



Economic models for water management and pricing in Europe: the case of Spain

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On behalf of Europa

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1. General Introduction	1
2. The political framework	1
2.1 The local institutional organization in Spain	1
2.2 The institutional organization for the small water cycle	4
2.2.1 The public drinking water and sanitation service	4
2.2.2 Private drinking water and sanitation service	4
2.3 The implementation of public water and sanitation services	5
2.3.1 Drinking water service	5
2.3.2 Sanitation service	5
2.3.3 Management mode	6
2.3.4 Related regulations	7
3. The economic model of water services:	8
3.1 Funding	8
3.1.1 Associated institutions	11
3.2 variable fee (volumetric)	11
3.3 The fixed fee	11
3.4 Other royalties	12
3.4.1 Drought fee	12
3.4.2 Water royalty (canon del agua)	12
4. Principles of Water Pricing in Spain for Households ...	13
4.1 Tariff determination	13
4.2 Formation of tariffs	14
4.3 Tariffs for water services: Example of Canal de Isabel II	15
4.4 Example of an itemized water bill	16
4.5 Tariff approval	16
4.6 Costs borne by water services (OPEX / CAPEX)	16
4.6.1 Investment and operating costs	16
4.6.2 Evolution of costs	17

4.7	The elasticity of a household's water demand to the price of water.....	18
5.	Actions to be taken.....	19
5.1	Consequences of the drought in Spain	19
5.2	Avenues for a possible change in water pricing	19

1. GENERAL INTRODUCTION

This document describes the situation in Spain with regard to water management and pricing. It is part of a global project which includes the analysis of the situation in seven European countries (France, Ireland, the Netherlands, Romania, Germany, Latvia and Spain studied here) carried out with the aim of producing a publication intended for territorial decision-makers and whose subject is the following: "*The management of economic models and the pricing of drinking water services in the face of the need to save water*".

Spain has an area of 505,957 km², with a population of 47,432,805 inhabitants, and has a moderate population density, 94 people per km². The GDP per capita in 2021 is 25,460€.

Spain faces a major water management challenge: water scarcity, including the need to secure its supply, manage demand for competing water uses and recover overexploited water resources in the face of climate change.

2. THE POLITICAL FRAMEWORK

2.1 The local institutional organization in Spain

Spain is a decentralized state and the design and development of water policies and the allocation of water resources are carried out by the central government and the autonomous regions, in close collaboration.

Water management is a competence shared between the different territorial administrations.

The competences of the **General State Administration** in the area of sanitation and treatment are as follows:

- Draw up the basic regulations applicable to the treatment of urban waste water.
- Monitor compliance with obligations arising from European regulations in this area.
- Promotion of national instruments that involve all administrations and promote actions aimed at achieving compliance with the objectives established by the aforementioned legislation.
- Declaration of actions of general interest of the State.

The legislation of the **Autonomous Community** declares, in many cases, that the treatment and delivery of waste water to treatment plants is of interest to the Autonomous Community and, although the municipalities are recognized as competent in matters of water distribution and sanitation, planning is assigned to the Autonomous Community, through the formulation of Master Plans with their corresponding guidelines. In addition, the Autonomous Community is entitled to exploit the works that it promotes directly or those that are incorporated by agreement.

To ensure that sanitation and treatment targets are met and sustained over time, and to give small towns the capacity to meet these challenges, a growing number of regional governments have regional bodies responsible for implementation, maintenance and management of the service, which are maintained by the imposition of a sanitation and treatment fee. The structures and functions of the entities responsible for providing these services in some Autonomous Communities are already well established, but in others they have varied over time.

Chapter III of Title II of Law 7/1985, of April 2, 1985, regulating the bases of the local regime, establishes the competences of the local entities. Among all these competences, it is worth highlighting those concerning the urban environment (parks and public gardens, management of solid urban waste, etc.), as well as the supply of households with drinking water and the evacuation and treatment of waste.

In particular, the actions carried out by **the municipalities** in the field of sanitation are as follows:

- Provision of sanitation services.
- Planning of the municipal sanitation network, in accordance with urban planning.
- Construction of the municipal sanitation network, as well as its maintenance.
- Establishment of corresponding tariffs for sanitation services.
- Control of discharges into municipal networks.
- Establishment of areas that must be equipped with individual sewage systems, due to the fact that the municipal sewage network does not reach them.
- Development of works projects, both for sewage networks and for wastewater treatment plants (EDAR, in Spanish).
- Carrying out works projects for the sanitation networks and the EDARs, by financing these projects from its funds.
- The management of all these installations, in particular the EDARs, which can be managed jointly with other municipalities.

Municipal ownership of the service does not imply that the management of the EDARs must be carried out directly by the local councils, since these competences can be entrusted to the private sector and associations or consortia can be created to optimize the provision of the supply service and sanitation.

Article 44 of the Ley de Bases du Régime Local recognizes the right of municipalities to associate with other municipalities in joint associations for the joint execution of specific works and services within their jurisdiction. The “mancomunidades” (inter-municipal cooperation associations) have legal personality and the capacity to accomplish their specific objectives and are governed by their own statutes. In Spain, “mancomunidades” of metropolitan services are very common.

The decentralized nature of the country's water sector results in a complex regulatory and operational structure and processes. This low level of centralization combined with the existence of different models of administration and management of the water cycle provides a framework where responsibilities are shared between several public and private actors operating at different spatial scales.

The criteria used to regulate the water sector are shaped by the political strategies of municipalities, but also by the interventions and interests of higher levels of government, river basin authorities, water agencies, utilities and, finally, of the European Union. This, combined with the sources of water drawn and the quality of services provided, results in a wide range of prices for end users, depending on their location.

