in the trade in services restriction index periodically compiled by the OECD⁸.

⁸ [Services Trade Restrictiveness Index \(oecd.org\)](https://www.oecd.org/)



4.8.1. Engineering and Innovation Indicators

4.8.1.1 Indicator WATER I.1: Number of patents related to water treatment and purification per million population (OECD)

AGUA I.1	Número de patentes relacionadas con el tratamiento de aguas y depuración/Millón de población (OCDE)						
	2010	2015	2016	2017	2018	2019	
España		1,39	1,22	1,38	1,04	0,95	
Alemania		4,73	4,68	4,29	4,13	4,01	
Francia		2,32	2,04	2,18	2,28	1,81	
Reino Unido		1,79	2,15	1,94	1,65	2,26	
Italia		1,10	1,09	0,66	0,84	0,93	
Turquía		0,19	0,31	0,28	0,29	0,33	
EEUU		3,98	4,29	4,23	3,58	3,11	
México		0,39	0,40	0,39	0,30	0,08	
Brasil		0,42	0,49	0,45	0,43	0,48	
Perú		0,07	0,16	0,06	0,09	0,18	
Egipto		0,04	0,00	0,02	0,02	0,01	
Israel		5,97	6,30	4,19	4,39	4,18	
Arabía Saudí		1,40	0,91	1,44	1,74	1,72	
Japón		4,87	4,46	4,21	4,52	3,22	
China		0,26	0,33	0,40	0,43	0,48	
India		0,05	0,04	0,05	0,04	0,03	
Maximo:		6,30		Percentil 90%:	4,304	10	
Mínimo:		0,003	MIN ((Media-Factor min *Desv);0):			0	1
Media:		1,669		Percentil 90%:	4,304	9,000	
Media+Factor max*Desv Estándar:		4,266		Percentil 10%:	0,045	Unidad:	2,091
Media-Factor min*Desv Estándar:		-0,927		Desv. Est.:	1,731		

Table 105: Indicator WATER I.1 Values: Number of patents related to water treatment and purification per million population (OECD)

AGUA I.1	Número de patentes relacionadas con el tratamiento de aguas y depuración/Millón de población (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		3,9	3,6	3,9	3,2	3,0	INSUFICIENTE	FX
Alemania		10,0	10,0	10,0	9,6	9,4	EXCELENTE	A
Francia		5,8	5,3	5,6	5,8	4,8	INSUFICIENTE	FX
Reino Unido		4,7	5,5	5,1	4,4	5,7	SUFICIENTE	E
Italia		3,3	3,3	2,4	2,8	2,9	MUY INSUFICIENTE	F
Turquía		1,4	1,6	1,6	1,6	1,7	MUY INSUFICIENTE	F
EEUU		9,3	10,0	9,8	8,5	7,5	BIEN	C
México		1,8	1,8	1,8	1,6	1,2	MUY INSUFICIENTE	F
Brasil		1,9	2,0	1,9	1,9	2,0	MUY INSUFICIENTE	F
Perú		1,1	1,3	1,1	1,2	1,4	MUY INSUFICIENTE	F
Egipto		1,1	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Israel		10,0	10,0	9,8	10,0	9,7	EXCELENTE	A
Arabía Saudí		3,9	2,9	4,0	4,6	4,6	INSUFICIENTE	FX
Japón		10,0	10,0	9,8	10,0	7,7	BIEN	C
China		1,5	1,7	1,8	1,9	2,0	MUY INSUFICIENTE	F
India		1,1	1,1	1,1	1,1	1,1	MUY INSUFICIENTE	F

Table 106: Indicator WATER I.1 Rating: Number of patents related to water treatment and purification per million population (OECD)



4.8.1.2 *Indicator WATER I.2: Number of patents related to water treatment and purification per million population (OECD)*

AGUA I.2	Número de patentes relacionadas con la reducción de la contaminación de las aguas/Millón de población (OCDE)					
	2010	2015	2016	2017	2018	2019
España		1,41	1,24	1,42	1,09	0,99
Alemania		4,75	4,82	4,34	4,36	4,01
Francia		2,41	2,05	2,25	2,46	1,93
Reino Unido		1,81	2,20	1,94	1,77	2,27
Italia		1,10	1,09	0,69	0,87	0,97
Turquía		0,19	0,32	0,28	0,29	0,35
EEUU		4,02	4,34	4,26	3,70	3,15
México		0,39	0,40	0,39	0,32	0,08
Brasil		0,44	0,53	0,47	0,46	0,48
Perú		0,07	0,16	0,06	0,09	0,18
Egipto		0,04	0,00	0,02	0,02	0,01
Israel		6,32	6,30	4,30	4,50	4,18
Arabia Saudí		1,40	0,91	1,44	1,77	1,76
Japón		4,88	4,46	4,23	4,59	3,24
China		0,27	0,34	0,41	0,43	0,50
India		0,05	0,04	0,05	0,05	0,03
Maximo:		6,32		Percentil 90%:	4,372	10
Mínimo:		0,003	MIN ((Media-Factor min *Desv.);0):		0	1
Media:		1,702	Percentil 90%:	4,372	4,372	9,000
Media+Factor max*Desv Estándar:		4,345	Percentil 10%:	0,045	Unidad:	2,059
Media-Factor min*Desv Estándar:		-0,940		Desv. Est.:	1,761	

Table 107: WATER I.2 Values: Number of patents related to water treatment and purification per million population (OECD)

AGUA I.2	Número de patentes relacionadas con la reducción de la contaminación de las aguas/Millón de población (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		3,9	3,6	3,9	3,2	3,0	INSUFICIENTE	FX
Alemania		10,0	10,0	9,9	10,0	9,2	EXCELENTE	A
Francia		6,0	5,2	5,6	6,1	5,0	SUFICIENTE	E
Reino Unido		4,7	5,5	5,0	4,6	5,7	SUFICIENTE	E
Italia		3,3	3,2	2,4	2,8	3,0	INSUFICIENTE	FX
Turquía		1,4	1,7	1,6	1,6	1,7	MUY INSUFICIENTE	F
EEUU		9,3	9,9	9,8	8,6	7,5	BIEN	C
México		1,8	1,8	1,8	1,7	1,2	MUY INSUFICIENTE	F
Brasil		1,9	2,1	2,0	1,9	2,0	MUY INSUFICIENTE	F
Perú		1,1	1,3	1,1	1,2	1,4	MUY INSUFICIENTE	F
Egipto		1,1	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Israel		10,0	10,0	9,9	10,0	9,6	EXCELENTE	A
Arabia Saudí		3,9	2,9	4,0	4,6	4,6	INSUFICIENTE	FX
Japón		10,0	10,0	9,7	10,0	7,7	BIEN	C
China		1,6	1,7	1,8	1,9	2,0	MUY INSUFICIENTE	F
India		1,1	1,1	1,1	1,1	1,1	MUY INSUFICIENTE	F

Table 108: Indicator WATER I.2 Rating: Number of patents related to water treatment and purification per million population (OECD)



4.8.1.3 Indicator WATER I.3: Number of patents. Desalination of seawater per million population (OECD)

AGUA I.3	Número de patentes. Desalación de agua de mar/Millón de población (OCDE)					
	2010	2015	2016	2017	2018	2019
España		0,043	0,108	0,086	0,096	0,085
Alemania		0,035	0,028	0,042	0,030	0,048
Francia		0,075	0,020	0,015	0,089	0,030
Reino Unido		0,046	0,038	0,114	0,135	0,015
Italia		0,049	0,066	0,033	0,017	0,025
Turquía		0,025	0,013		0,040	0,004
EEUU		0,113	0,122	0,101	0,212	0,091
México		0,066	0,032	0,012	0,032	
Brasil		0,007	0,005	0,019	0,014	0,009
Perú						
Egipto		0,035		0,014		0,010
Israel		0,716	0,702	0,689	0,113	0,423
Arabía Saudí						
Japón		0,212	0,150	0,144	0,249	0,118
China		0,017	0,007	0,009	0,007	0,024
India		0,002	0,000	0,001	0,001	
Maximo:		0,72	MAX ((Media+Factor max*Desv Est.):		0,32	10,00
Mínimo:		0,000	MIN ((Media-Factor min *Desv);0):		0	1
Media:		0,091	Percentil 90%:	0,187	0,321	9,000
Media+Factor max*Desv Estándar:		0,321	Percentil 10%:	0,007	Unidad:	28,044
Media-Factor min*Desv Estándar:		-0,139		Desv. Est.:	0,153	

Table 109: Indicator WATER I.13 Values: Number of patents. Desalination of seawater per million population (OECD)

AGUA I.3	Número de patentes. Desalación de agua de mar/Millón de población (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		2,2	4,0	3,4	3,7	3,4	INSUFICIENTE	FX
Alemania		2,0	1,8	2,2	1,8	2,3	MUY INSUFICIENTE	F
Francia		3,1	1,6	1,4	3,5	1,8	MUY INSUFICIENTE	F
Reino Unido		2,3	2,1	4,2	4,8	1,4	MUY INSUFICIENTE	F
Italia		2,4	2,9	1,9	1,5	1,7	MUY INSUFICIENTE	F
Turquía		1,7	1,4		2,1	1,1	MUY INSUFICIENTE	F
EEUU		4,2	4,4	3,8	6,9	3,6	INSUFICIENTE	FX
México		2,8	1,9	1,3	1,9			
Brasil		1,2	1,1	1,5	1,4	1,3	MUY INSUFICIENTE	F
Perú								
Egipto		2,0		1,4		1,3	MUY INSUFICIENTE	F
Israel		10,0	10,0	10,0	4,2	10,0	EXCELENTE	A
Arabía Saudí								
Japón		7,0	5,2	5,0	8,0	4,3	INSUFICIENTE	FX
China		1,5	1,2	1,2	1,2	1,7	MUY INSUFICIENTE	F
India		1,0	1,0	1,0	1,0			

Table 110: Indicator WATER I.3 Rating: Number of patents. Desalination of seawater per million population (OECD)



4.8.1.4 Indicator WATER I.4: % of GDP allocated to Gross Domestic Expenditure on Research and Development (R&D) (OECD R&D)

AGUA I.4	% del PIB destinado al Gasto interior bruto en I+D (OCDE R&D)					
	2010	2015	2016	2017	2018	2019
España		1,22%	1,19%	1,21%	1,24%	1,25%
Alemania		2,93%	2,94%	3,05%	3,11%	3,17%
Francia		2,23%	2,22%	2,20%	2,20%	2,19%
Reino Unido		1,63%	1,64%	1,66%	1,70%	1,71%
Italia		1,34%	1,37%	1,37%	1,42%	1,46%
Turquía		0,88%	0,94%	0,95%	1,03%	1,06%
EEUU		2,79%	2,85%	2,91%	3,01%	3,18%
México		0,43%	0,39%	0,33%	0,31%	0,28%
Brasil						
Perú						
Egipto						
Israel		4,26%	4,51%	4,66%	4,80%	5,14%
Arabía Saudí						
Japón		3,24%	3,11%	3,17%	3,22%	3,21%
China		2,06%	2,10%	2,12%	2,14%	2,23%
India						
Maximo:		5,14%	MAX ((Media+Factor max*Desv Est.):		3,95%	10
Mínimo:		0,28%	MIN ((Media-Factor min *Desv);0):		0,38%	1
Media:		2,16%	Percentil 90%:	3,23%	3,57%	9,000
Media+Factor max*Desv Estándar:		3,95%	Percentil 10%:	0,90%	Unidad:	251,920
Media-Factor min*Desv Estándar:		0,38%		Desv. Est.:	1,19%	

Table 111: Indicator WATER I.4 Values: % of GDP allocated to Gross Domestic Expenditure on Research and Development (R&D) (OECD R&D)

AGUA I.4	% del PIB destinado al Gasto interior bruto en I+D (OCDE R&D)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		3,1	3,0	3,1	3,2	3,2	INSUFICIENTE	FX
Alemania		7,4	7,5	7,7	7,9	8,0	MUY BIEN	B
Francia		5,7	5,6	5,6	5,6	5,6	SUFICIENTE	E
Reino Unido		4,2	4,2	4,2	4,3	4,4	INSUFICIENTE	FX
Italia		3,4	3,5	3,5	3,6	3,7	INSUFICIENTE	FX
Turquía		2,3	2,4	2,4	2,6	2,7	MUY INSUFICIENTE	F
EEUU		7,1	7,2	7,4	7,6	8,1	MUY BIEN	B
México		1,1	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Brasil								
Perú								
Egipto								
Israel		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Arabía Saudí								
Japón		8,2	7,9	8,0	8,2	8,1	MUY BIEN	B
China		5,2	5,3	5,4	5,4	5,7	SUFICIENTE	E
India								

Table 112: Indicator WATER I.4 Rating: % of GDP allocated to Gross Domestic Expenditure on Research and Development (R&D) (OECD R&D)



4.8.1.5 *Indicator WATER I.5: Gross Domestic Expenditure on Research and Development (\$)/Population (OECD R&D)*

AGUA I.5	Gasto interior bruto en I+D (\$)/Población (OCDE R&D)					
	2010	2015	2016	2017	2018	2019
España		427	444	479	506	522
Alemania		1397	1487	1617	1717	1763
Francia		909	952	977	1019	1070
Reino Unido		701	733	770	811	838
Italia		498	550	575	619	649
Turquía		227	250	269	290	289
EEUU		1581	1651	1740	1892	2066
México		79	76	66	63	57
Brasil		0	0	0	0	0
Perú		0	0	0	0	0
Egipto		0	0	0	0	0
Israel		1512	1708	1823	1915	2057
Arabia Saudí		0	0	0	0	0
Japón		1326	1263	1315	1361	1364
China		266	284	303	334	376
India		0	0	0	0	0
Maximo:		2066,00		Percentil 90%:	1708,90	10,00
Mínimo:		57,000	MIN ((Media-Factor min *Desv);0):		0	1
Media:		906,055	Percentil 90%:	1.708,900	1708,900	9,000
Media+Factor max*Desv Estándar:		1.899,644	Percentil 10%:	0,000	Unidad:	0,005
Media-Factor min*Desv Estándar:		-87,535		Desv. Est.:	662,393	

Table 113: Indicator WATER I.5 Values: Gross Domestic Expenditure on Research and Development (\$)/Population (OECD R&D)

AGUA I.5	Gasto interior bruto en I+D (\$)/Población (OCDE R&D)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		3,2	3,3	3,5	3,7	3,7	INSUFICIENTE	FX
Alemania		8,4	8,8	9,5	10,0	10,0	EXCELENTE	A
Francia		5,8	6,0	6,1	6,4	6,6	SUFICIENTE ALTO	D
Reino Unido		4,7	4,9	5,1	5,3	5,4	SUFICIENTE	E
Italia		3,6	3,9	4,0	4,3	4,4	INSUFICIENTE	FX
Turquía		2,2	2,3	2,4	2,5	2,5	MUY INSUFICIENTE	F
EEUU		9,3	9,7	10,0	10,0	10,0	EXCELENTE	A
México		1,4	1,4	1,3	1,3	1,3	MUY INSUFICIENTE	F
Brasil								
Perú								
Egipto								
Israel		9,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Arabia Saudí								
Japón		8,0	7,7	7,9	8,2	8,2	MUY BIEN	B
China		2,4	2,5	2,6	2,8	3,0	INSUFICIENTE	FX
India								

Table 114: Indicator WATER I.5 Rating: Gross Domestic Expenditure on Research and Development (\$)/Population (OECD R&D)



4.8.1.6 Indicator WATER I.6: % of GDP allocated to basic research expenditure (OECD R&D)

AGUA I.6	% del PIB destinado a gasto en investigación básica (OCDE R&D)					
	2010	2015	2016	2017	2018	2019
España		0,27%	0,26%	0,26%	0,26%	0,29%
Alemania						
Francia		0,54%	0,50%	0,50%	0,50%	0,50%
Reino Unido		0,27%	0,30%	0,29%	0,31%	0,31%
Italia		0,33%	0,32%	0,30%	0,31%	0,31%
Turquía						
EEUU		0,46%	0,46%	0,46%	0,47%	0,48%
México		0,14%	0,12%	0,10%	0,09%	0,09%
Brasil						
Perú						
Egipto						
Israel						
Arabia Saudí						
Japón		0,39%	0,39%	0,42%	0,41%	0,40%
China		0,10%	0,11%	0,12%	0,12%	0,13%
India						
Maximo:		0,54%	MAX ((Media+Factor max*Desv Est.):		0,52%	10
Mínimo:		0,09%	MIN ((Media-Factor min *Desv);0):		0,10%	1
Media:		0,31%	Percentil 90%:	0,50%	0,42%	9,000
Media+Factor max*Desv Estándar:		0,52%	Percentil 10%:	0,11%	Unidad:	2136,303
Media-Factor min*Desv Estándar:		0,10%		Desv. Est.:	0,14%	

Table 115: Indicator WATER I.6 Values: % of GDP allocated to basic research expenditure (OECD R&D)

AGUA I.6	% del PIB destinado a gasto en investigación básica (OCDE R&D)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		4,7	4,4	4,4	4,4	5,1	SUFICIENTE	E
Alemania								
Francia		10,0	9,6	9,6	9,6	9,6	EXCELENTE	A
Reino Unido		4,7	5,3	5,1	5,5	5,5	SUFICIENTE	E
Italia		5,9	5,7	5,3	5,5	5,5	SUFICIENTE	E
Turquía								
EEUU		8,7	8,7	8,7	8,9	9,1	EXCELENTE	A
México		1,9	1,4	1,0	1,0	1,0	MUY INSUFICIENTE	F
Brasil								
Perú								
Egipto								
Israel								
Arabia Saudí								
Japón		7,2	7,2	7,9	7,6	7,4	BIEN	C
China		1,0	1,2	1,4	1,4	1,7	MUY INSUFICIENTE	F
India								

Table 116: Indicator WATER I.6 Rating: % of GDP allocated to basic research expenditure (OECD R&D)



4.8.1.7 Indicator WATER I.7: % of GDP of Private Funding for Research and Development (R&D) (OECD R&D)

AGUA I.7	% del PIB de Financiación privada destinada a I+D (OCDE R&D)					
	2010	2015	2016	2017	2018	2019
España		0,56%	0,56%	0,58%	0,61%	0,61%
Alemania		1,93%	1,92%	2,02%	2,05%	2,04%
Francia		1,23%	1,24%	1,24%	1,24%	1,24%
Reino Unido		0,80%	0,85%	0,89%	0,93%	0,92%
Italia		0,67%	0,71%	0,74%	0,78%	0,82%
Turquía		0,39%	0,44%	0,47%	0,55%	0,60%
EEUU		1,76%	1,83%	1,84%	1,93%	2,08%
México		0,07%	0,07%	0,06%	0,05%	0,05%
Brasil						
Perú						
Egipto						
Israel		1,41%	1,73%	1,65%	1,78%	1,96%
Arabía Saudí						
Japón		2,53%	2,43%	2,48%	2,55%	2,54%
China		1,54%	1,60%	1,62%	1,64%	1,70%
India						
Maximo:		2,55%	MAX ((Media+Factor max*Desv Est.):		2,34%	10
Mínimo:		0,05%	MIN ((Media-Factor min *Desv);0):		0,15%	1
Media:		1,25%	Percentil 90%:	2,07%	2,19%	9,000
Media+Factor max*Desv Estándar:		2,34%	Percentil 10%:	0,41%	Unidad:	410,250
Media-Factor min*Desv Estándar:		0,15%		Desv. Est.:	0,73%	

Table 117: Indicator WATER I.7 Values: % of GDP of Private Funding for Research and Development (R&D) (OECD R&D)

AGUA I.7	% del PIB de Financiación privada destinada a I+D (OCDE R&D)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		2,7	2,7	2,8	2,9	2,9	MUY INSUFICIENTE	F
Alemania		8,3	8,3	8,7	8,8	8,8	MUY BIEN	B
Francia		5,4	5,5	5,5	5,5	5,5	SUFICIENTE	E
Reino Unido		3,7	3,9	4,0	4,2	4,2	INSUFICIENTE	FX
Italia		3,1	3,3	3,4	3,6	3,8	INSUFICIENTE	FX
Turquía		2,0	2,2	2,3	2,6	2,8	MUY INSUFICIENTE	F
EEUU		7,6	7,9	7,9	8,3	8,9	MUY BIEN	B
México		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Brasil								
Perú								
Egipto								
Israel		6,2	7,5	7,2	7,7	8,4	MUY BIEN	B
Arabía Saudí								
Japón		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China		6,7	7,0	7,0	7,1	7,4	BIEN	C
India								