According to Spanish water legislation, each municipality in the country is competent to provide water services in its area of jurisdiction. In carrying out this responsibility, municipalities can choose either to provide these services on their own or integrate public communities called local water entities (*entidad local del agua*) in order to provide water services in a wider area. They can also choose between public, private or joint management models for the provision of water and sanitation services.

In Spain, there is no National Regulatory Agency. Consequently, the Spanish regulatory framework is less developed than in other countries. This implies political and administrative control by each municipality. Prices are collected by the *Comisiones de Precios* (Price Commissions) of each Autonomous Region. (OECD, 2020)

The Ministry of Ecological Transition is the national water resources management authority. It exercises this function through the Directorate General for Water, which is responsible for:

- The elaboration of the National Hydrological Plan, the regulation of the Basin Plans and their coordination with the sectoral plans;
- The water resources information system;
- Coordination of emergency plans;
- Inspection and safety control of hydraulic infrastructures;
- The establishment of criteria for the conservation of aquifers;
- The encouragement and promotion of activities for the purification and reuse of treated water and, in general, of all the measures intended to favor water saving.

The National Water Council, in force since the law of 1985, is the highest consultative body whose attributions are to report on the draft National Hydrological Plan and the Hydrological Plans of the Basin. Public, regional, local and central administrations are responsible for water management in Spain.

The Basin Organizations, or Hydrographic Confederations, created in 1926, are the highest authority in the management of water resources at basin level. Its main role is the protection and sustainable use of water. (Fundacion, s.d.)

AEAS (Asociación Española de Abastecimientos de Agua y Saneamiento) is the technical and professional association of entities, institutions, operators and partner companies and individual experts who carry out the operation, maintenance, operation and the management of urban water supply and sanitation networks, whether public-private or mixed.

The Catalan Water Agency (ACA) is the public company of the Generalitat de Catalunya responsible for planning and managing the water cycle in accordance with the basic principles of the Water Framework Directive. The Catalan Water Agency works to ensure the sustainable use of water resources in Catalonia.

Water quality management is ensured by different administrations, regional, local or central, depending on whether it is an intra-community or inter-community component.

2.2 The institutional organization for the small water cycle

2.2.1 *The public drinking water and sanitation service*

The generalized management is in the hands **of the public administrations**, through entities comprised between the State or the autonomous administration itself and the local entities, and which are therefore responsible for promoting economic activities related to water and their public promotion. In Spain, urban water supply, sewerage and waste water treatment services fall under municipal jurisdiction - Articles 25 and 26 of Law 7 (April 2, 1985), regulating the basis of the local regime.

Nearly half of the population is served by private or mixed public-private water companies. However, all major cities are served by public companies except Barcelona and Valencia.

The largest public company: Canal de Isabel II, serves the metropolitan area of Madrid and has 157 treatment plants as well as a 17,700 km pipeline network.

The town halls ensure the provision of final services to users, such as those corresponding to the supply of drinking water and sanitation. The private sector tends increasingly to participate in these services through administrative concessions, with the municipality retaining the regulatory function.

2.2.2 *Private drinking water and sanitation service*

The private sector also performs a relevant function in the management of water resources vis-à-vis the end user. The Communities of Users (called Communities of Irrigation when the priority use of water is irrigation) and the concessionaires with a right of private use of the resource, are the two main institutions that make up the participation of the sector.

Private companies operate under concession contracts with municipalities. The largest, with a market share of around 50% of private concessions, is Aguas de Barcelona (Agbar), the Catalan subsidiary of French Suez.

With a second large multi-service group: Fomento de Construcciones Contratas (FCC), they alone control 80% of the private water management market in Spain.

2.3 The implementation of public water and sanitation services

2.3.1 *Drinking water service*

Water supply and sanitation in Spain are characterized by unequal drinking water coverage and variable quality of service. In 2020, the Ministry of Health detected toxic, non-drinkable levels in the distribution networks of 4,243 of the 8,131 Spanish municipalities, requiring supply by tanker transport or new plugs.

10% of the population is served by local entities (direct public management), 22% by public-private companies (considering delegated public management), 34% of services are provided by public companies, and 34% by water services are provided by private companies (delegated private management). The tariffs for water supply and sanitation in the country are unequal according to the territories. (OIEau, 2020)

The distribution of the population supplied by public, private and mixed entities remains balanced. The sector is a good historical example of public-private collaboration, where 35% of the population is supplied by public entities, 33% by private companies, 22% by mixed companies and 10% by municipal services (AEAS, 2022).

In Spain, there is great controversy over the privatization of water (Spain being one of the European countries where the privatization of local services is the most advanced), its quality, political corruption (in the allocation of concessions involving mayors...) and the pressure of private interests to avoid the municipalization of public services.

2.3.2 *Sanitation service*

Spain has 1,777 wastewater treatment plants including 31 plants with primary treatment, 577 plants with primary and secondary treatment and 1,169 plants with treatment more stringent than secondary in 2020. (OIEau, 2020)

Spain has some 1,640 drinking water treatment plants (EDAR) which supply an annual total of 4,057 hm³ to urban reservoirs and distribution networks. The country also has 29,305 water storage tanks ((AEAS), 2022)(given from the “National Study on Drinking Water Supply and Sanitation in Spain” (2022), Spanish Supply Association water and sanitation).

Water supply —total water leaving distribution reservoirs for consumption— is 245 liters per capita per day for all uses, up for the first time since 2007. This increase appears to be due to a slight increased consumption and an increase in unrecorded water.