Table 118: Indicator WATER I.7 Rating: % of GDP of Private Funding for Research and Development (R&D) (OECD R&D)



4.8.1.8 Indicator WATER I.8: % of GDP of Public Funding for Research and Development (R&D) (OECD R&D)

AGUA I.8	% del PIB de Financiación pública destinada a I+D (OCDE R&D)					
	2010	2015	2016	2017	2018	2019
España		0,50%	0,48%	0,47%	0,47%	0,47%
Alemania		0,82%	0,84%	0,84%	0,87%	0,88%
Francia		0,79%	0,72%	0,71%	0,69%	0,69%
Reino Unido		0,45%	0,43%	0,43%	0,44%	0,46%
Italia		0,51%	0,48%	0,44%	0,47%	0,47%
Turquía		0,34%	0,33%	0,32%	0,33%	0,31%
EEUU		0,69%	0,66%	0,65%	0,66%	0,66%
México		0,34%	0,30%	0,25%	0,24%	0,22%
Brasil						
Perú						
Egipto						
Israel		0,55%	0,50%	0,51%	0,50%	0,49%
Arabia Saudí						
Japón		0,50%	0,47%	0,47%	0,47%	0,47%
China		0,44%	0,42%	0,42%	0,43%	0,46%
India						
Maximo:		0,88%	MAX ((Media+Factor max*Desv Est.):		0,76%	10
Mínimo:		0,22%	MIN ((Media-Factor min *Desv);0):		0,27%	1
Media:		0,51%	Percentil 90%:	0,76%	0,50%	9,000
Media+Factor max*Desv Estándar:		0,76%	Percentil 10%:	0,32%	Unidad:	1817,425
Media-Factor min*Desv Estándar:		0,27%		Desv. Est.:	0,17%	

Table 119: Indicator WATER I.8 Values: % of GDP of Public Funding for Research and Development (R&D) (OECD R&D)

AGUA I.8	% del PIB de Financiación pública destinada a I+D (OCDE R&D)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		5,3	4,9	4,7	4,7	4,7	INSUFICIENTE	FX
Alemania		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Francia		10,0	9,3	9,1	8,7	8,7	MUY BIEN	B
Reino Unido		4,4	4,0	4,0	4,2	4,5	INSUFICIENTE	FX
Italia		5,4	4,9	4,2	4,7	4,7	INSUFICIENTE	FX
Turquía		2,4	2,2	2,0	2,2	1,8	MUY INSUFICIENTE	F
EEUU		8,7	8,2	8,0	8,2	8,2	MUY BIEN	B
México		2,4	1,6	1,0	1,0	1,0	MUY INSUFICIENTE	F
Brasil								
Perú								
Egipto								
Israel		6,2	5,3	5,4	5,3	5,1	SUFICIENTE	E
Arabia Saudí								
Japón		5,3	4,7	4,7	4,7	4,7	INSUFICIENTE	FX
China		4,2	3,8	3,8	4,0	4,5	INSUFICIENTE	FX
India								

Table 120: Indicator WATER I.8 Rating: % of GDP of Public Funding for Research and Development (R&D) (OECD R&D)



4.8.1.9 Indicator WATER I.9: Digitization. Participation in new technologies. GCI Score (WEF)

AGUA I.9	Digitalización. Participación en la nuevas tecnologías. Puntuación GCI (WEF)					
	2010	2015	2016	2017	2018	2019
España						98,30%
Alemania						92,10%
Francia						96,60%
Reino Unido						98,30%
Italia						95,50%
Turquía						86,00%
EEUU						98,30%
México						94,40%
Brasil						97,20%
Perú						86,50%
Egipto						53,90%
Israel						83,10%
Arabia Saudí						71,40%
Japón						98,30%
China						90,50%
India						95,50%
Maximo:		98,30%	MAX		100,00%	10
Mínimo:		53,90%	MIN ((Media-(F min *Desv));>0):		71,66%	0
Media:		89,74%	Percentil 90%:	98,30%	28,34%	10,000
Media+Factor max*Desv Estándar:		107,82%	Percentil 10%:	77,25%	Unidad:	35,289
Media-Factor min*Desv Estándar:		71,66%		Desv. Est.:	12,05%	

Table 121: Indicator WATER I.9 Values: Digitization. Participation in new technologies. GCI Score (WEF)

AGUA I.9	Digitalización. Participación en la nuevas tecnologías. Puntuación GCI (WEF)					
	2010	2015	2016	2017	2018	Calificación 2019
España						9,4 EXCELENTE A
Alemania						7,2 BIEN C
Francia						8,8 MUY BIEN B
Reino Unido						9,4 EXCELENTE A
Italia						8,4 MUY BIEN B
Turquía						5,1 SUFICIENTE E
EEUU						9,4 EXCELENTE A
México						8,0 MUY BIEN B
Brasil						9,0 EXCELENTE A
Perú						5,2 SUFICIENTE E
Egipto						MUY INSUFICIENTE F
Israel						4,0 INSUFICIENTE FX
Arabia Saudí						MUY INSUFICIENTE F
Japón						9,4 EXCELENTE A
China						6,6 SUFICIENTE ALTO D
India						8,4 MUY BIEN B

Table 122: Indicator WATER I.9 Rating: Digitization. Participation in new technologies. GCI Score (WEF)



4.8.1.10 Indicator WATER I.10: Digitization. Information and Communication Technology Infrastructure Index. (ND Index)

AGUA I.10	Digitalización. Índice de las Infraestructuras de tecnologías de información y comunicación. (ND Index)					
	2010	2015	2016	2017	2018	2019
España		0,622	0,632	0,648	0,656	0,671
Alemania		0,698	0,694	0,699	0,706	0,710
Francia		0,698	0,706	0,713	0,719	0,725
Reino Unido		0,702	0,712	0,701	0,703	0,710
Italia		0,542	0,554	0,566	0,598	0,603
Turquía		0,454	0,469	0,491	0,514	0,524
EEUU		0,620	0,650	0,654	0,657	0,661
México		0,466	0,475	0,488	0,498	0,512
Brasil		0,476	0,483	0,502	0,512	0,521
Perú		0,392	0,405	0,420	0,432	0,446
Egipto		0,371	0,381	0,394	0,406	0,436
Israel		0,613	0,619	0,624	0,631	0,637
Arabía Saudí		0,523	0,537	0,588	0,589	0,593
Japón		0,670	0,679	0,678	0,680	0,687
China		0,479	0,497	0,519	0,535	0,558
India		0,295	0,300	0,303	0,308	0,331
Maximo:		0,73	MAX		1	10
Mínimo:		0,295	MIN ((Media-(F min *Desv));>0):		0,38	0
Media:		0,561	Percentil 90%:	0,704	0,361	10,000
Media+Factor max*Desv Estándar:		0,741	Percentil 10%:	0,394	Unidad:	27,690
Media-Factor min*Desv Estándar:		0,380		Desv. Est.:	0,120	

Table 123: Indicator WATER I.10 Values: Digitization. Information and Communication Technology Infrastructure Index. (ND Index)

AGUA I.10	Digitalización. Índice de las Infraestructuras de tecnologías de información y comunicación. (ND Index)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		6,7	7,0	7,4	7,6	8,1	MUY BIEN	B
Alemania		8,8	8,7	8,8	9,0	9,1	EXCELENTE	A
Francia		8,8	9,0	9,2	9,4	9,5	EXCELENTE	A
Reino Unido		8,9	9,2	8,9	8,9	9,1	EXCELENTE	A
Italia		4,5	4,8	5,2	6,0	6,2	SUFICIENTE ALTO	D
Turquía		2,0	2,5	3,1	3,7	4,0	INSUFICIENTE	FX
EEUU		6,6	7,5	7,6	7,7	7,8	BIEN	C
México		2,4	2,6	3,0	3,2	3,6	INSUFICIENTE	FX
Brasil		2,6	2,9	3,4	3,7	3,9	INSUFICIENTE	FX
Perú		0,3	0,7	1,1	1,4	1,8	MUY INSUFICIENTE	F
Egipto			0,0	0,4	0,7	1,5	MUY INSUFICIENTE	F
Israel		6,4	6,6	6,7	6,9	7,1	BIEN	C
Arabía Saudí		3,9	4,3	5,7	5,8	5,9	SUFICIENTE	E
Japón		8,0	8,3	8,2	8,3	8,5	MUY BIEN	B
China		2,7	3,2	3,8	4,3	4,9	INSUFICIENTE	FX
India							MUY INSUFICIENTE	F

Table 124: WATER I.11 Rating: Digitization. Information and Communication Technology Infrastructure Index. (ND Index)



4.8.1.11 Indicador WATER I.11: Digitization. % of people using the internet

AGUA I.11	Digitalización. % de personas que usan internet					
	2010	2015	2016	2017	2018	2019
España		78,7%	81,7%	84,6%	86,1%	90,7%
Alemania		87,6%	86,0%	84,4%	87,0%	88,1%
Francia		78,0%	79,3%	80,5%	82,0%	83,3%
Reino Unido		92,0%	91,2%	90,4%	90,7%	92,5%
Italia		58,1%	60,6%	63,1%	74,4%	78,0%
Turquía		53,7%	59,2%	64,7%	71,0%	74,0%
EEUU		74,6%	81,0%	87,3%	88,5%	90,0%
México		57,4%	60,7%	63,9%	65,8%	70,1%
Brasil		58,3%	62,9%	67,5%	70,4%	73,9%
Perú		40,9%	45,7%	50,5%	55,1%	60,0%
Egipto		37,8%	41,4%	45,0%	46,9%	57,3%
Israel		77,4%	79,5%	81,6%	83,7%	86,8%
Arabia Saudí		51,9%	54,1%	56,2%		
Japón		91,1%	91,4%	91,7%	91,3%	92,7%
China		50,3%	52,3%	54,3%		
India		17,0%	18,0%	19,0%	20,1%	21,0%
Maximo:		92,70%		MAX	100,00%	10
Mínimo:		17,00%		MIN ((Media-Factor min *Desv);0):	38,09%	1
Media:		68,50%		Percentil 90%:	90,90%	61,91%
Media+Factor max*Desv Estándar:		98,90%		Percentil 10%:	43,20%	Unidad:
Media-Factor min*Desv Estándar:		38,09%		Desv. Est.:	20,27%	

Table 125: Indicador WATER I.11 Values: Digitization. % of people using the internet

AGUA I.11	Digitalización. % de personas que usan internet						Calificación 2019	
	2010	2015	2016	2017	2018			
España		6,9	7,3	7,8	8,0	8,6	MUY BIEN	B
Alemania		8,2	8,0	7,7	8,1	8,3	MUY BIEN	B
Francia		6,8	7,0	7,2	7,4	7,6	BIEN	C
Reino Unido		8,8	8,7	8,6	8,6	8,9	MUY BIEN	B
Italia		3,9	4,3	4,6	6,3	6,8	SUFICIENTE ALTO	D
Turquía		3,3	4,1	4,9	5,8	6,2	SUFICIENTE ALTO	D
EEUU		6,3	7,2	8,2	8,3	8,5	MUY BIEN	B
México		3,8	4,3	4,8	5,0	5,7	SUFICIENTE	E
Brasil		3,9	4,6	5,3	5,7	6,2	SUFICIENTE ALTO	D
Perú		1,4	2,1	2,8	3,5	4,2	INSUFICIENTE	FX
Egipto		1,0	1,5	2,0	2,3	3,8	INSUFICIENTE	FX
Israel		6,7	7,0	7,3	7,6	8,1	MUY BIEN	B
Arabia Saudí		3,0	3,3	3,6				
Japón		8,7	8,7	8,8	8,7	8,9	MUY BIEN	B
China		2,8	3,1	3,4				
India		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F

Table 126: Indicador WATER I.11 Rating: Digitization. % of people using the internet



4.8.1.12 Indicator WATER I.12: Engineering. Regulatory transparency. Services Trade Restrictiveness Index (OECD)

AGUA I.12	Ingeniería. Transparencia regulatoria. Índice de restricción del comercio de servicios (OCDE)					
	2010	2015	2016	2017	2018	2019
España		0,028	0,028	0,028	0,028	0,028
Alemania		0,014	0,014	0,014	0,014	0,028
Francia		0,028	0,028	0,028	0,014	0,014
Reino Unido		0,028	0,028	0,028	0,028	0,028
Italia		0,028	0,028	0,028	0,028	0,028
Turquía		0,028	0,028	0,028	0,028	0,042
EEUU		0,014	0,014	0,014	0,014	0,014
México		0,028	0,028	0,042	0,042	0,042
Brasil		0,000	0,000	0,014		
Perú		0,014	0,014	0,014	0,014	0,042
Egipto						
Israel		0,042	0,042	0,042	0,042	0,042
Arabía Saudí						
Japón		0,000	0,000	0,000	0,000	0,000
China		0,000	0,000	0,000	0,000	0,000
India		0,042	0,042	0,042	0,042	0,042
Maximo:		0,04	MAX ((Media+Factor max*Desv Est.):		0,04	1
Mínimo:		0,000	MIN ((Media-Factor min *Desv);0):		0,0006059	10
Media:		0,022	Percentil 90%:	0,042	0,044	-9,000
Media+Factor max*Desv Estándar:		0,044	Percentil 10%:	0,000	Unidad:	-205,660
Media-Factor min*Desv Estándar:		0,001		Desv. Est.:	0,015	

Table 127: Indicator WATER I.12 Values: Engineering. Regulatory transparency. Services Trade Restrictiveness Index (OECD)

AGUA I.12	Ingeniería. Transparencia regulatoria. Índice de restricción del comercio de servicios (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		4,4	4,4	4,4	4,4	4,4	INSUFICIENTE	FX
Alemania		7,2	7,2	7,2	7,2	4,4	INSUFICIENTE	FX
Francia		4,4	4,4	4,4	7,2	7,2	BIEN	C
Reino Unido		4,4	4,4	4,4	4,4	4,4	INSUFICIENTE	FX
Italia		4,4	4,4	4,4	1,0	4,4	INSUFICIENTE	FX
Turquía		4,4	4,4	4,4	4,4	1,5	MUY INSUFICIENTE	F
EEUU		7,2	7,2	7,2	7,2	7,2	BIEN	C
México		4,4	4,4	1,5	1,5	1,5	MUY INSUFICIENTE	F
Brasil		10,0	10,0	7,2				
Perú		7,2	7,2	7,2	7,2	1,5	MUY INSUFICIENTE	F
Egipto								
Israel		1,5	1,5	1,5	1,0	1,5	MUY INSUFICIENTE	F
Arabía Saudí								
Japón		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India		1,5	1,5	1,5	1,5	1,5	MUY INSUFICIENTE	F

Table 128: Indicator WATER I.12 Rating: Engineering. Regulatory transparency. Services Trade Restrictiveness Index (OECD)



4.8.1.13 *Indicator WATER I.13: Engineering. Barriers to competition. Services Trade Restrictiveness Index (OECD)*

AGUA I.13	Ingeniería. Barreras a la competencia. Índice de restricción del comercio de servicios (OCDE)					
	2010	2015	2016	2017	2018	2019
España		0,009	0,009	0,009	0,009	0,009
Alemania		0,019	0,019	0,019	0,019	0,019
Francia		0,009	0,009	0,009	0,009	0,009
Reino Unido						
Italia		0,009	0,009	0,009	0,009	0,009
Turquía		0,019	0,019	0,019	0,028	0,028
EEUU		0,000	0,000	0,000	0,000	0,000
México		0,000	0,000	0,000	0,000	0,000
Brasil		0,009	0,009	0,009	0,009	0,009
Perú		0,009	0,009	0,009	0,009	0,009
Egipto						
Israel		0,009	0,009	0,009	0,009	0,009
Arabía Saudí						
Japón		0,000	0,000	0,000	0,000	0,000
China		0,019	0,000	0,000	0,000	0,000
India		0,000	0,000	0,000	0,000	0,000
Maximo:		0,03	MAX ((Media+Factor max*Desv Est.):		0,02	1,00
Mínimo:		0,000	MIN ((Media-Factor min *Desv);0):		0	10
Media:		0,008	Percentil 90%:	0,019	0,019	-9,000
Media+Factor max*Desv Estándar:		0,019	Percentil 10%:	0,000	Unidad:	-482,416
Media-Factor min*Desv Estándar:		-0,003		Desv. Est.:	0,007	

Table 129: Indicator WATER I.13 Values: Engineering. Barriers to competition. Services Trade Restrictiveness Index (OECD)

AGUA I.13	Ingeniería. Barreras a la competencia. Índice de restricción del comercio de servicios (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		5,7	5,7	5,7	5,7	5,7	SUFICIENTE	E
Alemania		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Francia		5,7	5,7	5,7	5,7	5,7	SUFICIENTE	E
Reino Unido								
Italia		5,7	5,7	5,7	5,7	5,7	SUFICIENTE	E
Turquía		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
EEUU		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Brasil		5,7	5,7	5,7	5,7	5,7	SUFICIENTE	E
Perú		5,7	5,7	5,7	5,7	5,7	SUFICIENTE	E
Egipto								
Israel		5,7	5,7	5,7	5,7	5,7	SUFICIENTE	E
Arabía Saudí								
Japón		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China		1,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A

Table 130: WATER I.13 Rating: Engineering. Barriers to competition. Services Trade Restrictiveness Index (OECD)



4.8.1.14 Indicator WATER I.14: Engineering. Movement restrictions. Services Trade Restrictiveness Index (OECD)

AGUA I.14	Ingeniería. Restricciones al movimiento. Índice de restricción del comercio de servicios (OCDE)					
	2010	2015	2016	2017	2018	2019
España		0,048	0,048	0,048	0,048	0,048
Alemania		0,097	0,097	0,097	0,097	0,097
Francia		0,065	0,081	0,081	0,081	0,081
Reino Unido		0,097	0,097	0,113	0,113	0,113
Italia		0,323	0,323	0,323	0,323	0,323
Turquía		0,097	0,097	0,097	0,097	0,097
EEUU		0,129	0,129	0,129	0,129	0,129
México		0,129	0,129	0,129	0,129	0,129
Brasil		0,113	0,113	0,113	0,113	0,113
Perú		0,097	0,097	0,097	0,097	0,097
Egipto						
Israel		0,162	0,162	0,129	0,129	0,129
Arabía Saudí						
Japón		0,048	0,048	0,048	0,048	0,048
China		0,065	0,065	0,065	0,065	0,048
India		0,097	0,097	0,097	0,097	0,097
Maximo:		0,32	MAX ((Media+Factor max*Desv Est.):		0,21	1,00
Mínimo:		0,048	MIN ((Media-Factor min *Desv);0):		0,013582174	10
Media:		0,112	Percentil 90%:	0,132	0,197	-9,000
Media+Factor max*Desv Estándar:		0,210	Percentil 10%:	0,048	Unidad:	-45,783
Media-Factor min*Desv Estándar:		0,014		Desv. Est.:	0,066	
			Percent. 90<Media+Factor*Desv. Est.		Percent. 10>Media-Factor*Desv. Est.	