According to data from the study (UNED), currently, in Spain, the actual investment annual average does not reach 50% of what is needed. In this sense, urban water needs an additional annual investment of 2.5 billion euros, up to 4.9 billion euros/year, to guarantee

the quality and sustainability of services and to face to these future challenges. This represents an additional 53 euros per inhabitant and per year.

The total annual amount billed to all consumers for urban water in Spain decreased by 0.3% to 7.6 billion euros, of which approximately 56% corresponds to water supply, 27% to wastewater treatment, 13% for sanitation and 4% for other expenses such as the maintenance of meters or connections.

With regard to water distribution networks, Spain has a total of 248,245 km of networks. The aging of these installations continues to be evident, since their renewal percentage decreases to 0.2%.

The Country enjoys a universal connection to water supply and sanitation. However, in sensitive areas, 34% of wastewater is still not treated according to the requirements for stricter wastewater treatment (i.e. beyond secondary treatment). In addition, 12% of wastewater still does not meet secondary treatment requirements, and 0.5% of wastewater, corresponding to 300,000 inhabitants, does not yet.

In total, 43% of the population is served by private companies for wastewater service, 56% according to the delegated public management model and 1% is administered directly by local entities.

Moreover, although the vast majority of the management of this part of the wastewater treatment is public (mainly public companies and supra-municipal consortia), the operation of the plant is generally entrusted to private companies through contracts. The maintenance and operation of the plant is carried out by private entities, while the supervision of these activities is mainly the responsibility of public institutions.

2.3.3 Management mode

98% of the urban population and 93% of the rural population are connected to mains drainage. The rest is taken care of by on-site sanitation systems such as septic tanks.

100% of public tap water in Spain is considered potable according to the Ministry of Health, which is responsible for water quality. However, the quality of tap water can vary greatly between regions and even streets within the same city. This is due to the quality of the local water infrastructure and the fact that many pipes in Spain are quite old and the local authorities use chlorine to keep them clean.

Each local supplier must report certified laboratory tests every 6 months, resulting in more than 40 million reports per year available on the National Drinking Water Information System of the Ministry of Health, Social Services and Equality (SINAC). To find out where the water comes from in the locality, when was the last test and the results of the tests carried out, users are also encouraged to consult SINAC.

Each water utility is also required to provide a water quality analysis report upon request.(Fundacion, s.d.)

2.3.4 *Related regulations*

The Water Law of the year 1985 was published in the Official State Gazette on August 2, 1985 and entered into force on January 1, 1986, today the current regulations are given by Royal Legislative Decree 1/2001, of July 20, approving the text of the water law. Among its basic principles are:

- **The public nature of waters:** One of the most innovative contributions of the law is to establish that all continental, surface and underground waters are an integral part of the hydraulic public domain.
- **Hydrological planning :** The law establishes hydrological planning as an instrument for organizing water management in the basin. Hydrological plans are not simple work programs but instruments of a normative nature which adapt the generic provisions of the law to the particular conditions of each basin.
- **The Basin Organizations :** are the entities in charge of drawing up the hydrological plans of the inter-municipal and intra-community basins as a specialized, decentralized and participatory authority for water planning and management.

Law 29/1985 was amended by Law 46/1999, deepening environmental aspects such as the authorization of discharges, the control canon of discharges, the reuse of waste water and the desalination of sea water. Of particular interest is the introduction of contracts for the transfer of water use rights, the first step in the creation of an incipient water market at the national level.

In Spain, drinking water, whether from the public network or from other sources, must comply with the standards set out in the European Directive (98/83/EC) on drinking water. It is the duty of each EU Member State government to translate the requirements of the directive into local law, which must at least meet the requirements of EU law. (Baldo, 2021)

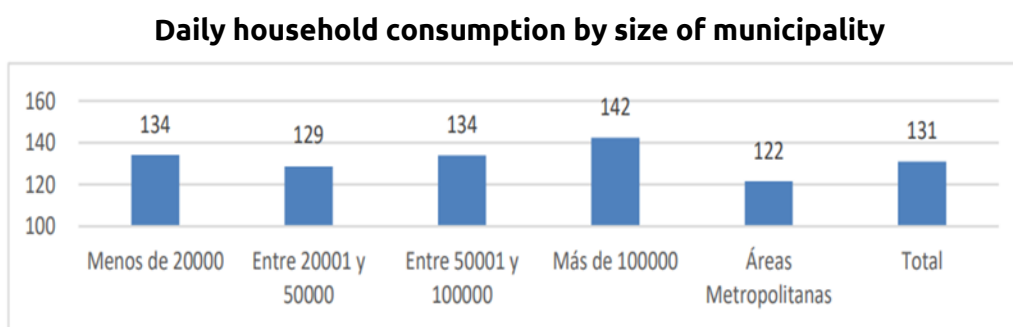
The European and Spanish standards are based on the advice of the World Health Organization, through the WHO guidelines for the quality of drinking water, which are regularly updated to take into account new knowledge. .

3. THE ECONOMIC MODEL OF WATER SERVICES:

3.1 Funding

Water financing is complex in Spain, where each stage of the water cycle (capture, distribution, treatment, planning) is managed by a separate entity, which could lead to a loss of efficiency and a lack of transparency. .

Average household consumption increased slightly, from 128 to 131 liters per capita per day, one of the lowest in Europe. Consumption is lowest in metropolitan areas, falling to 122 litres/capita/day.