Table 131: Indicator WATER I.14 Values: Engineering. Movement restrictions. Services Trade Restrictiveness Index (OECD)

AGUA I.14	Ingeniería. Restricciones al movimiento. Índice de restricción del comercio de servicios (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		8,4	8,4	8,4	8,4	8,4	MUY BIEN	B
Alemania		6,2	6,2	6,2	6,2	6,2	SUFICIENTE ALTO	D
Francia		7,6	6,9	6,9	6,9	6,9	SUFICIENTE ALTO	D
Reino Unido		6,2	6,2	5,4	5,4	5,4	SUFICIENTE	E
Italia		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Turquía		6,2	6,2	6,2	6,2	6,2	SUFICIENTE ALTO	D
EEUU		4,7	4,7	4,7	4,7	4,7	INSUFICIENTE	FX
México		4,7	4,7	4,7	4,7	4,7	INSUFICIENTE	FX
Brasil		5,4	5,4	5,4	5,4	5,4	SUFICIENTE	E
Perú		6,2	6,2	6,2	6,2	6,2	SUFICIENTE ALTO	D
Egipto								
Israel		3,2	3,2	4,7	4,7	4,7	INSUFICIENTE	FX
Arabía Saudí								
Japón		8,4	8,4	8,4	8,4	8,4	MUY BIEN	B
China		7,6	7,6	7,6	7,6	8,4	MUY BIEN	B
India		6,2	6,2	6,2	6,2	6,2	SUFICIENTE ALTO	D

Table 132: Indicator WATER I.14 Rating: Engineering. Movement restrictions. Services Trade Restrictiveness Index (OECD)



4.8.1.15 *Indicator WATER I.15: Engineering. Restrictions on entry of foreign engineers. Services Trade Restrictiveness Index (OECD)*

AGUA I.15	Ingeniería. Restricciones a la entrada de ingenieros del extranjero. Índice de restricción del comercio de servicios (OCDE)					
	2010	2015	2016	2017	2018	2019
España		0,047	0,047	0,047	0,047	0,047
Alemania		0,047	0,047	0,047	0,047	0,047
Francia		0,024	0,024	0,024	0,024	0,024
Reino Unido		0,024	0,024	0,024	0,024	0,024
Italia		0,071	0,071	0,071	0,071	0,071
Turquía		0,036	0,036	0,036	0,047	0,047
EEUU		0,024	0,024	0,024	0,024	0,024
México		0,071	0,071	0,071	0,071	0,071
Brasil		0,095	0,107	0,107	0,118	0,118
Perú		0,071	0,071	0,071	0,071	0,071
Egipto						
Israel		0,047	0,047	0,047	0,047	0,047
Arabia Saudí						
Japón		0,012	0,012	0,024	0,024	0,024
China		0,142	0,130	0,130	0,118	0,118
India		0,083	0,083	0,083	0,083	0,083
Maximo:		0,14	MAX ((Media+Factor max*Desv Est.):		0,11	1,00
Mínimo:		0,012	MIN ((Media-Factor min *Desv.);0):		0,007805202	10
Media:		0,059	Percentil 90%:	0,116	0,102	-9,000
Media+Factor max*Desv Estándar:		0,110	Percentil 10%:	0,024	Unidad:	-88,448
Media-Factor min*Desv Estándar:		0,008		Desv. Est.:	0,034	

Table 133: Indicator WATER I.15 Values: Engineering. Restrictions on entry of foreign engineers. Services Trade Restrictiveness Index (OECD)

AGUA I.15	Ingeniería. Restricciones a la entrada de ingenieros del extranjero. Índice de restricción del comercio de servicios (OCDE)						Calificación 2019	
	2010	2015	2016	2017	2018			
España		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Alemania		6,5	6,5	6,5	6,5	6,5	SUFICIENTE ALTO	D
Francia		8,6	8,6	8,6	8,6	8,6	MUY BIEN	B
Reino Unido		8,6	8,6	8,6	8,6	8,6	MUY BIEN	B
Italia		4,4	4,4	4,4	4,4	4,4	INSUFICIENTE	FX
Turquía		7,5	7,5	7,5	1,0	1,0	MUY INSUFICIENTE	F
EEUU		8,6	8,6	8,6	8,6	8,6	MUY BIEN	B
México		4,4	4,4	4,4	4,4	4,4	INSUFICIENTE	FX
Brasil		2,3	1,2	1,2	1,0	1,0	MUY INSUFICIENTE	F
Perú		4,4	4,4	4,4	4,4	4,4	INSUFICIENTE	FX
Egipto								
Israel		6,5	6,5	6,5	6,5	6,5	SUFICIENTE ALTO	D
Arabia Saudí								
Japón		9,6	9,6	8,6	8,6	8,6	MUY BIEN	B
China		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
India		3,3	3,3	3,3	3,3	3,3	INSUFICIENTE	FX

Table 134: Indicator WATER I.15 Rating: Engineering. Restrictions on entry of foreign engineers. Services Trade Restrictiveness Index (OECD)



4.8.1.16 Indicator WATER I.16: Innovation index. ND Gain Index

AGUA I.16	Índice de innovación. ND Gain Index					
	2010	2015	2016	2017	2018	2019
España		0,282	0,276	0,217	0,152	0,128
Alemania		1,000	1,000	1,000	1,000	1,000
Francia		1,000	0,995	1,000	0,996	0,980
Reino Unido		1,000	0,988	0,941	0,905	0,843
Italia		0,672	0,682	0,667	0,690	0,722
Turquía		0,318	0,365	0,471	0,406	0,441
EEUU		1,000	1,000	1,000	1,000	1,000
México		0,052	0,050	0,050	0,058	0,048
Brasil		0,106	0,118	0,123	0,111	0,121
Perú		0,010	0,011	0,015	0,013	0,020
Egipto		0,036	0,045	0,050	0,047	0,048
Israel		0,717	0,711	0,770	0,792	0,706
Arabia Saudí		0,105	0,154	0,128	0,149	0,162
Japón		1,000	1,000	1,000	1,000	1,000
China		1,000	1,000	1,000	1,000	1,000
India		0,045	0,047	0,052	0,056	0,066
Maximo:		1,00	MAX:		1	10
Mínimo:		0,010	MIN:		0	1
Media:		0,524	Percentil 90%:	1,000	1,000	9,000
Media+Factor max*Desv Estándar:		1,149	Percentil 10%:	0,046	Unidad:	9,000
Media-Factor min*Desv Estándar:		-0,101		Desv. Est.:	0,417	

Table 135: Indicator WATER I.16 Values: Innovation index. ND Gain Index

AGUA I.16	Índice de innovación. ND Gain Index						Calificación 2019	
	2010	2015	2016	2017	2018			
España		3,5	3,5	3,0	2,4	2,1	MUY INSUFICIENTE	F
Alemania		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Francia		10,0	10,0	10,0	10,0	9,8	EXCELENTE	A
Reino Unido		10,0	9,9	9,5	9,1	8,6	MUY BIEN	B
Italia		7,0	7,1	7,0	7,2	7,5	BIEN	C
Turquía		3,9	4,3	5,2	4,7	5,0	SUFICIENTE	E
EEUU		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México		1,5	1,4	1,4	1,5	1,4	MUY INSUFICIENTE	F
Brasil		2,0	2,1	2,1	2,0	2,1	MUY INSUFICIENTE	F
Perú		1,1	1,1	1,1	1,1	1,2	MUY INSUFICIENTE	F
Egipto		1,3	1,4	1,4	1,4	1,4	MUY INSUFICIENTE	F
Israel		7,4	7,4	7,9	8,1	7,4	BIEN	C
Arabia Saudí		1,9	2,4	2,2	2,3	2,5	MUY INSUFICIENTE	F
Japón		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
India		1,4	1,4	1,5	1,5	1,6	MUY INSUFICIENTE	F

Table 136: Indicator WATER I.16 Rating: Innovation index. ND Gain Index

4.8.2. Engineering and Innovation Indicator

	Índice de Ingeniería e Innovación						Max valor 2019
	2010	2015	2016	2017	2018	2019	
España		65,6	66,8	67,3	66,4	76,7	144
Alemania		104,0	104,0	105,6	106,2	110,4	135
Francia		103,6	99,5	100,3	106,2	111,7	144
Reino Unido		80,2	82,2	82,0	82,5	91,2	135
Italia		61,4	62,3	59,4	60,3	74,1	144
Turquía		41,5	43,6	44,6	42,0	44,3	135
EEUU		117,7	121,2	121,7	123,6	129,1	144
México		45,4	43,9	40,1	40,9	47,0	135
Brasil		36,9	37,1	35,8	28,7	38,6	90
Perú		28,6	30,1	30,8	31,9	32,9	90
Egipto		6,5	4,9	7,3	6,5	10,1	63
Israel		98,8	100,7	102,6	97,7	107,8	135
Arabía Saudí		16,7	15,8	19,5	17,4	17,6	45
Japón		130,4	127,7	127,1	130,7	132,0	144
China		59,3	69,4	71,0	68,7	78,9	135
India		26,7	26,6	26,7	26,7	34,1	90
Maximo:		131,991		Máxima puntuación:	144	10	
Mínimo:		4,929		Mínima puntuación:	0	0	
Media:		65,920		Dif:	144,000	10,000	
				Unidad:		0,069	

Table 137: Engineering and Innovation Indicator Values

Subindicadores de Ingeniería e Innovación		Pesos	Punt. Max.	Total Max puntuación
AGUA I.1	Número de patentes relacionadas con el tratamiento de aguas y depuración/Millón de población (OCDE)	1	10	10
AGUA I.2	Número de patentes relacionadas con la reducción de la contaminación de las aguas/Millón de población (OCDE)	1	10	10
AGUA I.3	Número de patentes. Desalación de agua de mar/Millón de población (OCDE)	1	10	10
AGUA I.4	% del PIB destinado al Gasto interior bruto en I+D (OCDE R&D)	1	10	10
AGUA I.5	Gasto interior bruto en I+D (\$)/Población (OCDE R&D)	1	10	10
AGUA I.6	% del PIB destinado a gasto en investigación básica (OCDE R&D)	1	10	10
AGUA I.7	% del PIB de Financiación privada destinada a I+D (OCDE R&D)	1	10	10
AGUA I.8	% del PIB de Financiación pública destinada a I+D (OCDE R&D)	1	10	10
AGUA I.9	Digitalización. Participación en la nuevas tecnologías. Puntuación GCI (WEF)	1	10	10
AGUA I.10	Digitalización. Índice de las Infraestructuras de tecnologías de información y comunicación. (ND Index)	1	10	10
AGUA I.11	Digitalización. % de personas que usan internet	1	10	10
AGUA I.12	Ingeniería. Transparencia regulatoria. Índice de restricción del comercio de servicios (OCDE)	1	10	10
AGUA I.13	Ingeniería. Barreras a la competencia. Índice de restricción del comercio de servicios (OCDE)	1	10	10
AGUA I.14	Ingeniería. Restricciones al movimiento. Índice de restricción del comercio de servicios (OCDE)	1	10	10
AGUA I.15	Ingeniería. Restricciones a la entrada de ingenieros del extranjero. Índice de restricción del comercio de servicios (OCDE)	1	10	10
AGUA I.16	Índice de innovación. ND Gain Index	1	10	10
		16		160
		90% Valorado de la Max. Puntuación del Criterio	90,0%	144

Table 138: Engineering and Innovation Indicators Weights

	Evaluación de Ingeniería e Innovación						Subindicadores considerados		
	2010	2015	2016	2017	2018	Calificación 2019			
España		4,9	4,9	5,0	4,9	5,3	SUFICIENTE	E	16
Alemania		8,3	8,3	8,4	8,4	8,2	MUY BIEN	B	15
Francia		7,7	7,4	7,4	7,9	7,8	BIEN	C	16
Reino Unido		6,4	6,5	6,5	6,5	6,8	SUFICIENTE ALTO	D	15
Italia		4,5	4,6	4,4	4,5	5,1	SUFICIENTE	E	16
Turquía		3,3	3,5	3,8	3,3	3,3	INSUFICIENTE	FX	15
EEUU		8,7	9,0	9,0	9,2	9,0	EXCELENTE	A	16
México		3,4	3,3	3,0	3,0	3,5	INSUFICIENTE	FX	15
Brasil		4,1	4,1	4,0	3,5	4,3	INSUFICIENTE	FX	10
Perú		3,5	3,7	3,8	3,9	3,7	INSUFICIENTE	FX	10
Egipto		1,2	1,1	1,3	1,4	1,6	MUY INSUFICIENTE	F	7
Israel		7,8	8,0	8,1	7,8	8,0	MUY BIEN	B	15
Arabía Saudí		3,7	3,5	4,3	4,8	3,9	INSUFICIENTE	FX	5
Japón		9,7	9,5	9,4	9,7	9,2	EXCELENTE	A	16
China		4,4	5,1	5,3	5,4	5,8	SUFICIENTE	E	15
India		3,0	3,0	3,0	3,0	3,8	INSUFICIENTE	FX	10

Table 139: Engineering and Innovation Criterion Rating



The OECD indicators related to research and development (R&D) showcase the global strategic position of countries in various sectors of the economy with respect to research. The indicator "% of GDP spent on gross domestic expenditure on R&D" for the analyzed countries spans a wide spectrum, ranging from a maximum of 3.21% (Japan) to a minimum of 0.28% (Mexico). Spain falls in the lower range (1.25%), surpassed by all EU countries. It's logical that the world's most technologically advanced countries invest more in R&D, with Japan (3.21%), the US (3.18%), Germany (3.17%) leading the way. France (2.19%) and the UK (1.71%) fall in intermediate positions. These percentages remain relatively constant over the five analyzed years (2015 to 2019), highlighting the increasing technological gap.

The indicator "% of GDP from private funding spent on R&D" presents an interesting insight: the US, Germany, Japan, and Israel exceed 2% of GDP from private funding. Private investment undoubtedly plays a crucial role in boosting R&D funding, as shown by the indicator "% of GDP from public funding spent on R&D": no country surpasses 1%, and the differences in investment percentages narrow (Spain's results are comparable to the UK, Italy, and Japan).

Looking at gross R&D investment per capita, the results show important differences: Spain (\$522 per capita), the US (\$2,066 per capita), and Germany (\$1,763 per capita).

The three selected indicators for assessing digitization yield very similar results across the analyzed countries. Nonetheless, Spain stands among the top-performing countries: 90.7% of people use the internet (surpassed only by the UK, Japan, and South Korea); the World Economic Forum's score for the "participation in new technologies" indicator is 98.3% (second only to South Korea); however, the University of Notre Dame's "ICT infrastructure index" grants Spain a score of 0.671, surpassed by Germany (0.710), France (0.725), the UK (0.710), and South Korea (0.732).

As previously mentioned, since specific economic investment data for engineering in the analyzed sector and information about the number of engineers and their training related to engineering were unavailable, four OECD indicators were utilized to analyze the state of engineering: regulatory transparency, barriers to competition, restrictions on engineers' movement, and restrictions on entry of foreign engineers. All of these are related to the trade in services restriction index periodically compiled by the OECD. In these indicators, Spain is positioned in an intermediate position among the analyzed countries: good in restrictions on engineers' movement, sufficient in barriers to competition, and insufficient in restrictions on entry of foreign engineers and regulatory transparency.

The global innovation index from the University of Notre Dame was also analyzed. The best results were achieved by Germany, the US, China, and Japan (with the highest score of "1"). Following them are France (0.98), the UK (0.84), and Italy (0.722). Spain falls among the lower-performing countries analyzed (0.128).

The overall evaluation of the Engineering and Innovation criterion awards the highest ratings to the US (9.0), Japan (9.2), followed by Germany (8.2), and Israel (8.0). Spain receives a rating of 5.3, placing it below China (5.8).



4.9. Evaluation of the Complete Water Cycle through objective indicators

The assessment based on the established criteria is as follows:

AGUA I C	Capacidad					Calificación 2019		
	2010	2015	2016	2017	2018			
España		7,5	7,6	7,6	7,6	7,6	BIEN	C
Alemania		6,9	6,9	6,9	6,9	6,9	SUFICIENTE ALTO	D
Francia		7,6	7,6	7,6	7,6	7,6	BIEN	C
Reino Unido		7,1	7,1	7,1	7,1	7,1	BIEN	C
Italia		8,5	8,5	8,5	8,4	8,5	MUY BIEN	B
Turquía		7,0	6,9	6,9	6,9	6,8	SUFICIENTE ALTO	D
EEUU		8,1	8,1	8,1	8,1	8,1	MUY BIEN	B
México		6,5	6,5	6,5	6,5	6,5	SUFICIENTE ALTO	D
Brasil		7,0	7,0	7,0	7,0	7,0	BIEN	C
Perú		5,1	5,1	5,1	5,1	5,1	SUFICIENTE	E
Egipto		6,2	6,2	6,2	6,2	6,2	SUFICIENTE ALTO	D
Israel		6,5	6,4	6,6	6,7	6,7	SUFICIENTE ALTO	D
Arabia Saudí		4,8	4,8	4,8	4,8	4,8	INSUFICIENTE	FX
Japón		8,5	8,5	8,5	8,5	8,5	MUY BIEN	B
China		4,4	4,4	4,4	4,4	4,4	INSUFICIENTE	FX
India		5,1	5,1	5,1	5,1	5,1	SUFICIENTE	E

Table 140: Capacity Criterion Rating

AGUA I P	Prestaciones					Calificación 2019		
	2010	2015	2016	2017	2018			
España		9,1	9,1	9,1	9,1	9,1	EXCELENTE	A
Alemania		8,8	8,8	8,8	8,8	8,8	MUY BIEN	B
Francia		7,8	7,8	7,8	7,8	7,8	BIEN	C
Reino Unido		9,2	9,2	9,2	9,2	9,2	EXCELENTE	A
Italia		6,9	6,9	7,0	7,0	7,0	BIEN	C
Turquía		5,7	6,2	6,2	6,4	6,1	SUFICIENTE ALTO	D
EEUU		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
México		2,6	3,3	3,3	3,3	5,0	SUFICIENTE	E
Brasil		3,6	4,3	4,4	4,2	4,3	INSUFICIENTE	FX
Perú		3,1	3,7	3,7	3,7	3,7	INSUFICIENTE	FX
Egipto		7,1	7,2	6,9	7,0	7,4	BIEN	C
Israel		8,0	8,1	8,2	8,2	8,3	MUY BIEN	B
Arabia Saudí		7,4	7,7	7,8	7,8	7,9	BIEN	C
Japón		6,6	6,8	6,8	6,9	7,1	BIEN	C
China		5,8	6,9	6,9	6,9	6,9	SUFICIENTE ALTO	D
India		5,1	5,1	5,1	5,1	5,2	SUFICIENTE	E

Table 141: Performance Criterion Rating



AGUA I F	Financiación							
	2010	2015	2016	2017	2018	Calificación 2019		
España		5,9	5,9	5,9	5,9	6,0	SUFICIENTE ALTO	D
Alemania		6,5	6,4	6,3	6,2	6,3	SUFICIENTE ALTO	D
Francia		7,2	7,2	7,2	7,1	7,2	BIEN	C
Reino Unido		6,7	6,7	6,9	6,8	6,8	SUFICIENTE ALTO	D
Italia		5,9	5,9	5,9	5,9	6,0	SUFICIENTE ALTO	D
Turquía		4,9	5,0	5,1	5,3	5,4	SUFICIENTE	E
EEUU		6,6	6,6	6,6	6,6	6,7	SUFICIENTE ALTO	D
México		4,9	5,1	5,0	4,9	4,8	INSUFICIENTE	FX
Brasil		5,8	6,0	5,9	5,9	6,0	SUFICIENTE ALTO	D
Perú		1,1	1,1	1,1	1,1	1,1	MUY INSUFICIENTE	F
Egipto		6,1	5,7	5,9	5,4	5,2	SUFICIENTE	E
Israel		9,8	10,0	10,0	10,0	10,0	EXCELENTE	A
Arabia Saudí		5,9	6,0	5,9	5,8	6,1	SUFICIENTE ALTO	D
Japón		7,6	7,6	7,6	7,5	7,5	BIEN	C
China		4,8	5,2	5,2	5,1	5,1	SUFICIENTE	E
India		4,4	4,4	4,3	4,4	4,5	INSUFICIENTE	FX

Table 142: Financing Criterion Rating

AGUA I A	Adaptación al futuro y desarrollo sostenible							
	2010	2015	2016	2017	2018	Calificación 2019		
España		7,1	7,4	7,1	7,5	6,6	SUFICIENTE ALTO	D
Alemania		4,4	4,4	4,3	4,5	6,0	SUFICIENTE ALTO	D
Francia		6,0	5,9	6,0	6,0	6,9	SUFICIENTE ALTO	D
Reino Unido		5,2	5,3	5,3	5,3	5,8	SUFICIENTE	E
Italia		6,3	6,2	6,3	6,2	6,8	SUFICIENTE ALTO	D
Turquía		7,6	7,7	8,2	7,8	7,0	BIEN	C
EEUU		6,8	6,8	6,7	6,7	6,4	SUFICIENTE ALTO	D
México		6,8	7,0	7,7	7,7	7,0	BIEN	C
Brasil		7,8	7,8	7,8	7,8	7,6	BIEN	C
Perú		5,9	5,9	6,8	6,4	5,9	SUFICIENTE	E
Egipto		5,6	3,8	2,8	2,7	2,7	MUY INSUFICIENTE	F
Israel		2,9	2,7	2,5	2,5	3,9	INSUFICIENTE	FX
Arabia Saudí		0,6	0,6	0,6	0,6	0,6	MUY INSUFICIENTE	F
Japón		3,6	3,6	3,7	3,8	5,4	SUFICIENTE	E
China		5,5	5,5	5,5	5,5	5,6	SUFICIENTE	E
India		4,1	4,2	4,1	4,1	4,1	INSUFICIENTE	FX

Table 143: Adaptation to the Future and Sustainability Criterion Rating

AGUA I O	Operación y mantenimiento							
	2010	2015	2016	2017	2018	Calificación 2019		
España		6,5	6,8	7,1	7,9	8,6	MUY BIEN	B
Alemania		5,6	5,3	5,4	5,7	6,1	SUFICIENTE ALTO	D
Francia		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
Reino Unido		4,1	4,3	4,4	6,2	5,9	SUFICIENTE	E
Italia		5,2	5,4	5,5	6,0	6,3	SUFICIENTE ALTO	D
Turquía		1,9	2,0	2,1	2,0	2,7	MUY INSUFICIENTE	F
EEUU		8,4	8,3	8,2	7,9	8,2	MUY BIEN	B
México		2,7	2,9	2,8	2,6	2,7	MUY INSUFICIENTE	F
Brasil		6,2	6,4	5,8	4,8	5,1	SUFICIENTE	E
Perú					10,0	7,2	BIEN	C
Egipto		3,2	3,3	4,8	4,1	3,5	INSUFICIENTE	FX
Israel					10,0	9,7	EXCELENTE	A
Arabia Saudí		5,3	5,8	6,0	5,9	6,5	SUFICIENTE ALTO	D
Japón		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China		2,7	2,9	2,8	2,8	2,9	MUY INSUFICIENTE	F
India		1,8	1,7	1,6	1,8	1,5	MUY INSUFICIENTE	F

Table 144: Operation and Maintenance Criterion Rating



AGUA I S	Seguridad							
	2010	2015	2016	2017	2018	Calificación 2019		
España		9,0	9,0	9,0	8,9	8,9	MUY BIEN	B
Alemania		8,7	8,7	8,7	8,7	8,7	MUY BIEN	B
Francia		8,8	8,8	8,8	8,7	8,7	MUY BIEN	B
Reino Unido		8,4	8,5	8,5	8,4	8,4	MUY BIEN	B
Italia		9,1	9,1	9,2	9,2	9,2	EXCELENTE	A
Turquía		5,6	5,6	5,8	6,0	6,1	SUFICIENTE ALTO	D
EEUU		8,3	8,3	8,4	8,3	8,3	MUY BIEN	B
México		1,3	1,3	1,3	1,3	1,4	MUY INSUFICIENTE	F
Brasil		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Perú		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F
Egipto		1,0	1,0	1,0	1,0	1,1	MUY INSUFICIENTE	F
Israel		8,5	8,6	8,6	8,6	8,7	MUY BIEN	B
Arabía Saudí		7,3	7,4	7,5	7,6	7,7	BIEN	C
Japón		6,0	6,0	6,0	6,0	6,0	SUFICIENTE ALTO	D
China		7,5	7,4	7,6	7,8	7,9	BIEN	C
India		1,0	1,0	1,0	1,0	1,0	MUY INSUFICIENTE	F

Table 145: Safety Criterion Rating

AGUA I R	Resiliencia							
	2010	2015	2016	2017	2018	Calificación 2019		
España		6,8	6,9	6,9	6,9	6,9	SUFICIENTE ALTO	D
Alemania		7,8	7,8	7,8	7,8	7,8	BIEN	C
Francia		9,5	9,6	9,6	9,6	9,6	EXCELENTE	A
Reino Unido		7,7	7,7	7,7	7,7	7,7	BIEN	C
Italia		8,3	8,3	8,3	8,4	8,4	MUY BIEN	B
Turquía		7,4	7,2	7,3	7,2	7,1	BIEN	C
EEUU		9,4	9,4	9,4	9,4	9,4	EXCELENTE	A
México		6,7	6,7	6,7	6,7	6,8	SUFICIENTE ALTO	D
Brasil		8,5	8,5	8,5	8,9	8,9	MUY BIEN	B
Perú		8,6	8,6	8,6	8,9	8,9	MUY BIEN	B
Egipto		3,0	3,0	3,0	2,9	2,9	MUY INSUFICIENTE	F
Israel		3,2	3,2	3,2	3,0	3,0	INSUFICIENTE	FX
Arabía Saudí		3,2	3,2	3,2	3,2	3,2	INSUFICIENTE	FX
Japón		10,0	10,0	10,0	10,0	10,0	EXCELENTE	A
China		6,9	6,9	6,9	6,9	6,9	SUFICIENTE ALTO	D
India		8,1	8,1	8,1	8,1	8,1	MUY BIEN	B

Table 146: Resilience Criterion Rating

AGUA I I	Ingeniería e Innovación							
	2010	2015	2016	2017	2018	Calificación 2019		
España		4,9	4,9	5,0	4,9	5,3	SUFICIENTE	E
Alemania		8,3	8,3	8,4	8,4	8,2	MUY BIEN	B
Francia		7,7	7,4	7,4	7,9	7,8	BIEN	C
Reino Unido		6,4	6,5	6,5	6,5	6,8	SUFICIENTE ALTO	D
Italia		4,5	4,6	4,4	4,5	5,1	SUFICIENTE	E
Turquía		3,3	3,5	3,8	3,3	3,3	INSUFICIENTE	FX
EEUU		8,7	9,0	9,0	9,2	9,0	EXCELENTE	A
México		3,4	3,3	3,0	3,0	3,5	INSUFICIENTE	FX
Brasil		4,1	4,1	4,0	3,5	4,3	INSUFICIENTE	FX
Perú		3,5	3,7	3,8	3,9	3,7	INSUFICIENTE	FX
Egipto		1,2	1,1	1,3	1,4	1,6	MUY INSUFICIENTE	F
Israel		7,8	8,0	8,1	7,8	8,0	MUY BIEN	B
Arabía Saudí		3,7	3,5	4,3	4,8	3,9	INSUFICIENTE	FX
Japón		9,7	9,5	9,4	9,7	9,2	EXCELENTE	A
China		4,4	5,1	5,3	5,4	5,8	SUFICIENTE	E
India		3,0	3,0	3,0	3,0	3,8	INSUFICIENTE	FX

Table 147: Engineering and Innovation Criterion Rating



With the assessments of the different criteria, the overall evaluation of the Complete Water Cycle sector is formed, applying weights to each criterion. The assigned weights are as follows:

Criterios de Ciclo del agua		Pesos	Punt. Max.	Total Max puntuación
AGUA I C	Capacidad	1	10	10
AGUA I P	Prestaciones	1	10	10
AGUA I F	Financiación	3	10	30
AGUA I A	Adaptación al futuro y desarrollo sostenible	3	10	30
AGUA I O	Operación y mantenimiento	2	10	20
AGUA I S	Seguridad	1	10	10
AGUA I R	Resiliencia	3	10	30
AGUA I I	Ingeniería e Innovación	3	10	30
		17		170
		90% Valorado de la Max. Puntuación del Criterio	1	170

Table 148: Weights assigned to the criteria for forming the assessment of the Complete Water Cycle sector

	Evaluación de la Ciclo del agua						Subindicadores considerados		
	2010	2015	2016	2017	2018	Calificación 2019			
España		6,6	6,8	6,7	6,9	6,9	SUFICIENTE ALTO	D	57
Alemania		6,8	6,8	6,8	6,9	7,1	BIEN	C	56
Francia		8,0	7,9	7,9	8,0	8,1	MUY BIEN	B	57
Reino Unido		6,5	6,6	6,6	6,8	6,9	SUFICIENTE ALTO	D	51
Italia		6,5	6,5	6,5	6,6	6,8	SUFICIENTE ALTO	D	55
Turquía		5,4	5,5	5,7	5,5	5,5	SUFICIENTE	E	56
EEUU		8,1	8,1	8,1	8,1	8,1	MUY BIEN	B	53
México		4,8	4,9	4,9	4,9	5,0	SUFICIENTE	E	53
Brasil		6,0	6,1	6,0	5,9	6,0	SUFICIENTE ALTO	D	44
Perú		4,4	4,5	4,7	5,3	4,9	INSUFICIENTE	FX	34
Egipto		4,0	3,6	3,7	3,5	3,5	INSUFICIENTE	FX	37
Israel		6,3	6,3	6,3	6,7	6,9	SUFICIENTE ALTO	D	46
Arabía Saudí		4,1	4,2	4,4	4,4	4,4	INSUFICIENTE	FX	33
Japón		7,9	7,8	7,9	7,9	8,1	MUY BIEN	B	55
China		5,2	5,5	5,5	5,5	5,6	SUFICIENTE	E	48
India		4,3	4,3	4,3	4,3	4,4	INSUFICIENTE	FX	42

Table 149: Assessment of the Complete Water Cycle sector through objective indicators

The assessment of each country in each year in the overall evaluation has been carried out by using the country's maximum assessment and the corresponding year as a reference (without making any adjustments or limiting the maximum and minimum), to avoid distorting the assessment when data for a certain criterion is not available. This aspect is important to consider, as the overall assessment only considers the criteria for which validated data is available.

In countries where data for a specific criterion is missing and thus not evaluated, the overall sector assessment could either increase or decrease, depending on the result that the unassessed criterion or criteria would yield.

The top-performing countries in the global assessment, considering the established indicators, are France, Japan, and the USA (8.1). Spain, Germany, Italy, the United Kingdom, and Israel have received similar scores (ranging between 7.1 and 6.8).

Spain achieves a good score in Capacity (7.6), Performance (9.1), Operation and Maintenance (8.6), and Safety (8.9).



4.10. Sensitivity analysis based on objective indicators

Se ha realizado un análisis de sensibilidad variando los pesos asignados a cada Criterio. En términos generales, cuando se modifican los pesos de los criterios la evaluación de los países oscila ligeramente, sin alterar sustancialmente la valoración. A continuación, se suministran los resultados alcanzados variando los pesos de las Criterios.

4.10.1. Emphasized weights in Capacity, Performance, and Safety (3); moderate weights in Funding and Adaptation to the future and sustainable development; and Operation and Maintenance (2); low weights in Resilience and Innovation (1)

Criterios de Ferrocarriles		Pesos	Total Max puntuación
FFCC I C	Capacidad	3	30
FFCC I P	Prestaciones	3	30
FFCC I F	Financiación	2	20
FFCC I A	Adaptación al futuro y desarrollo sostenible	2	20
FFCC I O	Operación y mantenimiento	2	20
FFCC I S	Seguridad	3	30
FFCC I R	Resiliencia	1	10
FFCC I I	Ingeniería e Innovación	1	10
		17	170
		100 % Valorado de la Max. Puntuación de los Criterios	170

Table 150: Sensitivity analysis. Emphasized weights on the Criteria: Capacity, Performance, and Safety (3)

	Evaluación de la Ciclo del agua						Subindicadores considerados		
	2010	2015	2016	2017	2018	Calificación 2019			
España		7,8	7,9	7,9	8,1	8,1	MUY BIEN	B	55
Alemania		7,5	7,5	7,5	7,5	7,8	BIEN	C	54
Francia		8,1	8,1	8,1	8,1	8,3	MUY BIEN	B	55
Reino Unido		7,0	7,1	7,1	7,3	7,3	BIEN	C	51
Italia		7,6	7,7	7,7	7,7	7,9	BIEN	C	53
Turquía		5,9	6,1	6,1	6,1	6,1	SUFICIENTE ALTO	D	54
EEUU		8,4	8,4	8,4	8,4	8,3	MUY BIEN	B	53
México		4,4	4,5	4,5	4,5	4,9	INSUFICIENTE	FX	53
Brasil		5,0	5,1	5,1	4,9	5,0	SUFICIENTE	E	44
Perú		3,9	4,0	4,2	4,8	4,4	INSUFICIENTE	FX	34
Egipto		4,8	4,6	4,6	4,5	4,5	INSUFICIENTE	FX	37
Israel		7,2	7,3	7,3	7,6	7,7	BIEN	C	44
Arabía Saudí		5,3	5,4	5,5	5,6	5,6	SUFICIENTE	E	33
Japón		7,6	7,6	7,6	7,6	7,8	BIEN	C	54
China		5,5	5,8	5,8	5,8	5,9	SUFICIENTE	E	48
India		4,0	3,9	3,9	3,9	4,0	INSUFICIENTE	FX	42

Table 151: Sensitivity analysis. Emphasized weights on the Criteria: Capacity, Performance, and Safety (3). Assessment of the Complete Water Cycle



4.10.2. Emphasized weights in Capacity, Performance, and Safety (2); moderate weights in the rest of the criteria. (1)

Criterios de Ferrocarriles		Pesos	Total Max puntuación	Total Max puntuación reducida
FFCC IC	Capacidad	2	20	20
FFCC IP	Prestaciones	2	20	20
FFCC IF	Financiación	1	10	10
FFCC IA	Adaptación al futuro y desarrollo sostenible	1	10	10
FFCC IO	Operación y mantenimiento	1	10	10
FFCC IS	Seguridad	2	20	20
FFCC IR	Resiliencia	1	10	10
FFCC II	Ingeniería e Innovación	1	10	10
		11	110	
		100 % Valorado de la Max. Puntuación de los Criterios	110	110

Table 152: Sensitivity analysis. Emphasized weights on the Criteria: Capacity, Performance, and Safety (2); moderate weights on the rest of the Criteria (1)

	Evaluación de la Ciclo del agua						Subindicadores considerados		
	2010	2015	2016	2017	2018	Calificación 2019			
España		7,8	7,9	7,9	8,0	8,0	MUY BIEN	B	55
Alemania		7,7	7,7	7,7	7,7	7,9	BIEN	C	54
Francia		8,2	8,2	8,2	8,2	8,3	MUY BIEN	B	55
Reino Unido		7,1	7,2	7,2	7,3	7,4	BIEN	C	51
Italia		7,7	7,7	7,7	7,8	7,9	BIEN	C	53
Turquía		5,9	6,2	6,1	6,2	6,1	SUFICIENTE ALTO	D	54
EEUU		8,5	8,5	8,5	8,5	8,5	MUY BIEN	B	53
México		4,4	4,5	4,5	4,5	5,0	SUFICIENTE	E	53
Brasil		4,9	5,1	5,0	4,9	5,0	SUFICIENTE	E	44
Perú		4,1	4,2	4,3	4,8	4,5	INSUFICIENTE	FX	34
Egipto		4,6	4,4	4,4	4,4	4,4	INSUFICIENTE	FX	37
Israel		7,1	7,2	7,3	7,4	7,6	BIEN	C	44
Arabia Saudí		5,3	5,4	5,6	5,6	5,6	SUFICIENTE	E	33
Japón		7,8	7,8	7,8	7,8	8,0	MUY BIEN	B	54
China		5,6	5,9	6,0	6,0	6,1	SUFICIENTE ALTO	D	48
India		4,1	4,1	4,1	4,1	4,2	INSUFICIENTE	FX	42

Table 153: Sensitivity analysis. Emphasized weights on the Criteria: Capacity, Performance, and Safety (2); on the rest of the Criteria (1). Assessment of the Complete Water Cycle



4.11. Conclusions from the assessment based on objective indicators

The best globally evaluated countries considering the established indicators are France, Japan, and the USA (8.1). Spain, Germany, Italy, the United Kingdom, and Israel have received a similar rating (between 7.1 and 6.8).

Spain achieves a good score in Capacity (7.6), Performance (9.1), Operation and Maintenance (8.6), and Safety (8.9).

4.11.1. Capacity Criterion

For the evaluation of this Criterion, seven indicators have been used. The first two analyze the percentage of the population with access to basic drinking water and sanitation services. The third indicator relates the extracted water resources for non-domestic use to the irrigated area's surface. The fourth indicates the percentage of irrigated area in relation to the total area and the percentage of irrigated area in relation to the agricultural land area.

Indicator 6.4.2 of the United Nations' 2030 Agenda defines water stress as the ratio between the total freshwater withdrawn (Total Flow Water Withdrawn) and the total renewable freshwater resources (Total Renewable fresh Water Resources), after considering environmental flow requirements (Ambiental Environmental Flow Requirements). The mathematical definition is: $\text{Water stress (\%)} = \text{TFWW} / (\text{TRWR} - \text{EFR}) * 100$ (Variable units: km³/year or 109m³/year). The interpretation of values is as follows: No stress <25%; Low stress: 25%-50%; Medium stress: 50%-75%; High stress: 75%-100%; Critical stress >100%.

From water stress, another indicator is calculated: $(100 - \text{Water Stress Index}) * \text{available water per capita (m}^3\text{)}$. This indicator represents the water needs of countries.

As observed in the indicator "% of the population with access to basic drinking water services," high values are present. Most developed countries show very high percentages (between 99% and 100%), developing countries range between 95% and 97%, and the least developed countries range between 90% and 95%. India has the lowest value (90%), and China has 95%. All European countries (except Turkey), the USA, and Japan have 100%.

The indicator "% of the population with access to basic sanitation services" also presents high values, albeit lower than the first indicator. India has the lowest percentage (68%), China has 75%, and Peru has 78%. Similar to the previous indicator, European countries, the USA, and Japan have 99%.

These two indicators are considered essential for human development, as recognized by all multinational organizations, and they are a development aid priority.

The indicator "Extracted water resources for non-domestic use/irrigated area (m³/ha)" is representative for analyzing available water for irrigation. Naturally, drier countries generally have a lower available volume, but it's also necessary to consider water extraction and the irrigated area's surface. Thus, Germany, the UK, Peru, Egypt, and Japan have high ratios, while Israel, Spain, France, China, and India show low values.



Regarding the percentage of Irrigated Area/Total Area, India stands out (19.1%), followed by Israel (9.8%), Italy (8.7%), and Spain (7.5%). Naturally, countries with higher rainfall require less irrigated land.

The indicator of water stress is significant. Countries without water stress (values below 25%) include Brazil, Peru, the UK, and France. Countries with critical stress (values over 100%) are Saudi Arabia, Egypt, and Israel. The rest of the countries fall in intermediate values.

Spain performs well concerning the indicator "% Irrigated Area/Total Area" (14.5%), surpassed by Egypt, Japan, India, and Italy.

Overall, Japan has the best evaluation in the Capacity Criterion, followed by a very good assessment for Spain, France, Italy, and the USA. Saudi Arabia, China, India, and Peru have the worst ratings.

4.11.2. Performance Criterion

The indicators selected for this criterion analyze performance, network development level, extent of wastewater treatment, and the needs of the water supply and sanitation systems in countries.

In the indicator "Percentage of the population using safely managed drinking water," the same trend observed in the Capacity indicators can be seen: highly developed countries have very good ratios, while less developed countries have considerably lower values. Mexico and Peru are the worst-rated countries, followed by India, China, and Egypt.

The indicator "Percentage of the population using safely managed sanitation services" follows a similar trend as the previous indicator, although with lower values.

The indicator "Efficiency in water use (USD/m³)/(GDP*10,000) (SDG: 6.4.1) UN" refers to the price of 1 m³ of water paid by users. The United Kingdom stands out with the highest price (87 USD/m³). The lowest prices are found in the USA and Peru (8 USD/m³). Among the analyzed European countries, Spain, along with Italy and Turkey, has the lowest prices.

Indicators that analyze wastewater treatment also exhibit the same differences between developed and developing countries. The percentage of collected wastewater in sewer systems is high in all European countries, USA and Israel (range between 97% and 80%). France stands out with only 82% of collected wastewater for treatment.

Wastewater treatment indicators (primary, secondary, and tertiary) provide detailed insight into treatment quality, although only the indicator related to tertiary treatment is evaluated: "% of the population connected to a tertiary wastewater treatment plant (OECD)."

The overall assessment of the Performance criterion is excellent in the USA, the United Kingdom, and Spain, followed by European countries, Israel, and Japan.

4.11.3. Financing Criterion

The financing of infrastructure is an essential criterion for evaluating the quality of infrastructure and encompasses two distinct elements: investment for infrastructure creation and investment for conservation, operation, and maintenance. In countries where the Complete Water Cycle infrastructure is mature, less overall investment is allocated compared to countries where it is being established. Consequently, a significant percentage is directed towards conservation relative to creation. Conversely, in countries where infrastructure is still being established and



under development, the investment in creating infrastructure is crucial compared to investment in conservation. Unfortunately, separating investment for creation from investment for conservation is not straightforward.

One of the most representative indicators is the investment in the Complete Water Cycle relative to the national GDP. The evolution of this indicator over the years provides valuable insights into the country's infrastructure development level and its conservation status. A high percentage of GDP (above 0.7% or 0.8%) indicates that the Complete Water Cycle is in the process of being established. Generally, if this percentage drops below 0.4%, it suggests that no new infrastructure is being created. Moreover, if this percentage falls below 0.2-0.3%, it's an indication that the investment also inadequately covers the needs for conservation, maintenance, and management of the infrastructure.

The "Investment Needs" ratio is defined as the percentage of the population without safe drinking water management multiplied by the percentage of the population without safe sanitation management. This ratio has been used to apply it to the Complete Water Cycle expenditure as a percentage of GDP and the total expenditure per capita to consider the effect of the development level of the full cycle network for evaluating investment.