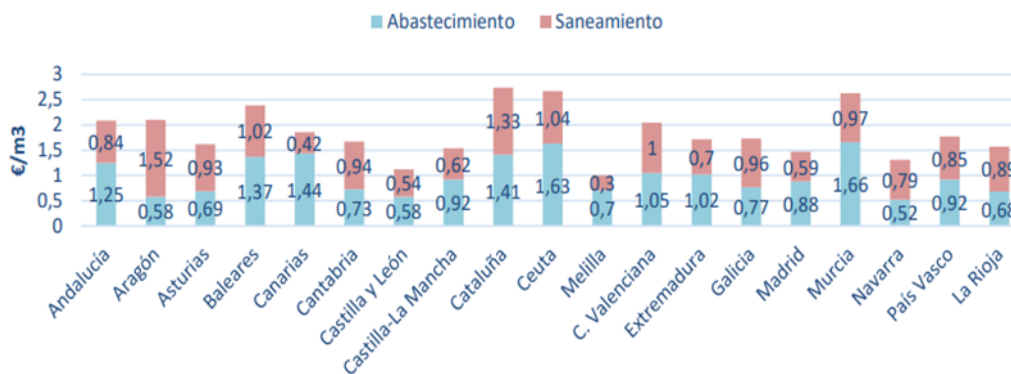
Source: ((AEAS), 2022)

In 2022, the average price of domestic water (excluding VAT) will be €1.97/m³ and the water bill will represent 0.9% of household budgets, i.e. one of the lowest in Europe, as Spain is not meeting the "cost recovery" target.

According to the results of the recent AEAS-AGA 2022 tariff study, the average price of domestic water in Spain amounts to 1.97% (excluding VAT). Of this amount, €1.09/m³ (55%) corresponds to the supply service and €0.88/m³ (45%) to the sanitation service.

In general, tariffs have been contained, as evidenced by the increase of only 0.51% per year in the stable domestic supply service. With one euro cent a citizen has 5 liters of water (supply and sanitation included). These prices are far from covering the cost of the services, contrary to the requirements of the Water Framework Directive. The regional and local heterogeneity of tariffs is maintained in the absence of harmonization of tariffs or a generic national framework.

Domestic tariff (supply and sanitation) by region



Source : ((AEAS), 2022)

Although it is one of the European countries where water resources are limited, the impact of water bills on the household budget is, on average, less than 0.7%, well below the 3% set by the UN as the threshold for accessibility of the human right to water. So, 1.97 euros can provide the same volume of water as 1,000 one-liter bottles of water bought in a supermarket.

In Spain, the tariffs are very heterogeneous according to the localities and do not cover all the costs of the urban water services, which has an impact on the progressive deterioration of the infrastructures. The current tariff only, and not always, covers the operating costs of the service, but not those related to infrastructure: depreciation, renovation and new actions aimed at improving the yield or quality of water services.

The water sector insists on the fact that it considers it necessary to establish a clear and transparent cost and tariff structure for consumers, so that the price of water reflects its real value and guarantees the sustainable management of the long-term service and the investments needed to modernize water resources and improve infrastructure.

In this sense, the sector reiterates that there should be a controlled and progressive tariff increase staggered over the next 10 years, which would bring Spain to levels similar to the European average. This would make it possible to comply with the precepts of the Water Framework Directive which establishes the principles of "cost recovery".

Water charges should also be transparent and targeted, in order to improve service, particularly for wastewater treatment.

Despite the efforts made in recent years to equip itself with a large number of treatment plants, and although some progress has been made, Spain is still not achieving the objectives set by the European Union and must pay fines for this.

65% of the water withdrawn for supply corresponds to surface water, 26% to groundwater and springs, and the remaining 9% to desalinated water.

Regarding the sanitary conditions of drinking water, the exhaustive monitoring of operators and health authorities shows that consumers can have full confidence in the sanitary conditions and quality of drinking water.

The rates are not the same from one commune to another.

The price varies according to different parameters:

- The pricing policy of each municipality

- The level of consumption
- The existence of possible subsidies for large families or people at risk of social exclusion.
- The type of installation

For example, some municipalities include in the water bill other elements such as waste taxes or waste management. These elements add considerably to the price of the invoice and do not constitute an expense of the supply itself.

Normally, the tariffs fix a minimum access charge and a variable part according to consumption. The price per cubic meter is fixed linearly or in installments (i.e. cubic meters are charged up to a certain limit at a given price, but the second installment at another, higher price) to discourage wastage of water.

The bill for a household with average consumption (about 175 cubic meters per year) is 301.15 euros. However, there are huge differences between municipalities. Thus, a family from Murcia that spends the same amount of water as a family from Palencia will pay 552 euros instead of 157 euros, or 254% more.

The relatively higher price in some cities can be explained by increased supply difficulties, but this limitation of the resource should only affect part of the bill, and should not have an impact on the cost of sanitation or wastewater treatment. In addition, the weight of these elements is very variable. In Valencia, for example, 10% is related to metering equipment, while in other cities it is not charged.

As a result, in many municipalities savings are not encouraged for various reasons: it is a politically sensitive issue for mayors, not all cities have a block pricing system, or they fail to achieve the effect of promoting savings, or the fixed costs are so high that they cancel their function.

In 2013, the unit cost of a liter of water was 2.73 € per cubic meter in Murcia, compared to 1 € in Castile and Leon, while the daily consumption per inhabitant of individuals reached, in 2013, 130 liters per person, down 3.7% compared to 2012, the average price per cubic meter being 1.83 €.

In this area, the OECD argues that per capita household consumption, which is already one of the highest in Europe, could continue to grow if prices do not rise, and stresses that urban consumption has been slower in areas where prices increased the most.