Data on "Complete Water Cycle expenditure" and "Operation and Maintenance Expenses" have been collected from the organization "GLOBAL WATER INTELLIGENCE" (GWI), albeit indirectly (through the Confederation of Danish Industry, an organization linked to GWI that uses GWI's data).

Regarding investment in the Complete Water Cycle as a % of GDP, the average value among analyzed countries is 0.39%, with a maximum of 0.91% reached in 2019 by Egypt. Spain has a low value, 0.16% of GDP in 2019, the lowest among the analyzed European countries. The highest value in 2019 is seen in Egypt and Japan (0.91% and 0.66%, respectively). Among European countries, Turkey (0.46), France (0.44%), and the UK (0.36%) are the top investors.

Some interesting insights from the used indicators are summarized in the following table:

Indicator	Average	Min Value	Max Value
% of total WATER cycle expenditure relative to GDP	0,39%	0,15%	0,91%
Total WATER cycle sector expenditure per capita	89\$	11\$	267\$
Investment needs	0,311	0,021	0,81

The significant dispersion of the results presented in the previous table reflects a reality: countries that, during the analyzed years in the report (2015-2019) are creating new infrastructure or undergoing significant transformation in their networks show high values. This indicates a substantial commitment to the development and improvement of the full WATER cycle network.



The "Investment Needs"⁹ ratio shows widely varying values. For instance, it becomes evident that Mexico, Peru, and India require substantial investments; conversely, both Germany and the United Kingdom, along with Israel, the USA, and Spain, require fewer investments.

Spain receives a highly sufficient score in this Criterion (6.0), similar to the scores obtained by European countries (France stands out with 7.2). Israel achieves the highest score (10). The lowest scores are obtained by Mexico, Peru, and India.

4.11.4. Adaptation to the Future and Sustainability Criterion

To analyze this criterion, OECD data related to countries' freshwater resources has been utilized. Among these, the following have been selected: evapotranspiration (m³/capita), renewable freshwater (m³/capita), and gross freshwater extraction (long-term annual average) (m³/capita). Using these values, the percentage of gross freshwater extraction in relation to the total renewable freshwater has been calculated. This last indicator demonstrates the countries' vulnerability in terms of freshwater.

The University of Notre Dame (Indiana, USA) has been developing an indicator known as "ND-Gain" for several years. This indicator assesses how countries are adapting to climate change and environmental sustainability in relation to water use. It reveals the vulnerability of countries to climate change impacts while also evaluating their readiness to leverage public and private sector investments applied to climate change adaptation actions. The ND-Gain index compiles over 74 variables to form 45 core indicators measuring the vulnerability and readiness of 192 UN countries from 1995 to the present (due to data availability, ND-Gain assesses vulnerability for 182 countries and readiness for 184 countries). Among the ND-Gain index indicators, five related to water have been selected:

Proyección del cambio en la escorrentía anual (ND-GAIN Water Index.)
Proyección del cambio en la recarga anual de aguas subterráneas. (ND-GAIN Water Index.)
Tasa de extracción de agua dulce. (ND-GAIN Water Index. Fresh water withdrawal rate)
Ratio de dependencia del agua originada en el exterior de sus fronteras. (ND-GAIN Water Index)
Capacidad de presas. (ND-GAIN Water Index. Dam capacity)

The first indicator depicts the effects that climate change will have on runoff water resources by mid-century. It's expressed as the percentage change in annual runoff from the reference projection (1990-2009) to the future projection (2040-2069).

The second indicator illustrates how climate change will impact annual groundwater resources.

The third pertains to the assessment of total actual renewable water resources (including desalinated water).

The fourth evaluates the dependence on total renewable water resources originating from outside the country.

The fifth assesses the capacity to adapt to variations in water distribution (both temporal and geographical). It measures a country's per capita dam storage capabilities in the face of changes

⁹ Investment needs = % of the population without safe drinking water management × % of the population without safe sanitation management



in freshwater resources, including the effects of climate change (including surface and groundwater entering the country or secured through bilateral treaties).

In the indicator measuring evapotranspiration per capita, Israel stands out with a ratio of 431 m³/capita, much lower than the rest of the countries with available data (Brazil, Peru, Egypt, Saudi Arabia, China, and India are not evaluated). Among the analyzed European countries, Spain has the highest evapotranspiration (4,805 m³/capita).

Renewable freshwater resources per capita (long-term annual average) show similar results across all European countries (around 2,400 m³/capita). The United States stands out with 7,521 m³/capita. Israel has the lowest value (307 m³/capita).

In the indicator measuring freshwater extraction per capita, Spain unfavorably stands out (633 m³/capita). The USA has the highest ratio (1,207 m³/capita), double that of European countries. Israel extracts the least (129 m³/capita), and Egypt and Saudi Arabia are likely in a similar situation, although data is not available.

Regarding the University of Notre Dame (ND-GAIN) indicators, they show high vulnerability for most countries, although with different ratings depending on the indicator. The following table presents the results of these indicators in relation to those obtained for Spain:

Vulnerability Indicator ND-Gain	Max (1,00 worst)	Min (0,00 best)	Spain
Projection of change in annual runoff	0,87	0,40	0,45
Projection of change in annual groundwater recharge	0,32	0,13	0,19
Rate of freshwater extraction	1,00	0,01	0,24
Ratio of dependence on externally generated water	0,98	0,00	0,00
Dam capacity	0,99	0,15	0,72

Spain stands out in the ratio of dependence on water and dam capacity. In terms of water dependence, Spain's situation is evident: all of its water resources are generated within its own borders, not relying on any rivers originating outside its territory. In dam capacity, the indicator presents the best result after Brazil (due to the dams in the Amazon), Egypt (the Nile's dams, especially the Aswan Dam), and the USA (owing to the high regulation capacity of its large rivers).

In the percentage of technologies related to water treatment and purification, Spain receives an average rating. Mexico and Brazil achieve the highest ratings in this category.

In the indicator measuring the percentage of freshwater extraction relative to renewable freshwater, Spain (along with Turkey) presents a very high ratio (27%), surpassed only by Israel (41.9%). This result has a significant implication: Spain's ability to extract more water than it has available is limited compared to other countries. This implies that Spain must pay careful attention to and manage water consumption in the future.

In the final index of adaptation to the future and sustainable development, Brazil receives the highest rating (7.8). Spain's rating is similar to the analyzed European countries (6.6 within the range of 5.8-7.0). The lowest ratings are attributed to countries in Africa: Saudi Arabia (0.6), Egypt (2.7), and Israel (3.9). India also receives an inadequate rating (4.1).



4.11.5. Operation and Maintenance Criterion

Similarly to what was discussed regarding the Financing Criterion, the percentage of GDP allocated to conservation represents an indicator that can guide the appropriateness of investment for conservation needs. To provide additional context for this indicator, investment per capita has also been considered.

Reliability in water supply is related to good conservation and maintenance practices. To assess this parameter, the "Water Supply Reliability" indicator from the World Economic Forum's Global Competitiveness Index (GCI) has been used.

The most significant ratio for evaluating the Operation and Maintenance Criterion is the percentage of investment in operation and maintenance relative to the asset value. However, obtaining this value for the entire WATER cycle infrastructure is not feasible. Therefore, the investment in operation and maintenance relative to GDP has been utilized, although it couldn't be obtained for all countries. The average value for the ratio "% Water Sector Operation and Maintenance Expenses / Real GDP" is 0.62%, with a maximum of 1.3% and a minimum of 0.28%, corresponding to India. Spain has a percentage of 0.83%.

Another indicative ratio is the percentage of investment in operation and maintenance relative to the population. The resulting average value is \$168, while the maximum is \$453 and the minimum is \$5. Spain's value is \$244.

Regarding the "Water Supply Reliability" indicator from the Global Competitiveness Index by World Economic Forum, Spain, France, the United Kingdom, Israel, and Japan have the best results (over 90 out of 100).

In the entirety of the Operation and Maintenance Criterion, Spain is rated very well (8.6). The countries with the highest ratings are France and Japan (10), while the countries with lower ratings are India, China, and Mexico.

4.11.6. Safety Criterion

For the evaluation of this criterion, OECD indicators related to premature deaths per million inhabitants due to unsafe water supply, inadequate sanitation, and lack of access to safe handwashing facilities have been utilized.

The indicator "Premature deaths per million inhabitants (unsafe water source) (OECD)" has an average of 33 fatalities, with significant variations among countries: ranging from a minimum of 2 deaths in all European countries, the USA, and Israel, to a maximum of 372 deaths in India. Spain's value is 1.11, which ranks among the best-performing countries.

The second indicator analyzed, "Premature deaths per million inhabitants (unsafe sanitation) (OECD)", exhibits values in line with the first indicator. The standout performers in this category are the United Kingdom (0.12) and Spain (0.27), while India reports the highest value (213). A similar situation is observed in the third indicator, "Premature deaths per million inhabitants (lack of access to safe handwashing) (OECD)."

Overall, the best-performing countries are the European nations, the USA, and Israel, with slight differences among them. India stands as the worst-performing country, showing a significant gap compared to the rest. Following India, there is a considerable distance before Mexico, Brazil, Peru, and Egypt, which are notably worse-off compared to the top-rated countries.



4.11.7. Resilience Criterion

For the evaluation of this criterion, indicators have been chosen that indirectly provide some indication of the resilience of the entire water cycle sector.

For example, water availability per capita indicates vulnerability and capacity to respond to water supply issues in situations of drought or water scarcity. The assessment of renewable freshwater resources per agricultural land area, corrected for water stress, also provides information about the agricultural sector's ability to respond to freshwater scarcity phenomena.

The Sustainable Development Goal 6.5.1 indicator "% of integrated water resource management" can determine whether centralized management is possible in the face of adverse conditions. Centralized management enables the establishment of contingency plans and comprehensive actions in emergency situations affecting all processes within the entire water cycle. Highly decentralized management may hinder cohesive response efforts.

The last considered indicator is the percentage of freshwater extraction for domestic use relative to total freshwater extraction. This indicator evaluates available resources for domestic use during periods of scarcity.

The highest overall rating for this criterion is achieved by Japan (10.0), followed by France (9.6) and the USA (9.4), with European countries including Spain (6.9) following suit. The least well-performing countries are Egypt, Israel, and Saudi Arabia.

4.11.8. Engineering and Innovation Criterion

With regards to innovation, three OECD patent indicators have been identified: the number of patents related to treatment and purification, those related to water pollution reduction, and those related to desalination, all per million inhabitants.

Despite efforts to gather more specific data related to the entire water cycle infrastructure sector, reliable and verifiable data has been scarce. As a result, the approach taken is to analyze the overall state of research, development, and innovation (RDI) in different countries, assuming these data points can provide insights into the state of the entire water cycle. For this purpose, the indicators and data from the "Main Science and Technology Indicators, Volume 2021" published by the OECD in 2022 have been selected. This comprehensive report provides a set of indicators reflecting the level and structure of efforts made by OECD member countries and other non-member countries (Argentina, People's Republic of China, Romania, Russian Federation, Singapore, and South Africa) in the field of science and technology. These indicators cover resources dedicated to research and development, patent families, and international trade in R&D-intensive industries.

The Global Innovation Index from the University of Notre Dame (ND-Gain index) has also been considered.

To analyze the progress of digitalization, three indicators have been included: Participation in New Technologies (GCI -WEF-), ICT Infrastructure Index (ND-Gain Index, ICT infrastructure), and the number of people using the internet.

For assessing the state of engineering in the water cycle sector, it would have been useful to have precise information about the education and training of water cycle engineers, the number of engineers engaged in the design, construction, conservation, and management of the water cycle



per unit of economic investment, and economic data related to engineering investment compared to investment in the construction, conservation, operation, and management of water cycle networks. However, such specific data was not available, so four OECD indicators related to engineering have been considered. These indicators cover regulatory transparency, barriers to competition, restrictions on the movement of engineers, and restrictions on the entry of foreign engineers. All of these are included in the OECD's periodic index of trade in services restrictions.

The OECD indicators related to research and development show the global strategic position of countries in all sectors of the economy with respect to research.

For example, the indicator "% of GDP spent on gross domestic expenditure on R&D" for the analyzed countries shows a broad spectrum, ranging from a maximum of 3.21% (Japan) to a minimum of 0.28% (Mexico). Spain falls within the lower range at 1.25%, lower than all EU countries. It's logical that the world's technologically advanced countries invest more in R&D: Japan (3.21%), USA (3.18%), and Germany (3.17%). France (2.19%) and the United Kingdom (1.71%) fall in an intermediate position. These percentages remain relatively constant over the five years analyzed (2015 to 2019), which emphasizes the growing technological gap.

The indicator "% of GDP funded by the private sector for R&D" provides an interesting insight: the USA, Germany, Japan, and Israel exceed 2% of GDP in private sector funding. Clearly, private impetus is a determining factor in increasing R&D funding, as indicated by the "% of GDP funded by the public sector for R&D" indicator. None of the countries surpass 1% in this regard, and the percentage investment differences are narrowing (Spain's results are comparable to those of the United Kingdom, Italy, and Japan).

Regarding gross R&D investment per capita, the results show significant differences: Spain (\$522 per capita), USA (\$2,066 per capita), and Germany (\$1,763 per capita).

The three selected indicators for assessing digitalization show very similar results among the analyzed countries. However, Spain ranks among the top countries: 90.7% of people use the internet (surpassed only by the United Kingdom, Japan, and South Korea); the score given by the World Economic Forum for the "participation in new technologies" indicator is 98.3% (surpassed only by South Korea); yet, the University of Notre Dame's "ICT infrastructure index" rates Spain at 0.671, surpassed by Germany (0.710), France (0.725), the United Kingdom (0.710), and South Korea (0.732).

As previously mentioned, specific economic data on engineering investment within the analyzed sector and the number of engineers and their training related to engineering weren't available. Thus, four OECD indicators related to engineering were employed to assess the state of engineering. Spain ranks in an intermediate position among the analyzed countries: very good in terms of restrictions on the movement of engineers, sufficient in terms of barriers to competition, and insufficient regarding restrictions on the entry of foreign engineers and regulatory transparency. The overall innovation index from the University of Notre Dame was also analyzed. Germany, USA, China, and Japan achieved the best results (with a maximum score of "1"). Next in line are France (0.98), the United Kingdom (0.84), and Italy (0.722). Spain falls among the lowest-performing countries analyzed (0.128).

The overall evaluation of the Engineering and Innovation criterion assigns the highest ratings to the USA (9.0) and Japan (9.2), followed by Germany (8.2) and Israel (8.0). Spain receives a rating of 5.3, below that of China (5.8).



5. Qualitative evaluation. Expert surveys

As described in the methodology employed by Asociación Caminos, once the objective indicators have been obtained (which have served as the basis for the objective evaluation of the sector in comparison with selected countries), a series of questions have been formulated (grouped into the eight analyzed Criteria) for their assessment on the same scale as the objective indicator ratings. The posed questions include the possibility of providing comments and suggestions within each Criteria group, aiming to gather insights that experts might consider relevant and which are not covered by the objective indicators or the presented questionnaire.

These questions have been directed to a group of experts selected by Asociación Caminos. The survey has been transformed into a Google form to facilitate analysis and the integration of results.

The questionnaire sent to the experts includes two complementary questions:

- What infrastructure needs do you believe are necessary for the Water Cycle in Spain for the next 10 years, both globally and in various domains?
 - a) Global
 - b) Regulation Works (dams and reservoirs)
 - c) Desalination Stations
 - d) High Conduits
 - e) Drinking Water Treatment Plants
 - f) Low Networks
 - g) Wastewater Treatment Plants

- In what approximate amount do you quantify the necessary investment to develop the infrastructure needs in the Water Cycle in Spain for the next 10 years, both globally and in various domains?
 - a) Global
 - b) Regulation Works (dams and reservoirs)
 - c) Desalination Stations
 - d) High Conduits
 - e) Drinking Water Treatment Plants
 - f) Low Networks
 - g) Wastewater Treatment Plants

Given that the questions in the survey are quite generic (evaluating the public works sector in Spain as a whole), it is difficult to provide precise numeric qualitative ratings. Therefore, a non-numeric qualitative rating is requested. However, to integrate the results achieved with the objective numerical indicators, a numerical assignment is subsequently applied to each qualitative rating.

Rating system of Asociación Caminos							
Asociación Caminos	VERY INSUFFICIENT	INFUFFICIENT	SUFFICIENT	HIGHLY SUFFICIENT	GOOD	VERTY GOOD	EXCELLENT
	F	FX	E	D	C	B	A

Table 154: Qualitative evaluation rating system by the experts

Rating	Numerical Assignment
Excellent	9,5
Very good	8,5
Good	7,5
Highly sufficient	6,5
Sufficient	5,5
Insufficient	4,0
Very insufficient	2,0
Insufficient criterion or no response	-

Table 155: Numerical assignment of qualitative evaluation by experts

In a schematic way, the evaluation process for each sector is as follows:

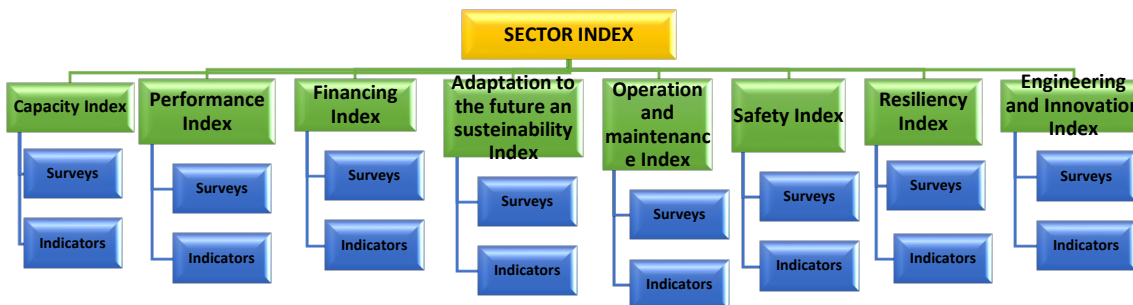


Figure 9: Scheme of the evaluation system for public works sectors

Once the responses have been obtained, the results achieved have been analyzed, combining them with the results obtained through the objective indicators.

In general¹⁰, a weighting is established for each Criterion between the quantitative indicators (expressed by objective indicators) and the qualitative evaluation from experts to obtain the Criterion Index, in the following proportions:

A. Quantitative evaluation of each Criterion: 50%

B. Qualitative evaluation of each Criterion by experts through surveys, questionnaires, and opinions 50%

¹⁰ In some sectors, such as Ports, there is the possibility of modifying this weighting due to the difficulty of quantitative indicators accurately reflecting the reality of the sector.



5.1. Survey for expert evaluation

A total of 33 responses have been obtained with the following results.

5.1.1. Capacity

Peso	EVALUACIÓN DE CAPACIDAD (Encuestas a expertos) (Max 10)			
1	1.1. ¿Cómo valora la cobertura del territorio de la red de abastecimiento de agua potable?	7,9	BIEN	C
1	1.1. ¿Cómo valora la cobertura del territorio de la red de abastecimiento de agua potable?	6,3	SUFICIENTE ALTO	D
1	1.3. Teniendo en cuenta las características de la población en España y la fuerte estacionalidad de las precipitaciones en muchas zonas, ¿ cómo valora la capacidad de las instalaciones del Ciclo del Agua en España para atender las demandas actuales?	6,1	SUFICIENTE ALTO	D
1	1.4. Teniendo en cuenta las características de la población en España, la fuerte estacionalidad de las precipitaciones en muchas zonas, y los posibles efectos de los fenómenos asociados al cambio climático en un futuro próximo, ¿ cómo valora la capacidad de las instalaciones del Ciclo del Agua en España para atender las demandas en el horizonte de los próximos 10 años?	5,4	SUFICIENTE	E
4	TOTAL EVALUACIÓN CAPACIDAD POR LOS EXPERTOS:	6,4	SUFICIENTE ALTO	D

Table 156: Expert assessment of capacity

Comments, suggestions, and recommendations from the experts

- The situation of industrial and agricultural supply varies widely by regions; domestic supply is more stable. In each region, infrastructure development and alternative goals need to be pursued.
- In my region (Mediterranean area), there is a permanent scarcity situation, but for the most part, the infrastructure exists. However, this year it's becoming clear that in areas not accustomed to scarcity, the necessary preparations haven't been made, and there isn't enough resilience and flexibility.
- Additionally, excessive political control over water tariffs results in tariffs that don't cover the necessary infrastructure renewal costs, leading to increasing deterioration.
- Climate change will require greater frugality in consumption.
- There shouldn't be problems in meeting urban water demand.
- The situation is adequate, but continuous maintenance of existing infrastructure, which is deteriorating, is necessary.
- While the capacity to meet supply demands is generally positive, it shouldn't be forgotten that often this comes at the cost of overexploiting rivers and aquifers, resulting in corresponding environmental impacts.
- Despite this, there are also current deficit situations and uncertainties about the capacity of current systems, particularly concerning agricultural demand.
- Not all territories have the same situation; some areas have adequate capacity, while others are insufficient.



- There is no hydraulic policy or planning in this country.
- Spain is very diverse; there are areas where demands are currently met without problems and will be met in 10 years, while others already face deficits that will worsen.
- I believe storage capacity of surface water and regulation in Mediterranean basins should be increased.
- The territory considered is where I reside; the situation differs in other relatively nearby areas.
- In the domestic sector, changing the local government framework law by assigning competencies to supra-municipal bodies aligned with the optimal management scope and separated from municipal political decisions. In the industrial and irrigation sectors, reviewing the concessionary system, cost recovery principles, and legal changes to promote public-private participation.
- Realistic planning considering the increasing occurrence of drought periods and occasional excess water events.
- Decouple water tariffs from political decisions as much as possible and ensure they truly cover costs.
- Strictly adhere to planned timelines.
- Expand the sewage network. Control pollution during rain episodes.
- Increase reservoir capacity, interconnect basins and surface-water and groundwater systems.
- Upcoming supply issues (especially in irrigation) for which reuse and desalination will be key.
- More reservoirs and/or increased investment in desalination are needed.
- The situation of systems currently causing overexploitation of surface or groundwater resources should be reviewed and corrected.
- In any case, new irrigation should not be authorized without guaranteed viability in terms of water, economic, and environmental factors, at both national and regional levels.
- There should be an exclusive ministry for water.
- There are many areas to progress in (river regulations, advancing reuse, improving network efficiency, etc.). In my opinion, the most urgent is progressing in the regulation of basins that have surpluses (typically in winter), such as the Órbigo and Carrión basins in the Duero region, although others could also be improved.



5.1.2. Performance

EVALUACIÓN DE PRESTACIONES (Encuestas a expertos) (Max 10)				
1	2.1. ¿Cómo valora la calidad del agua para consumo en España?	8,1	MUY BIEN	B
1	2.2. En relación con otros países de nuestro entorno, ¿cómo valora los sistemas de control de la calidad del agua para abastecimiento en España?	7,8	BIEN	C
1	2.3. ¿Cómo valora la capacidad de regulación existente en España (presas, depósitos, interconexión de cuencas, etc.)?	6,5	SUFICIENTE ALTO	D
1	2.4. ¿Cómo valora las interconexiones existentes entre cuencas?	5,1	SUFICIENTE	E
1	2.5. De forma global, ¿cómo valora la atención al público y la gestión de incidencias de los operadores del sector del agua en España?	6,4	SUFICIENTE ALTO	D
5	TOTAL EVALUACIÓN DE PRESTACIONES POR LOS EXPERTOS:	6,8	SUFICIENTE ALTO	D

Table 157: Expert assessment of Performance

Comments, suggestions, and recommendations from the experts

- The consumption of tap water should be encouraged, with prior investment - if necessary - in quality improvement infrastructure. The excessive use of bottled water, often without reason and with exorbitant cost, should be minimized, especially in the Levante region. Local municipalities refusing even minimal tariff increases for quality improvement contribute to this issue.
- The concept of water as a public good is not respected; it is considered territorial, making interconnections practically impossible.
- Depopulated and inland areas of Spain face significant difficulties in maintaining a good service.
- Private management for low supply should continue, as it is more efficient with strict regulation. On the other hand, high-level management by basin authorities proves capable of responding to challenges.
- Regardless of the mentioned current situations of overexploitation in the previous chapter, localized supply problems, current or foreseeable in the future, will always require specific solutions. This includes the high-value-added Mediterranean agriculture.
- Moreover, it is worth noting that the present questionnaire does not explicitly refer to groundwater exploitation systems, which contribute a considerable percentage of supplies. These systems gain special importance during drought situations.
- There is no hydraulic policy in this country.
- It is a mistake to consider water as a political tool for conflict between different communities.

5.1.3. Financing

Peso	EVALUACIÓN DE FINANCIACIÓN (Encuestas a expertos) (Max 10)			
1	3.1. ¿Considera suficiente la inversión actual en las instalaciones del ciclo del agua en España(embalses, desaladoras, otras obras de captación, ETAPS, EDARS, instalaciones de reutilización, etc.)?	4,3	INSUFICIENTE	FX
1	3.2. ¿Cómo valora la robustez de las actuales fuentes de financiación de las obras que tienen relación con el Ciclo del Agua?	4,7	INSUFICIENTE	FX
1	3.3. ¿Cómo considera que se está gestionando la inversión en las obras del Ciclo del Agua?	5,1	SUFICIENTE	E
1	3.4. ¿Cómo considera la actual participación de la inversión privada en el proyecto, construcción y/o explotación de las obras del Ciclo del Agua en España?	5,1	SUFICIENTE	E
4	TOTAL EVALUACIÓN FINANCIACIÓN POR LOS EXPERTOS:	4,8	INSUFICIENTE	FX

Table 158: Expert assessment of Financing

Comments, suggestions, and recommendations from the experts

- There is significant interest in investing in water cycle-related projects in Spain, but the legal and regulatory framework impedes or complicates these efforts.
- Public-private collaboration is very complex due to the current legal framework and continuous suspicion. There is a total lack of flexibility and clarity in approaches to such collaboration.
- Rural and urban Spain show significant differences.
- Necessary infrastructure to comply with the Water Framework Directive is still incomplete.
- The lack of funding in the sector is highly concerning, particularly for the conservation and maintenance of infrastructure. There is also insufficient private investment.
- There is no legal way (risk-sharing, etc.) to access private investments.
- There is an evident deficiency in urban water cycle treatment, as well as low cost recovery from users, more pronounced in the agricultural sector.
- Water should not become a business; that cannot be the objective.
- Replace and modify the regulatory framework (as previously mentioned, shifting competencies away from municipal jurisdiction) to promote public-private participation. Currently, except for concessions, private investment in public projects is impossible.
- Water should cover its own costs.
- Complete sanitation and treatment infrastructure.
- Reflect on existing fees and tariffs to ensure proper maintenance of existing systems and financing for new ones, including construction and private investment for operation due to limited public funding.
- Legislative changes in PPP-type contracts (which currently do not exist).
- Consequently, investment in treatment should be increased, and cost recovery policies applied, including modifying the economic regime under the Water Law.



- It should finally be accepted and passed on, in accordance with EU regulations, that the actual cost of water and the amortization of investments made and yet to be made should be covered, allowing private capital to enter investment, not just system operation.

5.1.4. Adaptation to the Future and Sustainability

Peso	EVALUACIÓN DE ADAPTACIÓN AL FUTURO Y DESARROLLO SOSTENIBLE (Encuestas a expertos) (Max 10)			
1	4.1. ¿Considera que los instrumentos de planificación hidrológica en vigor tienen en cuenta la adaptación a las demandas futuras de los usuarios?	5,9	SUFICIENTE	E
1	4.2. ¿Considera que la Planificación Hidrológica es coherente y dispone de las herramientas de financiación e inversión para llevarla a la práctica?	4,5	INSUFICIENTE	FX
1	4.3. ¿Cómo evaluaría la adaptación de las obras del Ciclo del Agua en España a la protección del medio ambiente en cuanto al cumplimiento de la legislación vigente, incluyendo la Directiva Marco del Agua?	6,1	SUFICIENTE ALTO	D
1	4.4. ¿Cómo valora las acciones que se están tomando para reducir el impacto ambiental de las obras del Ciclo del Agua en España?	6,6	SUFICIENTE ALTO	D
1	4.5. ¿Cómo valora la exigencia ambiental en las obras del Ciclo del Agua en España en relación con otro tipo de infraestructuras?	6,8	SUFICIENTE ALTO	D
1	4.6. ¿Cómo valora la eficiencia de las instalaciones de regadío en cuanto al ahorro de agua en España?	5,5	SUFICIENTE	E
1	4.7. ¿Cómo valora las acciones que se están tomando para reducir el consumo de CO2 en la infraestructura Ciclo completo del Agua?	6,1	SUFICIENTE ALTO	D
1	4.8. ¿Cómo considera la adaptación de la infraestructura del Ciclo completo del agua a los efectos del cambio climático?	5,8	SUFICIENTE	E
8	TOTAL EVALUACIÓN ADAPTACIÓN AL FUTURO Y DESARROLLO SOSTENIBLE POR LOS EXPERTOS:	5,9	SUFICIENTE	E

Table 159: Expert assessment of Adaptation to the Future and Sustainability

Comments, suggestions, and recommendations from the experts

- Non-public financing tools do not exist (as previously mentioned). I believe that environmental impact reduction is sufficient (in fact, it's slowing down many interesting projects). However, adaptation to climate change is insufficient, not only in the Levant, a traditional drought-prone area. Increasingly frequent drought issues are arising in the Cantabrian region due to unpreparedness and lack of investment. In the Levant, there's a need for more investment in alternative resources like desalination, and in large irrigable areas inland, added value for irrigators should be promoted to keep them in the territory.
- In terms of demand, efficiency in irrigation is crucial.
- The alignment of hydrological planning with the environment has an ideological bias inconsistent with data rigor, especially regarding irrigation. There's a significant gap between necessary investment in treatment and the projected, affecting the achievement of the Water Framework Directive.
- The uncertainties in the agricultural sector and the inadequate cost recovery, as mentioned in previous sections, are worth remembering.



- Regarding environmental variables, it's important to note the previously discussed issues of overexploitation, and generally emphasize how far our water bodies, both surface and groundwater, are from achieving the "good status" envisioned by the Water Framework Directive.
- On another note, the rating of "insufficient" in section 4.5 should not be understood to imply that other types of infrastructure are better environmentally protected; frequently, it may be the opposite due to greater social insensitivity in those cases. .



5.1.5. Operation and Maintenance

Peso	EVALUACIÓN DE OPERACIÓN Y MANTENIMIENTO (Encuestas a expertos) (Max 10)			
1	5.1. ¿Cómo valora la inversión en conservación y mantenimiento de las instalaciones del Ciclo del Agua en España en los diferentes ámbitos? [Estaciones depuradoras]	5,2	SUFICIENTE	E
1	5.2. ¿Considera que los medios aplicados a la operación, conservación y mantenimiento de las instalaciones del Ciclo del Agua son los adecuados para atender las demandas de los usuarios en los diferentes ámbitos? [Obras de regulación (presas y embalses)]	4,8	INSUFICIENTE	FX
1	5.3. ¿Considera que los medios aplicados a la operación, conservación y mantenimiento de las instalaciones del Ciclo del Agua son los adecuados para atender las demandas de los usuarios en los diferentes ámbitos? [Estaciones desaladoras]	6,3	SUFICIENTE ALTO	D
1	5.4. ¿Considera que los medios aplicados a la operación, conservación y mantenimiento de las instalaciones del Ciclo del Agua son los adecuados para atender las demandas de los usuarios en los diferentes ámbitos? [Conducciones en alta]	6,1	SUFICIENTE ALTO	D
1	5.5. ¿Considera que los medios aplicados a la operación, conservación y mantenimiento de las instalaciones del Ciclo del Agua son los adecuados para atender las demandas de los usuarios en los diferentes ámbitos? [Estaciones potabilizadoras]	6,3	SUFICIENTE ALTO	D
1	5.6. ¿Considera que los medios aplicados a la operación, conservación y mantenimiento de las instalaciones del Ciclo del Agua son los adecuados para atender las demandas de los usuarios en los diferentes ámbitos? [Redes de baja]	5,4	SUFICIENTE	E
1	5.7. ¿Considera que los medios aplicados a la operación, conservación y mantenimiento de las instalaciones del Ciclo del Agua son los adecuados para atender las demandas de los usuarios en los diferentes ámbitos? [Estaciones depuradoras]	5,3	SUFICIENTE	E
1	5.8. ¿Cómo valora el estado de conservación y mantenimiento de las obras del Ciclo del Agua en España en los diferentes ámbitos? [Obras de regulación (presas y embalses)]	4,9	INSUFICIENTE	FX
1	5.9. ¿Cómo valora el estado de conservación y mantenimiento de las obras del Ciclo del Agua en España en los diferentes ámbitos? [Estaciones desaladoras]	6,7	SUFICIENTE ALTO	D
1	5.10. ¿Cómo valora el estado de conservación y mantenimiento de las obras del Ciclo del Agua en España en los diferentes ámbitos? [Conducciones en alta]	6,0	SUFICIENTE ALTO	D
1	5.11. ¿Cómo valora el estado de conservación y mantenimiento de las obras del Ciclo del Agua en España en los diferentes ámbitos? [Estaciones potabilizadoras]	6,3	SUFICIENTE ALTO	D
1	5.12. ¿Cómo valora el estado de conservación y mantenimiento de las obras del Ciclo del Agua en España en los diferentes ámbitos? [Redes de baja]	5,1	SUFICIENTE	E
1	5.13. ¿Cómo valora el estado de conservación y mantenimiento de las obras del Ciclo del Agua en España en los diferentes ámbitos? [Estaciones depuradoras]	5,2	SUFICIENTE	E
13	TOTAL EVALUACIÓN OPERACIÓN Y MANTENIMIENTO POR LOS EXPERTOS:	5,7	SUFICIENTE	E

Table 160: Expert assessment of Operation and Maintenance



Comments, suggestions, and recommendations from the experts

- Each of the areas has a distinct management structure.
- Dams and especially canals are aging without proper replacement and maintenance.
- It's a consequence of the previously answered questions.
- Conservation requires investments that are not being carried out. Maintenance is relatively well managed by operators of different facilities within their capacities.
- It's difficult to differentiate among the three types of questions.
- The situation varies greatly depending on whether it's the agricultural or urban sector, and within the urban sector, based on the population size of the system.
- In this country, there is no planning.
- Establishing permanent auditing systems that trigger automatic mechanisms is necessary.
- Financial increase in human resources and conservation and maintenance.
- Greater investment for conservation, as demanded by AEAS for years.
- Regarding the urban sector, promoting the creation of systems or associations large enough to ensure technical, economic, and environmental viability is essential.
- Regarding irrigation, emphasizing modernization policies as previously mentioned is important.
- Regarding state and regional high-level infrastructures, they must be a priority, and in general, investment in operation and maintenance needs significant reinforcement.
- From another perspective, surveillance and control of the water domain by Public Administrations is essential to ensure proper operation and maintenance of surface and groundwater supply systems.



5.1.6. Safety

Peso	EVALUACIÓN DE SEGURIDAD (Encuestas a expertos) (Max 10)			
1	6.1. ¿Cómo valora las medidas de control existentes para garantizar el abastecimiento de agua a la población en España?	6,9	SUFICIENTE ALTO	D
1	6.2. ¿Cómo valora, desde el punto de vista de la seguridad sanitaria, la extensión y calidad de la depuración de las aguas residuales?	6,0	SUFICIENTE ALTO	D
1	6.3. De forma global, ¿cómo valora la seguridad de las instalaciones del Ciclo del Agua en España frente a ataques físicos en los diferentes ámbitos? [Global]	5,7	SUFICIENTE	E
1	6.4. De forma global, ¿cómo valora la seguridad de las instalaciones del Ciclo del Agua en España frente a ataques físicos en los diferentes ámbitos? [Obras de regulación (presas y embalses)]	5,5	SUFICIENTE	E
1	6.5. De forma global, ¿cómo valora la seguridad de las instalaciones del Ciclo del Agua en España frente a ataques físicos en los diferentes ámbitos? [Estaciones desaladoras]	6,2	SUFICIENTE ALTO	D
1	6.6. De forma global, ¿cómo valora la seguridad de las instalaciones del Ciclo del Agua en España frente a ataques físicos en los diferentes ámbitos? [Conducciones en alta]	6,1	SUFICIENTE ALTO	D
1	6.7. De forma global, ¿cómo valora la seguridad de las instalaciones del Ciclo del Agua en España frente a ataques físicos en los diferentes ámbitos? [Estaciones potabilizadoras]	6,0	SUFICIENTE ALTO	D
1	6.8. De forma global, ¿cómo valora la seguridad de las instalaciones del Ciclo del Agua en España frente a ataques físicos en los diferentes ámbitos? [Redes de baja]	5,5	SUFICIENTE	E
1	6.9. De forma global, ¿cómo valora la seguridad de las instalaciones del Ciclo del Agua en España frente a ataques físicos en los diferentes ámbitos? [Estaciones depuradoras]	5,8	SUFICIENTE	E
1	6.10. De forma global, ¿cómo valora la seguridad de las instalaciones del Ciclo del Agua en España frente a ataques de tipo lógico (ciberseguridad) en los diferentes ámbitos? [Global]	4,9	INSUFICIENTE	FX
1	6.11. De forma global, ¿cómo valora la seguridad de las instalaciones del Ciclo del Agua en España frente a ataques de tipo lógico (ciberseguridad) en los diferentes ámbitos? [Obras de regulación (presas y embalses)]	4,8	INSUFICIENTE	FX
1	6.12. De forma global, ¿cómo valora la seguridad de las instalaciones del Ciclo del Agua en España frente a ataques de tipo lógico (ciberseguridad) en los diferentes ámbitos? [Estaciones desaladoras]	5,1	SUFICIENTE	E
1	6.13. De forma global, ¿cómo valora la seguridad de las instalaciones del Ciclo del Agua en España frente a ataques de tipo lógico (ciberseguridad) en los diferentes ámbitos? [Conducciones en alta]	5,2	SUFICIENTE	E
1	6.14. De forma global, ¿cómo valora la seguridad de las instalaciones del Ciclo del Agua en España frente a ataques de tipo lógico (ciberseguridad) en los diferentes ámbitos? [Estaciones potabilizadoras]	4,9	INSUFICIENTE	FX
1	6.15. De forma global, ¿cómo valora la seguridad de las instalaciones del Ciclo del Agua en España frente a ataques de tipo lógico (ciberseguridad) en los diferentes ámbitos? [Redes de baja]	4,8	INSUFICIENTE	FX
1	6.16. De forma global, ¿cómo valora la seguridad de las instalaciones del Ciclo del Agua en España frente a ataques de tipo lógico (ciberseguridad) en los diferentes ámbitos? [Estaciones depuradoras]	4,8	INSUFICIENTE	FX
1	6.17. ¿Considera que se están tomando medidas para reducir en el futuro la incidencia de ataques físicos y/o lógicos a las instalaciones del Ciclo del Agua en España?	4,8	INSUFICIENTE	FX
17	TOTAL EVALUACIÓN SEGURIDAD POR LOS EXPERTOS:	5,5	SUFICIENTE	E

Table 161: Expert assessment of Safety



Comments, suggestions, and recommendations from the experts

- It's a topic of high specialization and difficult analysis, as it depends on the objective. The risk of a physical attack is much higher than a digital one. A physical attack could lead to mass contamination, while a digital one typically results in supply interruption.
- With the expansion of digitalization and remote control, vulnerability will increase.
- Handle this concept with caution and discretion. Avoid giving ideas to potential attackers.
- Greater financial commitment to cybersecurity is necessary.
- In previous sections, the need to improve the operation and maintenance of hydraulic infrastructures has been emphasized, and this also applies to their physical and logical security.
- In the specific case of the digital realm, it's important to leverage the European Next Generation funds, under which a national PERTE (Strategic Project for Economic Recovery and Transformation) has already been launched.