The European Union is one of the main donors to the Spanish water and sanitation sector. It does this both through grants from the European Commission and through loans from the European Investment Bank.

Generally, a two-part tariff system has been imposed, with a fixed connection charge and a variable or volumetric consumption charge. These fees are already included in the water tariffs.

3.1.1 Associated institutions

The Authority responsible for setting prices is the Regional Pricing Commission and Regional Administration.

The Revenue Collection Authority is:

- For the Supply Department: urban water distribution operators (public or private).
- For the Sanitation Service: municipalities (through public or private service providers) and regional water agencies

The Authority responsible for the reinvestment of income:

- For the Supply Department: urban water distribution operators (public or private) and regional water agencies
- For the Sanitation Service: municipalities and regional water agencies

3.2 variable fee (volumetric)

The variable charge is based on the volume of water consumed by each household (in cubic meters). Additionally, most cities use an increasing block tariff (IBT) model to design their volumetric water load, with the amount increasing according to the consumption band. Nevertheless, the structure of the IBT differs considerably from one city to another:

Town	Billing period	Type of tariff	Number of jars	Size of the 1st block (m³/month)	Last block size (m³/month)	Price of the 1st block (€/m³)	Price of the last block (€/m³)
<i>Alicante</i>	Quarterly	IBT	4	4.00	21.00	0.01	2.56
<i>Barcelona</i>	Monthly	IBT	5	7.00	18.00	0.61	3.04
<i>Bilbao</i>	Quarterly	IBT	3	8.33	25.00	0.57	3.04
<i>Cordoba</i>	Fortnightly	IBT	3	9.00	18.00	0.79	1.25
<i>Madrid</i>	Fortnightly	IBT	3	12.50	25.00	0.13	0.50
<i>Seville</i>	Monthly	IBT	3	4.00	5.00	0.50	1.61
<i>Valence</i>	Fortnightly	IBT	2	6.00	6.00	0.47	0.55
<i>Valladolid</i>	Quarterly	IBT	5	5.33	15.00	0.27	0.66
<i>Zaragoza</i>	Quarterly	IBT	3	6.00	18.48	0.21	1.26

Table 1: Water tariff structure: volumetric charges. From (Fernando Arbués, 2021)

The sewerage tariff is collected on behalf of the respective municipalities and is usually linked to water consumption, although one can find tariffs where the basis of calculation is, for example, the cadastral value. Just like the flat-rate structure for drinking water, that for sanitation is based on a fixed part as well as a part that is most often volumetric.

3.3 The fixed fee

The fixed part is applied in order to be able to guarantee the services to the citizen when he needs them, and on the other hand to ensure a minimum income to cover the fixed cost that the companies or suppliers. This fixed part is based on a minimum billing, a fixed fee or both.

The minimum billing consists of billing a minimum volume even if there is no consumption, once this volume is exceeded, it is billed for the actual consumption that has been made.

The components of the drinking water service tariff are as follows:

- The fixed charge: can also vary according to the tariff category (residential, commercial, industrial, official, spa) and the diameter of the connection (for drinking water).
- The flat rate charges for the sanitation services provided by the companies vary according to the tariff category and the type of sanitation (conventional or settled effluent).

3.4 Other royalties

3.4.1 Drought fee

In Spain, only in exceptional cases and during drought years, a drought charge is applied to the water bill in order to deter high levels of water consumption. This drought tax disappears with the increase in rainfall.

3.4.2 Water royalty (*canon del agua*)

It is an environmental tax that taxes the use of water and the pollution that its discharge can produce.

Its collection is intended to cover the investment and operating costs of infrastructures, recover and maintain ecological flows, prevent pollution and other actions provided for in hydrological planning.

This is intended to protect water resources, with the aim of guaranteeing supply and quality. The fee is calculated on the basis of water consumed by domestic and industrial users and is designed as an increasing flat rate.

The distributing entity collects it through the water bill on behalf of the Catalan Water Agency (ACA), except for industrial and similar users with an individualized pricing system to which the ACA pays the fee directly.

4. PRINCIPLES OF WATER PRICING IN SPAIN FOR HOUSEHOLDS

4.1 Tariff determination

In Spain, urban water services fall under municipal competence and each local entity may have different prices and tariff structures.

The municipality establishes the tariffs and royalties and defines their structure according to the costs related to the activity. Expenditures that depend on physical and demographic characteristics, such as the orography of the land, the availability of the resource, the density of the population, the seasonality of consumption, the quality of the service, the type of infrastructure financing, the type management and economies of scale, among others. In addition, local authorities are required to inform the local council annually of changes in tariffs and service standards.

In 2020 the price of water on average is 1.78 €/m³. (OI Eau, 2020)