5.1.7. Resilience

Peso	EVALUACIÓN DE RESILIENCIA (Encuestas a expertos) (Max 10)			
1	7.1. ¿Cómo valora la capacidad de las instalaciones del Ciclo del Agua en España para recuperar el estado de servicio inicial cuando se producen situaciones adversas?	6,4	SUFICIENTE ALTO	D
1	7.2. ¿Cómo valora las medidas adoptadas por los operadores para prevenir cortes de suministro del agua ante incidentes naturales o provocados?	6,4	SUFICIENTE ALTO	D
1	7.3. ¿Cómo evaluaría las medidas que se están adoptando en las instalaciones del Ciclo del Agua para paliar los efectos del cambio climático (por ejemplo, mayor frecuencia de fenómenos extremos como inundaciones y sequías)?	5,0	INSUFICIENTE	FX
1	7.4. ¿Cómo valora la interconexión de las redes de abastecimiento existentes a efectos de su capacidad de mantener el suministro en situaciones de destrucción o daño grave de una parte de la red?	5,4	SUFICIENTE	E
1	7.5. ¿Cómo valora los planes de contingencia que se aplican en el ciclo completo del agua para prevenir la infraestructura ante incidentes naturales o provocados?	5,7	SUFICIENTE	E
5	TOTAL EVALUACIÓN RESILIENCIA POR LOS EXPERTOS:	5,8	SUFICIENTE	E

Table 162: Expert assessment of Resilience

Comments, suggestions, and recommendations from the experts

- Contingency plans usually reflect anticipated situations. Changes resulting from climate are not well characterized (models are not precise and results fall within the range of error-average). However, given the uncertainty, it's advisable to proceed.
- Larger population size generally leads to better response.
- It's also challenging to differentiate between certain points in this section.
- It's worth mentioning that the resilience of urban systems is logically greater than that of irrigation systems. Within urban systems, larger population centers generally have better conditions than smaller ones.
- Review forecasts frequently by incorporating the latest data to reanalyze the outcomes. Analyze the cost/benefit of necessary infrastructure that will be needed within a specific timeframe.
- Undoubtedly, the ongoing climate change situation is an opportune context to conduct a comprehensive and thorough review of the resilience of all hydraulic supply systems, both surface and underground.



5.1.8. Engineering and Innovation

Peso	EVALUACIÓN DE INGENIERÍA E INNOVACIÓN (Encuestas a expertos) (Max 10)			
1	8.2. ¿Cómo valora la utilización de nuevas técnicas, tecnologías y materiales en la construcción, conservación y mantenimiento de instalaciones del Ciclo del Agua?	6,2	SUFICIENTE ALTO	D
1	8.3. ¿Cómo valora las medidas adoptadas en la licitación pública para favorecer la innovación en el sector del ciclo del agua (peso de la oferta técnica en las licitaciones, etc.)?	4,4	INSUFICIENTE	FX
1	8.4. ¿Cómo valora la adaptación del sector del regadío a las nuevas tecnologías (gestión en tiempo real, telecontrol, etc.)?	5,9	SUFICIENTE	E
1	8.5. ¿Cómo valora los programas de adaptación a las nuevas tecnologías en el caso de las estaciones de tratamiento de aguas residuales y en el campo de la reutilización de aguas?	5,6	SUFICIENTE	E
1	8.6. ¿Cómo valora la investigación, desarrollo e innovación que se está desarrollando en España con relación al ciclo completo del agua?	6,0	SUFICIENTE ALTO	D
1	8.7. ¿Cómo valora la tecnología actual que se está aplicando en el ciclo completo del agua?	6,2	SUFICIENTE ALTO	D
1	8.8. ¿Cómo valora las innovaciones en digitalización de la gestión y operaciones del ciclo completo del agua?	6,1	SUFICIENTE ALTO	D
1	8.8. ¿Cómo valora la tecnología actual que se está aplicando en la red ferroviaria?	7,5	BIEN	C
1	8.9. ¿Cómo considera el avance en la digitalización y monitorización del comportamiento de los elementos de la red ferroviaria?	7,1	BIEN	C
9	TOTAL EVALUACIÓN INGENIERÍA E INNOVACIÓN POR LOS EXPERTOS:	6,1	SUFICIENTE ALTO	D

Table 163: Expert assessment of Engineering and Innovation

Comments, suggestions, and recommendations from the experts

- Making generalizations is challenging. For example, irrigation differs greatly between the Levante region and the interior. In the Levante, there's ongoing R&D, while in the interior, it's less prominent. Investment in technology is facilitated if there's a return on investment through cost-reflective tariffs.
- Innovation is directly proportional to the size of the sample being considered.
- The issues primarily revolve around financing rather than technology and innovation.
- True technological advancements in facilities are hindered by maintaining outdated technologies due to procurement processes that impede the adoption of innovations.
- Situations vary widely depending on sectors—urban or irrigation—system size, or specific aspects considered. This leads to the coexistence of advanced remote control tools and cutting-edge desalination facilities alongside uncontrolled resource losses and insufficient engineering influence in procurement processes.
- Incorporate economic signals into water management to promote R&D.



- Implement procurement processes allowing for variations and new technologies. Employ processes based on Competitive Dialogue.
- Strengthen the role of engineering, fully develop the digitalization PERTE previously mentioned, and increase private sector involvement throughout the R&D and innovation process.



5.2. Supplementary Questionnaire

Among the questions posed to the experts, a supplementary questionnaire has been included with the following inquiries:

- **CP 1.- What infrastructure needs do you consider necessary for the Water Cycle in Spain in the next 10 years, both in a comprehensive manner and in different areas?**
 - a) Global
 - b) Regulation Works (dams and reservoirs)
 - c) Desalination Stations
 - d) High Conduits
 - e) Drinking Water Treatment Plants
 - f) Low Networks
 - g) Wastewater Treatment Stations

- **CP2.- ¿ In what approximate amount do you quantify the necessary investment to develop the infrastructure needs in the Water Cycle for the next 10 years, both globally and in different areas?**
 - a) Global
 - b) Regulation Works (dams and reservoirs)
 - c) Desalination Stations
 - d) High Conduits
 - e) Drinking Water Treatment Plants
 - f) Low Networks
 - g) Wastewater Treatment Stations



CP 1.- What infrastructure needs do you consider necessary for the Water Cycle in Spain in the next 10 years, both in a comprehensive manner and in different areas?

- a) Global**
- b) Regulation Works (dams and reservoirs)**
- c) Desalination Stations**
- d) High Conduits**
- e) Drinking Water Treatment Plants**
- f) Low Networks**
- g) Wastewater Treatment Stations**

- Wastewater treatment stations. Desalination stations. Low networks.
 - They are needed in all categories.
 - Low networks and wastewater treatment stations.
 - All those that improve efficiency, increase water security, lead to energy savings - especially through the use of renewable energy - and allow for addressing the expected reduction in natural resources by providing unconventional resources.
 - Significant investments will be needed in wastewater treatment stations to comply with the new European regulations that are coming into effect.
 - They are needed in all categories.
 - Required in c), d), and g).
 - Expansion and improvement of the sewage network.
 - Required in a) Global, transfers to deficit basins. Joint use of surface and groundwater to efficiently maintain the good status of both water bodies. Interconnection of systems to enhance resilience.
 - Required in b). Resuming necessary projects that have been discarded.
 - All of them.
 - Required in g), c), and b).
 - Required in c).
 - Regulation and desalination.
 - I do not have sufficient information to make forecasts about specific infrastructure needs, and even less to quantify the corresponding investments. I will simply dare to make the following suggestions.
1. I believe that the greatest investment effort should be made in the following areas:
 - a) Wastewater treatment
 - b) Correction of overexploitation or deficit situations, present or in the short and medium term, through sustainable infrastructure
 - c) Actions to achieve the "good status" of surface and groundwater in accordance with the Water Framework Directive
 - d) Reversible pumping to use reservoirs as renewable energy storage
 - e) Conservation and maintenance
 - f) Improvement of operation and deep digitization of systems
 2. In the case of irrigation, in addition to the above, it is also advisable:



- a) In singular critical situations of overexploitation or deficit, partial or total cancellation of irrigation authorization for the affected area may be necessary.
 - b) New irrigation projects that do not guarantee water, economic, and environmental sustainability should not be authorized.
3. Although this questionnaire hardly refers to floods, it seems logical that the need to invest in flood prevention infrastructure will also be important, always in accordance with the delineation of flood-prone areas identified in Flood Risk Management Plans, elaborated in accordance with the 2007/60 Flood Directive.
4. Promote the use of advanced technologies in at least the following fields:
- a) All types of water treatments - drinking water treatment, desalination, purification, reuse - to obtain new water and energy resources that contribute to the so-called water circular economy.
 - b) Direct use of renewable energies to meet all the needs of water systems that allow it.
 - c) Hydroelectric exploitation of all flows - in high and low conditions - that allow it.
 - d) Widespread digitization and remote control in high and low conditions.
5. In addition to all of the above, optimizing water system management indispensably requires improving water resource Governance in our country, which must include at least:
- a) Effectively harmonize the competencies in this matter of State, Regional, and Local Administrations.
 - b) Reform the Water Administrations in a way that gives higher priority and modernizes, including digitization, their functions related to hydrological planning, public domain surveillance and control, and operation and conservation of their infrastructures.
 - c) Promote and enhance social participation in relevant government bodies and functions.
- Required particularly in b), f), and g).
 - Required in b), e), and d).
 - In the following order: b), g), f), d), e), and finally c).
 - Required in g), d), b), f).
 - Regulation works, wastewater treatment stations, and high conditions for interconnections between basins.
 - Wastewater treatment stations, sewage collectors, and water regeneration stations.
 - Required in b) and e).
 - Regulation, interconnection, etc.



CP2.- In what approximate amount do you quantify the necessary investment to develop the infrastructure needs in the Water Cycle for the next 10 years, both globally and in different areas?

- a) Global**
- b) Regulation Works (dams and reservoirs)**
- c) Desalination Stations**
- d) High Conduits**
- e) Drinking Water Treatment Plants**
- f) Low Networks**
- g) Wastewater Treatment Stations**

- The amount of 50 billion euros has been mentioned frequently. I do not have access to specific inventories of actions, and I would not be able to assess it accurately.
- 5 billion euros.
- In principle, those indicated in the hydrological plans.
- 50 billion euros.
- 10 billion euros.



5.3. Evaluation of the Complete Water Cycle by experts

Integrating the evaluation provided by experts to the different Criteria, the overall result of the evaluation of the Complete Water Cycle by experts is as follows:

Evaluación del sector del Ciclo del agua por los expertos (Max: 10)		56		
Pesos del criterio	CRITERIOS	CALIFICACIÓN AICCP		
1	CAPACIDAD	6,4	SUFICIENTE ALTO	D
1	PRESTACIONES	6,8	SUFICIENTE ALTO	D
3	FINANCIACIÓN	4,8	INSUFICIENTE	FX
3	ADAPTACIÓN AL FUTURO Y DESARROLLO SOSTENIBLE	5,9	SUFICIENTE	E
2	OPERACIÓN Y MANTENIMIENTO	5,7	SUFICIENTE	E
1	SEGURIDAD	5,5	SUFICIENTE	E
3	RESILIENCIA	5,8	SUFICIENTE	E
3	INGENIERÍA E INNOVACIÓN	6,1	SUFICIENTE ALTO	D
Sector Ciclo del agua. Evaluación ponderada por los expertos		5,7	SUFICIENTE	E
Respuestas recibidas: 56				

Table 164: Overall evaluation of the Complete Water Cycle by the experts



6. Global assessment by objective indicators and by experts

Evaluación del sector del Ciclo del agua por los expertos (Max: 10)		56		
Pesos del criterio	CRITERIOS	CALIFICACIÓN AICCP		
1	CAPACIDAD	6,4	SUFICIENTE ALTO	D
1	PRESTACIONES	6,8	SUFICIENTE ALTO	D
3	FINANCIACIÓN	4,8	INSUFICIENTE	FX
3	ADAPTACIÓN AL FUTURO Y DESARROLLO SOSTENIBLE	5,9	SUFICIENTE	E
2	OPERACIÓN Y MANTENIMIENTO	5,7	SUFICIENTE	E
1	SEGURIDAD	5,5	SUFICIENTE	E
3	RESILIENCIA	5,8	SUFICIENTE	E
3	INGENIERÍA E INNOVACIÓN	6,1	SUFICIENTE ALTO	D
Sector Ciclo del agua. Evaluación ponderada por los expertos		5,7	SUFICIENTE	E
Respuestas recibidas: 56				

Table 165: Global assessment by experts

Evaluación del sector del Ciclo del agua por indicadores objetivos (Max: 10)				
Pesos del criterio	CRITERIOS	CALIFICACIÓN AICCP		
1	CAPACIDAD	7,6	BIEN	C
1	PRESTACIONES	9,1	EXCELENTE	A
3	FINANCIACIÓN	6,0	SUFICIENTE ALTO	D
3	ADAPTACIÓN AL FUTURO Y DESARROLLO SOSTENIBLE	6,6	SUFICIENTE ALTO	D
2	OPERACIÓN Y MANTENIMIENTO	8,6	MUY BIEN	B
1	SEGURIDAD	8,9	MUY BIEN	B
3	RESILIENCIA	6,9	SUFICIENTE ALTO	D
3	INGENIERÍA E INNOVACIÓN	5,3	SUFICIENTE	E
Sector Ciclo del agua. Evaluación ponderada por indicadores objetivos		6,9	SUFICIENTE ALTO	D
Indicadores considerados: 57				

Table 166: Overall assessment by objective indicators



Evaluación final del sector del Ciclo del agua (Max: 10)				
Pesos del criterio	CRITERIOS	CALIFICACIÓN FINAL AICCP (50% evaluación por indicadores; 50% evaluación por expertos)		
1	CAPACIDAD	7,0	BIEN	C
1	PRESTACIONES	7,9	BIEN	C
3	FINANCIACIÓN	5,4	SUFICIENTE	E
3	ADAPTACIÓN AL FUTURO Y DESARROLLO SOSTENIBLE	6,3	SUFICIENTE ALTO	D
2	OPERACIÓN Y MANTENIMIENTO	7,1	BIEN	C
1	SEGURIDAD	7,2	BIEN	C
3	RESILIENCIA	6,3	SUFICIENTE ALTO	D
3	INGENIERÍA E INNOVACIÓN	5,7	SUFICIENTE	E
Sector Ciclo del agua. Evaluación ponderada final		6,3	SUFICIENTE ALTO	D

Table 167: Overall assessment by objective indicators and by experts

Evaluación del sector del Ciclo del agua por los expertos (Max: 10)	
CRITERIOS	Diferencias (Indicadores- expertos)
CAPACIDAD	1,2
PRESTACIONES	2,3
FINANCIACIÓN	1,2
ADAPTACIÓN AL FUTURO Y DESARROLLO SOSTENIBLE	0,7
OPERACIÓN Y MANTENIMIENTO	2,9
SEGURIDAD	3,5
RESILIENCIA	1,2
INGENIERÍA E INNOVACIÓN	-0,8
Sector Ciclo del agua. Diferencias (indicadores-expertos)	1,2

Table 168: Differences between objective evaluation and expert assessment



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- 2. "The Global Competitiveness Report (GCI)." World Economic Forum (WEF)**
- 3. "The Global Adaptation Index (ND-Gain Indicators)." University of Notre Dame (USA)**

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ANNEX 3

Acronyms

ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
BTS	BUREAU OF TRANSPORTATION STATISTICS (USA)
OECD	ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
EE.UU.	THE UNITED STATES OF AMERICA
USDT	U.S. DEPARTMENT OF TRANSPORTATION
WB	THE WORLD BANK
WEF	WORLD ECONOMIC FORUM
GCI	GLOBAL COMPETITIVENESS INDEX (WEF)
LPI	LOGISTIC PERFORMANCE INDEX (WB)



ANNEX 4

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- <http://www.worldbank.org/>
- <https://www.weforum.org/>
- <https://www.itf-oecd.org/>
- <http://ec.europa.eu/eurostat/>
- <http://observatoriotransporte.fomento.es>
- [Annual-Report-2020.pdf \(unwater.org\)](#)
- AEAS. <https://www.aeas.es>



ANNEX 5

Complete Water Cycle Indicators from Key International Organizations

For the Complete Water Cycle sector, indicators from the following international organizations have been analyzed:

- OECD-International Transport Forum. <https://www.itf-oecd.org/>
- EUROSTAT. https://ec.europa.eu/info/departments/eurostat-european-statistics_es
- World Bank. <https://worldroadstatistics.org/>
- World Economic Forum <https://www.weforum.org/>
- European Comission https://ec.europa.eu/commission/index_es
- International Energy Agency <https://www.iea.org/>
- American Society of Civil Engineers. <https://www.fhwa.dot.gov/>
- Global Water Intelligence (GWI). [Home - Global Water Intelligence](#)
- European Federation of National Associations of Water Services. [EurEau - Water matters, the views of Europe's water sector](#)
- Global indicators for the Sustainable Development Goals (SDGs) and targets of the 2030 Agenda for Sustainable Development (UN). [UNSDG](#).
- Food and Agriculture Organization of the United Nations (FAO). AQUASTAT. [Libro de trabajo: Review Dashboard-v1 \(fao.org\)](#)

These international organizations, used as references, also have a complementary database that allows the creation of new quantitative indices. These selected basic data, combined with information from databases of various countries, have been the primary source of information for configuring the indicators of the Complete Water Cycle.

Below is detailed information about the assessments, indices, and indicators from the main organizations that evaluate the Complete Water Cycle:

- "Report Card for America's Infrastructure." American Society of Civil Engineers (ASCE).
- "The Global Competitiveness Report." World Economic Forum.
- "Transport in the European Union." European Commission.

1.- "Report Card for America's infrastructure." American Society of Civil Engineers (ASCE)

The "Report Card for America's Infrastructure" by ASCE (American Society of Civil Engineers) is the reference used by the Asociación Caminos for the preparation of this report. The report exclusively focuses on the scope of the United States, without conducting comparative studies with other countries or describing the specific methodology employed. The established indicators are not known, but the report provides generalized results with a rating that allows us to conclude whether the analyzed sectors of public works and services in the U.S. have improved or deteriorated compared to the previous period.

The latest edition of the "Infrastructure Report Card"¹¹ from 2021, analyzes eight criteria: capacity, physical condition, financing, future needs, operation and maintenance, public safety, resilience, and innovation.



Figure 10: Criteria analyzed in the IRC Report IRC, ASCE 2021

As can be seen in the table below, the assessment system used by Asociación Caminos is similar to the ASCE¹² system.

ESPAÑA	0,0 a 2,9	3,0 a 4,9	5,0 a 5,9	6,0 a 6,9	7,0 a 7,9	8,0 a 8,9	9,0 a 10
	SUSPENSO		APROBADO		NOTABLE		SOBRESALIENTE
ECTS	FAIL	FAIL	SUFFICIENT	SATISFACTORY	GOOD	VERY GOOD	EXCELLENT
	F	FX	E	D	C	B	A
ASOCIACIÓN CAMINOS	MUY INSUFICIENTE	INSUFICIENTE	SUFICIENTE	SUFICIENTE ALTO	BIEN	MUY BIEN	EXCELENTE
	F	FX	E	D	C	B	A
INFORME ASCE	CRITICAL	FAILING	POOR		MEDIOCRE	GOOD	EXCEPTIONAL
	1 (F)	2 (F)	3 (D)		4 (C)	4 (B)	5 (A)
GPA EEUU 1	F		C B-	B	B+		A
GPA EEUU 2	F		D- D	D+ C-	C C+	B- B	B+ A- A

Table 169: Sistema de calificación del índice del sector de Asociación Caminos y su equivalencia con el sistema utilizado en este informe

The full global report can be found at: https://infrastructurereportcard.org/wp-content/uploads/2020/12/National_IRC_2021-report.pdf

¹¹ [National_IRC_2021-report-2.pdf \(infrastructurereportcard.org\)](https://infrastructurereportcard.org/wp-content/uploads/2020/12/National_IRC_2021-report-2.pdf)

¹² The ASCE system uses letters accompanied by "+" and "-" signs to indicate if it is slightly above or below the assigned letter level. To create an equivalent system, the Report of Asociación Caminos, which quantifies the state of the sector numerically on a scale of 0 to 10, allows for a correspondence with the previously published Infrastructure Report Card (IRC) reports.