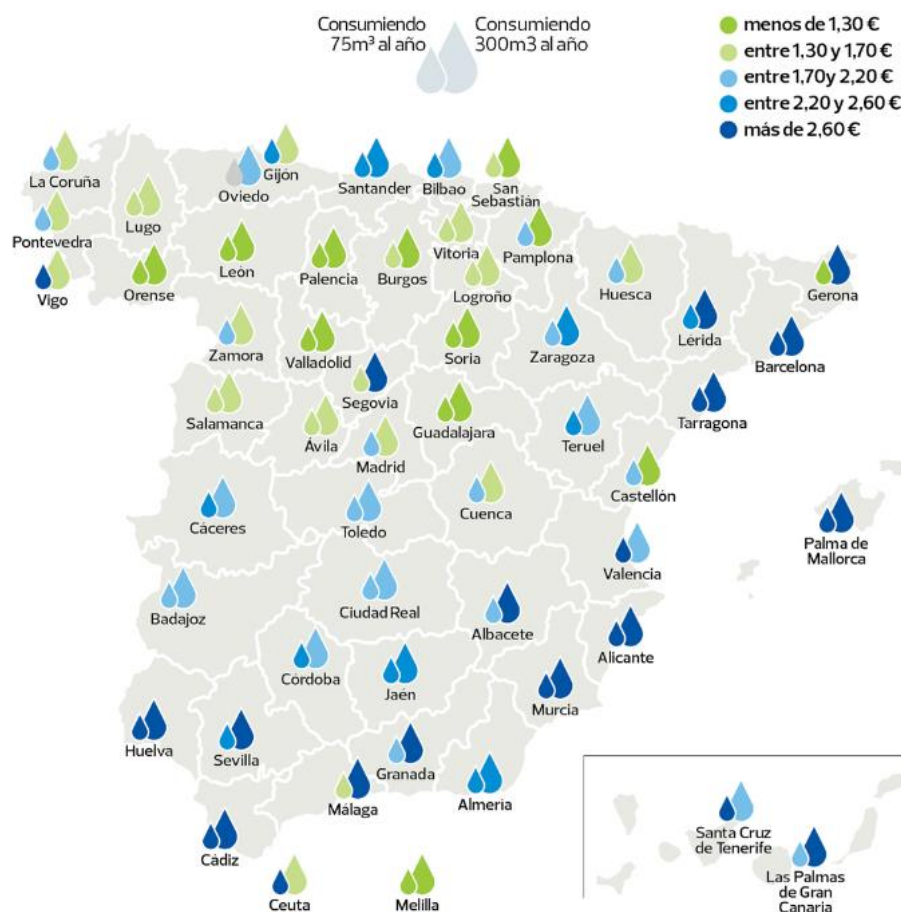


Figure 1: Cost per m³ of water by location in 2020. Source: (OCU, 2020)

4.2 Formation of tariffs

The price of water translates into two-part pricing: a fixed part and a variable part.

Water tariffs are usually calculated on a sliding scale, and a wastewater bill. Each city in Spain has its own water companies. In general, the amount of the bill is calculated based on the volume of water consumed, preferably determined by individual meters. For the most part, the price per cubic meter is established according to consumption brackets.

Potable water	Consumption m ³ per month		Tariff (USD/m ³)	Tariff (€/m ³)
1 st Block -	Until 16.04		0.66	0.54
2 nd Block _	16.05 to 20.15		1.13	0.92
3 rd Block _	20.16 and above		2.14	1.75
Other Charges	Fees (USD)	Fees (€)		
Fixed charge (USD/MB)	11.57	9.43		
Tax (VAT) (%)	10	10		

Table 2: Drinking water service price list in Seville in 2021. Source: (IBNet, 2021)

Waste	Consumption m ³ per month		Rate (USD/m ³)	Tariff (€/m ³)
1 st Block -	Until 16.04		0.84	0.68
2 nd Block _	16.05 to 20.15		1.47	1.2
3 rd Block _	20.16 and above		2.5	2.04
Other Charges	Fees (USD)	Fees (€)		
Fixed Charge (USD/MB)	3	2.45		
Tax (VAT) (%)	10	10		

Table 3: Wastewater service price grid in Seville in 2021. Source: (IBNet, 2021)

Water meters are a well-established method in Spain of billing users for consumption. The only consumption that is not generally measured is that which is not billed, such as municipal buildings and standpipes in parks and gardens. However, the problem is that many Spanish municipalities contain old meters, which increases measurement errors. In Spain, 27% of metering installations are more than 10 years old.

The average prices of urban water cycle services, estimated by dividing the annual billing of services by the volume of water services billed, turn out to be higher in river basins with less rainfall. Average prices also tend to be higher in river basins where less use is made of surface water sources and therefore groundwater sources or seawater desalination are more prevalent.

Overall, surface water source is the most common (77%), followed by groundwater (18%) and water obtained through desalination processes (5%); however, in municipalities with less than 50,000 inhabitants, the use of groundwater is higher (44%) as well as desalination

water sources (15%). In peninsular Spain, water desalination is concentrated on the Mediterranean coast.

4.3 Tariffs for water services: Example of Canal de Isabel II

Water tariffs in the Community of Madrid have not increased in the last seven years: they are almost 25% cheaper than the Spanish average. A liter of water in Madrid costs 0.001486 €.

The rates will nevertheless vary according to the associated use as well as according to other parameters such as seasonality, water being more expensive in summer in order to encourage savings in this resource.

Consumption	Winter (October 1-May 31)	Summer (June 1 - September 30)
Up to 25 m³/bimonthly	0.2965 €/m ³	0.2965 €/m ³
From 25 to 50m³/bimonthly	0.5486 €/m ³	0.6855 €/m ³
More than 50 m³/two months	1.3163 €/m ³	1.9746 €/m ³

Table 4: *Seasonal supply tariffs 2022 CANAL DE ISABEL II. Source (Clientes, 2022)*

Consumption	Price per m ³
Up to 25 m³/bimonthly	0.1335 €/m ³
From 25 to 50m³/bimonthly	0.2103 €/m ³
More than 50 m³/two months	0.5016 €/m ³

Table 5: *Distribution tariffs 2022 CANAL DE ISABEL II. Source (Clientes, 2022)*

Consumption	Price per m ³
Up to 25 m³/bimonthly	0.1094 €/m ³
From 25 to 50m³/bimonthly	0.1203 €/m ³
More than 50 m³/two months	0.1472 €/m ³

Table 6: *Sanitation tariffs 2022 CANAL DE ISABEL II. Source (Clientes, 2022)*

Consumption	Price per m ³
Up to 25 m³/bimonthly	0.3115 €/m ³
From 25 to 50m³/bimonthly	0.3556 €/m ³
More than 50 m³/two months	0.5431 €/m ³

Table 7: *ISABEL II CHANNEL 2022 debugging rates. Source (Clientes, 2022)*

When the water supply comes from self-sufficiency, in the absence of a meter, and is intended for domestic use or assimilated to domestic use, the tariff corresponding to the sanitation service will consist of a flat rate, the bimonthly amount of which will be of 22.51 euros and that the user who benefits from the debugging service will be charged. If the self-supply source supplies more than one domestic user, the amount of the tariff will be the result of its multiplication by the number of households or uses served.

4.4 Example of an itemized water bill

Water bills in Spain are usually paid monthly or quarterly and the user can pay in different ways, including direct debit.

4.5 Tariff approval

Like the water service, tariff regulation is a variable factor depending on the municipalities and the services. In Spain, whatever the form of management, the tariffs must be approved by the public administration. The Tariffs Commission (entity dependent on the Autonomous Communities and allowing in particular the revision of tariffs) and the administration of the municipality are generally responsible for authorizing the tariffs of the main water services of a locality. In some cases, only one of the two entities makes the decision.

The municipal council approves tariffs in 96% of Spanish municipalities, the other cases being approved by a municipal association.

4.6 Costs borne by water services (OPEX / CAPEX)

4.6.1 *Investment and operating costs*

The investment and maintenance costs of water service infrastructure, which include abstraction, transport and storage, are generally financed by the public budget, charging only part of the total costs to the final user. However, in many cases the charges do not cover investment costs and are often insufficient to cover running or maintenance costs.

In the construction of infrastructures, it is common to identify funding from various administrations: provincial government, regional government, national government or European Union. This therefore creates a complex web of infrastructure subsidies. The situation becomes more complex when the infrastructure is shared between different uses, for example the regulation and transport of raw water for populations, energy uses and irrigation. In these cases, it is therefore necessary to distribute the costs between the different uses.

Also, there are funding problems for urban water services in less populated municipalities. According to the Spanish Ministry of the Environment, the largest discrepancies usually occur in less populated municipalities where government-funded investment costs are not recovered. In addition, the deterioration of infrastructure financed by grants is not taken into account, so that the allowance for depreciation of these assets is not made.

In Spain, tariff revisions are generally carried out annually. However, local governments, in their role as water price supervisors, have been primarily concerned with ensuring that prices do not rise at a faster rate than the consumer price index. (García-Rubio & González-Gómez, 2015)

The increase in the price of water services in urban areas is very unpopular and often considered political suicide. In fact, geographically neighboring municipalities approve

similar water prices. In this way, local governments are likely to seek to avoid citizens perceiving a comparative disadvantage in paying water tariffs.

Nevertheless, although in most municipalities, urban water services are satisfactory, prices will have to increase in the coming years to ensure continuous quality service and begin to correct the infrastructure deficit affecting urban water services in Spain.

4.6.2 Evolution of costs

Spain has shown an increase in these drinking water and sanitation tariffs in recent years. This price increase is justified by the increase in investment in sanitation and purification, in favor of the environment, and also required by European legislation. Nevertheless, despite these increases, the level of prices in Spain is still below the European average (AEAS, 2010).

This situation is due to a lack of investment in water infrastructure in Spain in the past, with a very low renewal rate which has only worsened the situation year after year.