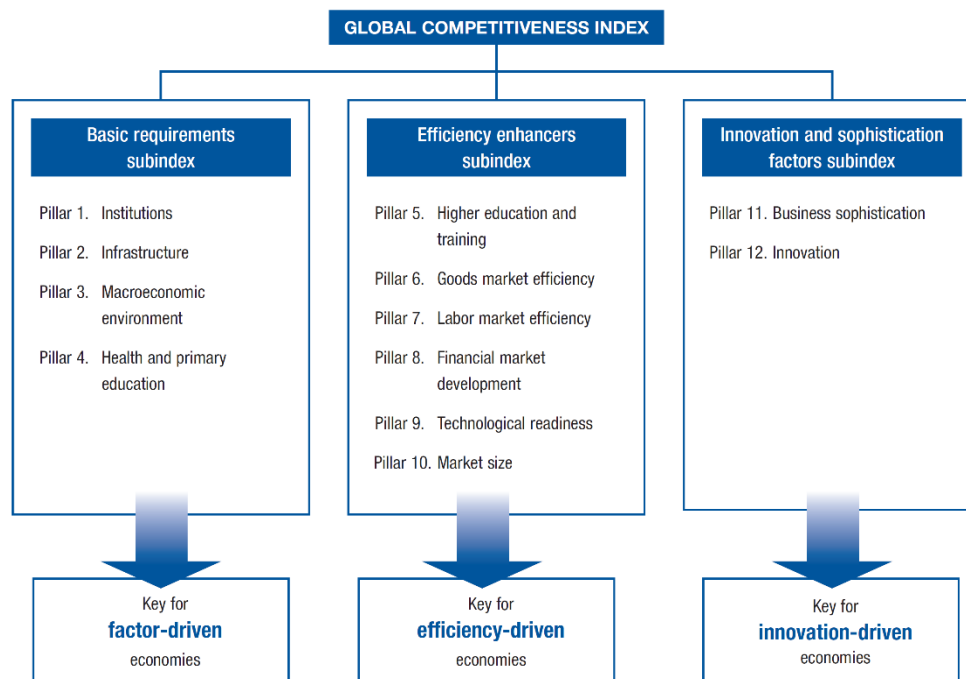
2.- “The Global Competitiveness Report”. World Economic Forum

The World Economic Forum (WEF) produces a series of annual economic reports. Among them, the "Global Competitiveness Report (2019)"¹³ provides an analysis of countries with data from the year 2019, creating a list of indicators and a main index called the Global Competitiveness Index (GCI).

This global competitiveness index combines 114 components grouped into twelve policy domains or "pillars" that measure, through an indicator, three main categories or "sub-indices." Each category assesses the development of each "pillar" for the 141 participating countries.

The main categories are:

- S1: Basic Requirements
- S2: Enhancers of Efficiency
- S3: Innovation and Complexity Factors



Fuente: World Economic Forum

Figure 11: Outline of the Composition of the GCI Indicator by the WEF

Infrastructure is considered a fundamental requirement for a country's development, and it has sufficient significance to be part of one of the four pillars comprising Subindex 1 - Basic Requirements. The assessment of its indicator is carried out through nine main components based on survey ratings and objective data.

¹³ [WEF_TheGlobalCompetitivenessReport2019.pdf \(weforum.org\)](#)



The calculation of the Global Competitiveness Index (GCI) is based on successive aggregations of ratings of the disaggregated indicator levels until the overall GCI is obtained. The weighting of the three main categories (subindices) depends on the development level of each country. To determine the weight of each pillar, a percentage weight is assigned to each indicator in advance, and the value of each component of the pillar is obtained from a series of surveys, adjusted with objective data to which a weight is assigned. The maximum rating is 100 and the minimum is 0.

Pillar 2: Infrastructure represents 8.3% of weight in the overall index, with the following weighting:

Pillar 2: Infrastructure	8.3%
A. Transport infrastructure	50%²
I. Road	25%
2.01 Quality of road network	
2.02 Quality of road infrastructure	
II. Rail	25%
2.03 Railroad density	
2.04 Efficiency of train services	
III. Air	25%
2.05 Airport connectivity	
2.06 Efficiency of air transport services	
IV. Sea.....	25%
2.07 Liner shipping connectivity ³	
2.08 Efficiency of seaport services	
B. Utility infrastructure	50%
I. Electricity	50%
2.09 Electricity access	
2.10 Electricity quality	
II. Water	50%
2.11 Exposure to unsafe drinking water	
2.12 Reliability of water supply	

Figure 12: Weighting of the Infrastructure Indicator in the 2019 GCI (Global Competitiveness Index) by the WEF (World Economic Forum)

Water accounts for 50% of the total score for public services infrastructure, with the other 50% being represented by electricity.

Spain's score in the infrastructure pillar is 90.3 out of 100, ranking seventh out of 141 countries worldwide:



2nd pillar: Infrastructure 0–100	-	90.3 ↑	7
Transport infrastructure 0–100	-	83.6 ↑	9
2.01 Road connectivity 0–100 (best)	100.0	100.0 ↑	1
2.02 Quality of road infrastructure 1–7 (best)	5.7	78.4 ↑	11
2.03 Railroad density km/1,000 km[[2	31.1	77.9 ↑	28
2.04 Efficiency of train services 1–7 (best)	5.4	72.9 ↓	9
2.05 Airport connectivity score	813,743.1	100.0 =	8
2.06 Efficiency of air transport services 1–7 (best)	5.6	76.9 ↑	18
2.07 Liner shipping connectivity 0–100 (best)	90.1	90.1 ↑	11
2.08 Efficiency of seaport services 1–7 (best)	5.4	73.0 ↑	16
Utility infrastructure 0–100	-	97.0 ↑	19
2.09 Electricity access % of population	100.0	100.0 =	2
2.10 Electricity supply quality % of output	9.5	94.3 ↓	56
2.11 Exposure to unsafe drinking water % of population	0.4	100.0 =	19
2.12 Reliability of water supply 1–7 (best)	6.6	93.6 ↑	16

Figure 13: Infrastructure indicators of the GCI (Global Competitiveness Index) from the WEF (World Economic Forum) in 2019

Spain's overall rating in the GCI indicator is 75%, placing it 23rd out of 141 countries:

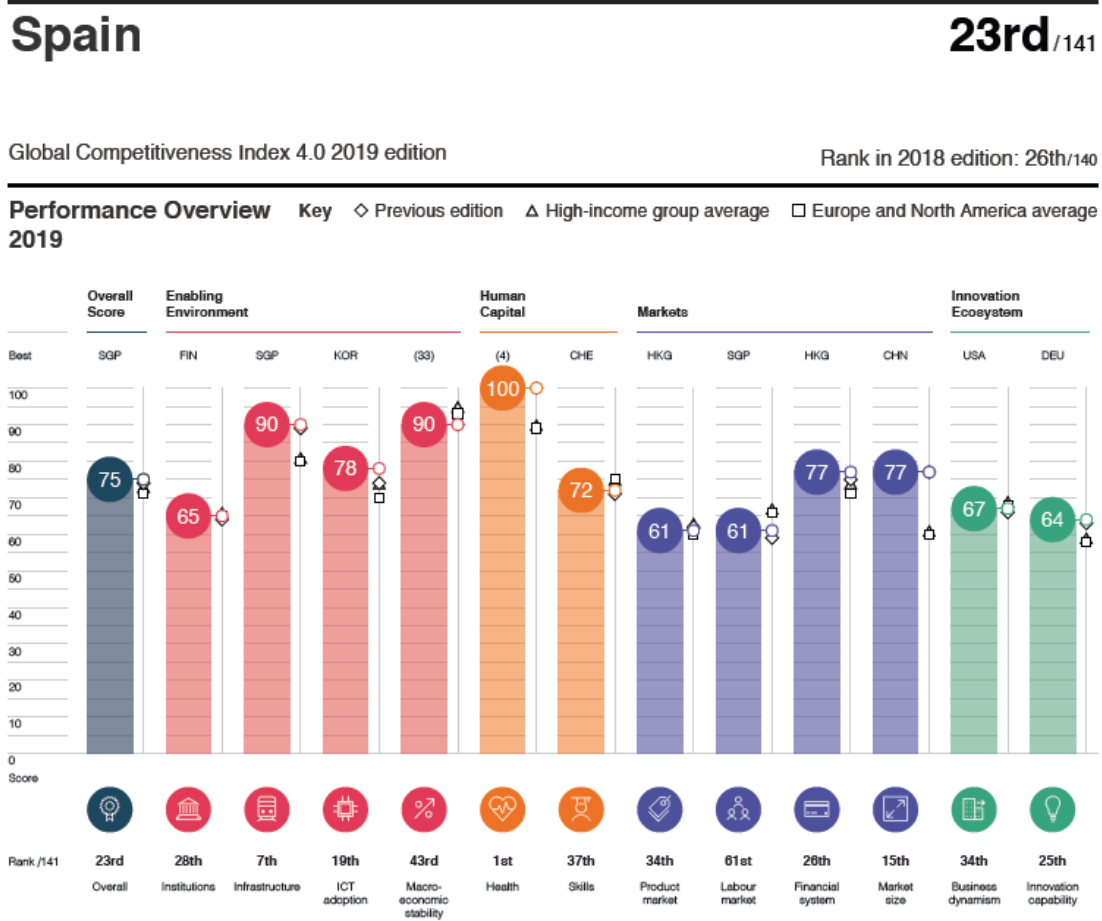


Figure 14: Spain's overall assessment in the GCI indicator of the World Economic Forum (2019)

3.- “The Global Adaptation Index (ND-Gain Indicators)”. University of Notre Dame (EE.UU.)

The Global Adaptation Index (ND-GAIN)¹⁴ by the University of Notre Dame is an open-source index that assesses a country's **vulnerability**¹⁵ to climate change and its **readiness**¹⁶ to utilize public and private sector investment for implementing adaptation actions to address climate change. The ND-GAIN index comprises over 74 variables, forming 45 basic indicators to measure the vulnerability and readiness of 192 UN member countries from 1995 to the present (due to data availability, ND-GAIN measures vulnerability for 182 countries and readiness for 184 countries).

Government agencies, multilateral organizations, NGOs, and many other entities that study the climate change adaptation measures implemented by countries use this classification and the associated indicators to evaluate countries' efforts in relation to climate change. All countries, to varying degrees, face the challenges of climate change adaptation. Some countries are more vulnerable to climate change impacts due to their geographic location or socioeconomic conditions. Additionally, certain countries are better prepared to take adaptation actions by leveraging public and private sector investments through national government policies, societal awareness, and the capacity of the private sector to engage. ND-GAIN measures both dimensions: vulnerability and readiness.

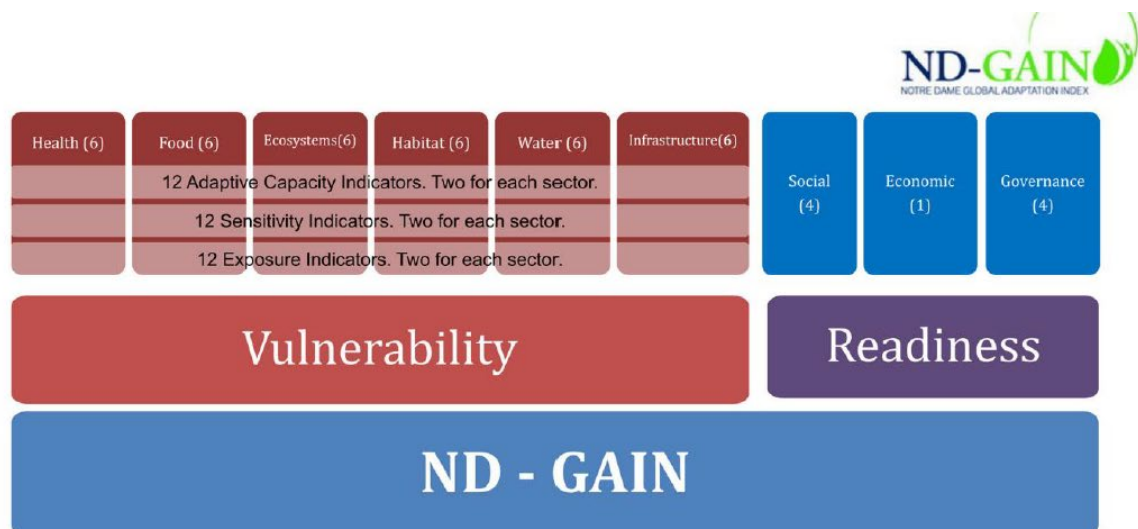


Figure 15: Summary of the vulnerability and readiness indicators from ND-GAIN

¹⁴ [Rankings // Notre Dame Global Adaptation Initiative // University of Notre Dame \(nd.edu\)](#)

¹⁵ ND-GAIN defines the concept of Vulnerability as: The propensity or predisposition of human societies to be negatively affected by climate threats.

¹⁶ ND-GAIN defines the concept of Readiness as: The willingness to make effective use of investments for adaptation actions due to a secure and efficient business and governmental environment.

The vulnerability is composed of 36 indicators grouped into three components (each component has 12 indicators) and six sectors (each sector has 6 indicators). The readiness consists of 9 indicators, grouped into three sectors.

The ND-GAIN index can be represented as a scatter plot matrix of readiness versus vulnerability.



Figure 16: Scatter plot: Vulnerability vs. Readiness by ND Gain

For assessment purposes: a higher vulnerability score indicates higher vulnerability ("worse"), a higher readiness score indicates greater readiness ("better"). Thus, vulnerability indicators are measured between 1 (lowest score) and 0 (highest score). Readiness indicators are measured between 1 (highest score) and 0 (lowest score).

The latest published ranking is from the year 2020 and shows the following results:



Rank countries by ND-GAIN Country Index, Vulnerability and Readiness.

Scores for 2020

ND-GAIN INDEX VULNERABILITY READINESS

Rank	Country	Income group	Score
1	Norway	Upper	75.4
2	Finland	Upper	72.0
3	Switzerland	Upper	71.9
4	Sweden	Upper	71.3
5	Denmark	Upper	71.1
6	Singapore	Upper	70.6
7	Austria	Upper	70.1
8	Germany	Upper	69.8
8	Iceland	Upper	69.8
10	New Zealand	Upper	69.7
11	United Kingdom	Upper	69.4
12	Luxembourg	Upper	68.6
13	Australia	Upper	68.5
14	Canada	Upper	67.5
15	Republic of Korea	Upper	67.2
16	France	Upper	66.9
17	Netherlands	Upper	66.6
18	United States	Upper	66.2
19	Japan	Upper	65.5
20	Slovenia	Upper	64.1
21	Ireland	Upper	64.0
22	Estonia	Upper	62.8
23	Belgium	Upper	62.7
24	Czech Republic	Upper	62.6
25	Portugal	Upper	62.2
26	Spain	Upper	61.8

Figure 17: Global ranking of the ND Gain Index for 2020

In the global ND Gain index, Spain ranks 28th with a score of 61.8 (the top country, Norway, has a score of 75.4).

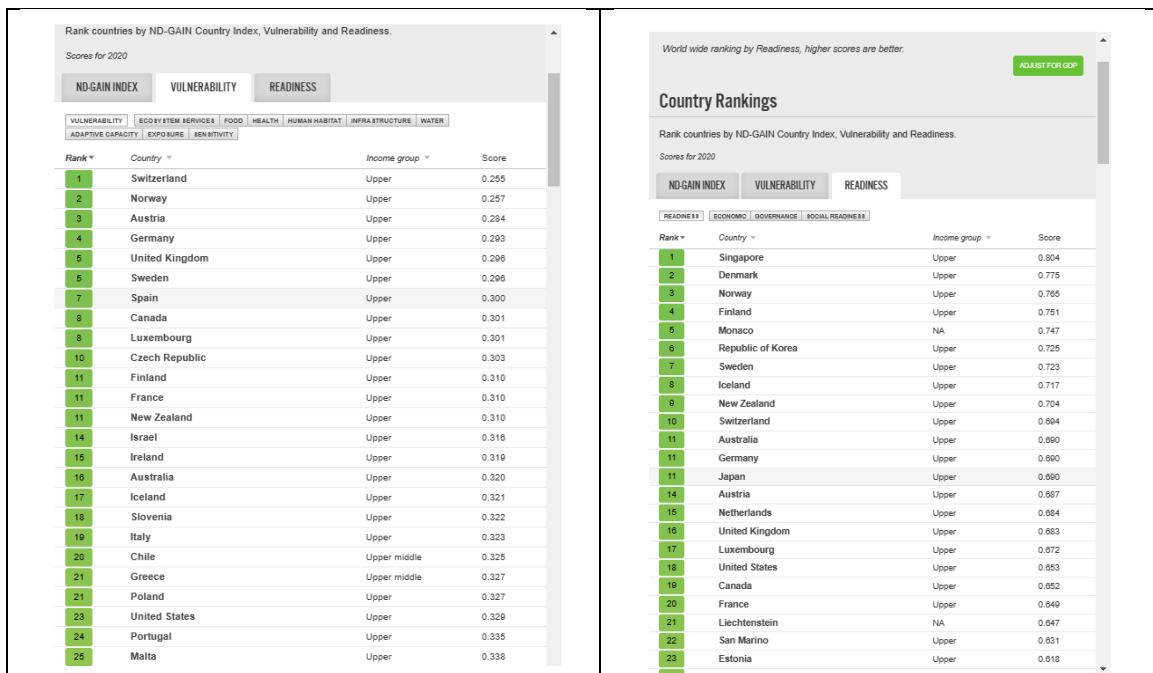


Figure 18: Ranking of Vulnerability and Preparedness in the 2020 ND Gain Index

In vulnerability, Spain ranks 7th with a score of 0.300 (the top country, Switzerland, has a score of 0.255). In preparedness, Spain scores 0.536 (the highest-scoring country is Singapore with 0.804).

The profile of Spain¹⁷ breaks down the results of all the indicators.

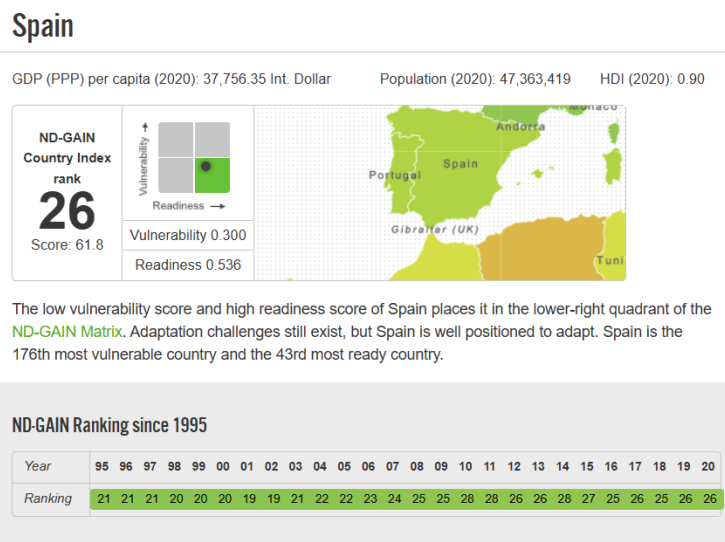


Figure 19: Position of Spain in the scatterplot and annual assessment of ND Gain

¹⁷ [Matrix // Notre Dame Global Adaptation Initiative // University of Notre Dame \(nd.edu\)](https://matrix.nd.edu/)



VULNERABILITY

READINESS

SECTOR COMPONENT

● Denotes worst scores

Indicator	2001 to 2020	Score
Vulnerability		0.300
Food		0.313
Projected change of cereal yields		0.801 ●
Projected population change		0.086
Food import dependency		0.185
Rural population		0.207
Agriculture capacity		0.601
Child malnutrition		0
Water		0.266
Projected change of annual runoff		0.453
Projected change of annual groundwater recharge		0.186
Fresh water withdrawal rate		0.237
Water dependency ratio		0.003
Dam capacity		0.715
Access to reliable drinking water		0.004



Health		0.228
Projected change of deaths from climate change induced diseases		0.030
Projected change in vector-borne diseases		0.658
Dependency on external resource for health services		0
Slum population		0
Medical staff		0.635
Access to improved sanitation facilities		0.044
Ecosystem Services		0.281
Projected change of biome distribution		0.647
Projected change of marine biodiversity		0.340
Natural capital dependency		0.038
Ecological footprint		0.343
Protected biome		0.149
Engagement in international environmental conventions		0.170
Human Habitat		0.373
Projected change of warm periods		0.084
Projected change of flood hazard		0.533

VULNERABILITY		READINESS	
			● Denotes worst scores
Indicator	2001 to 2020	Score	
Readiness		0.536	
Economic		0.499	
Doing business		0.499	
Governance		0.646	
Political stability and non-violence		0.638	
Control of corruption		0.597	
Regulatory quality		0.663	
Rule of law		0.687	
Social readiness		0.463	
Social inequality		0.403	
ICT infrastructure		0.682	
Education		0.625	
Innovation		0.141 ●	

Figure 20: Spain Indicators. ND Gain



ANNEX 6

Indicators from the main Spanish organizations for the Complete Water Cycle

In Spain, there are several key organizations that provide data on the Complete Water Cycle:

- Ministry for Ecological Transition and Demographic Challenge:
 - Water: [Agua \(miteco.gob.es\)](https://www.miteco.gob.es)
 - Public Bank of Environmental Indicators
 - Guide for the Development of Studies on the Physical Environment. Content and Methodology.
- Spanish Association of Water Supply and Sanitation (AEAS). Information available at: [AEAS - Asociación Española de Abastecimiento de Aguas y Saneamiento](https://www.aeas.es)
- IAGUA: [Mi iAgua | iAgua](https://www.iagua.es)