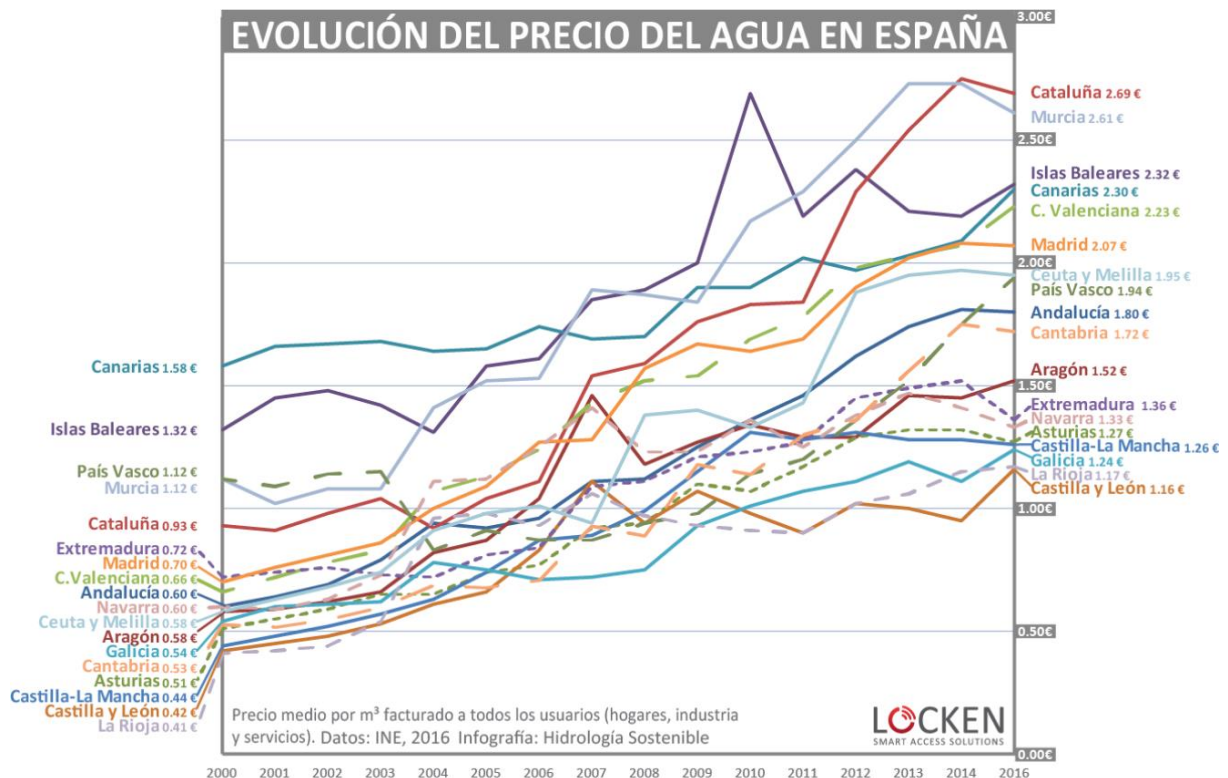


Figure 3 : Evolution of water prices in Spain. Source: (aguas, 2016)

We see that among those who have increased their prices the most, there is Catalonia, followed by the Valencian Community and Madrid. However, these variations were not linear, prices did not increase by the same amount each year. In each Autonomous Community they varied in a different way.

The Balearic Islands had the highest price in Spain in 2010, the same as Catalonia's current price of €2.69. But its price has since fallen to €2.32 in 2016. On the contrary, Catalonia had a price of €1.83 in 2010, ranking fourth in Spain, rising in 6 years to first place.

Economic factors, such as the crisis that began in 2008, political factors and even weather conditions can influence water prices. In view of their number, it would be insufficient to take into account only one, two or three.

4.7 The elasticity of a household's water demand to the price of water

According to the results of various studies carried out, the price elasticities of demand for electricity and drinking water are, in absolute value, less than one. Drinking water has the narrowest range compared to electricity or even natural gas, which has the widest range. With respect to drinking water consumption, the price elasticity obtained in this study is inelastic. (Galvez, Mariel, & Hoyos, 2016)

However, an older study conducted by the EEA suggests the opposite: the uninterrupted decline in demand for domestic water observed in Spain between 2004 and 2009, would seem to be correlated with the constant increase in prices. This with the gradual increase in the price of water triggered by the transposition of the WFD (the average price of water for households rose from 0.73 EUR/m³ to 1.42 EUR/m³ between 2000 and 2009) coincides with the drop in consumption between 2004 and 2009 (falling from 171 to 149 liters per inhabitant per day). (EEA, 2013)

5. ACTIONS TO BE TAKEN

5.1 Consequences of the drought in Spain

The availability of drinking water in Spain is often affected by droughts. The trend is moving in the direction of desalination: Barcelona receives more than 20% of Spain's drinking water thanks to desalination. The water quality does not suffer, but the taste seems strange just like in the situation of adding chlorine done in some areas. Therefore, most users prefer to drink bottled water or use water delivery services. This can affect the demand for drinking water and therefore contribute to the reduction of its consumption.

Additionally, there are areas in Spain where the pipes are old and/or exposed to contamination, or where the water comes from an unsafe source and the water needs to be filtered.

Users are encouraged to purchase water filters as well as use technologies such as activated carbon to filter chlorine from water and other unwanted substances from tap water to make it taste better. .

5.2 Avenues for a possible change in water pricing

First of all, it might be interesting to consider the establishment of a national control body. However, setting up an organization of this nature is not without challenges in the current Spanish decentralized framework. The ability of this organization to dictate political regulations and judicial functions may conflict with the municipal autonomy enshrined in the Spanish Constitution and with the powers of the Autonomous Communities. These problems are not insurmountable, since the national government has the legal authority for primary legislation.

Then, some public companies start investments for the production of renewable energy: implementation of Solar Plan in order to increase the production of clean energy for the self-consumption of the installations thanks to photovoltaic panels; installation of green hydrogen generation plants to obtain this gas from recycled water (example at the Arroyo Culebro Cuenca Media-Alta wastewater treatment plant).

Finally, the OECD estimates that EU member states will need to invest 253 billion euros between 2020 and 2030 in the wastewater sector to ensure and maintain compliance. According to the OECD, Spain should increase its investments by around 49%.

This, however, must be seen in the context of current investments per capita which are relatively low compared to other countries (rank 17 out of 28 in the EU). The country's current fiscal situation limits public spending. With the fact that affordability could be an issue that could restrict the ability to tap into commercial debt financing in the future. (OIEau, 2020)

The Spanish authorities have also themselves identified high investment needs for the coming period in order to comply with the UWWTD directive: nearly 6.5 billion euros. This concerns work on the treatment plants, the planned investment cost of which is 4.5 billion euros (4,451 million euros) and work on the collection and/or SAI systems, the the planned investment cost is 2 billion euros (2,044 million euros).

The methodologies used by the OECD and the Spanish authorities for the estimates are different, for example the work on IAS and for the treatment of stormwater overflows have been taken into account differently. The OECD has taken water supply costs into account, but these are not included in the reports of the Spanish authorities. It would therefore be relevant to harmonize the estimation methodologies.

The Spanish government recently announced the new DSEAR Plan, which includes considerable investments in water in Spanish, in three pillars:

- i) wastewater,
- ii) water efficiency and
- iii) Reuse of water.


Appendix:
**Economic models of water management
 and pricing in Europe: Spain**


Figure 2: Water bill 2022. Source: (ACA, 2022)