


Article

The Financial Model for Water and Sanitation Services in Portugal: Lessons from Decades of Subsidies and Questionable Public Policies

Rui Cunha Marques ^{1,2,*} , Pedro Simões ^{1,2} and Eduardo Marques ³¹ RCM2+, Lusófona University, 1749-024 Lisbon, Portugal; pedro.simoes@ulusofona.pt² RPG, 1990-108 Lisbon, Portugal³ AEPISA, 1700-066 Lisbon, Portugal; emarques@indaqua.pt

* Correspondence: rui.marques@ulusofona.pt or rcmr@rpgconsult.pt

Abstract: Despite the billions of euros used as subsidies over recent decades, Portugal's water sector continues to struggle, being characterized by significant inefficiencies and differences between high- and low-performing water and sanitation services (WSSs). Current subsidy policies lack transparency and are not linked to performance results, undermining efforts to promote efficiency and sustainability in both environmental and financial dimensions. To address these issues, this article highlights relevant aspects to be taken into account in the redefinition of funding allocation in the Portuguese WSS sector. By implementing performance-based criteria for subsidy allocation and prioritization, regardless of the identity of beneficiaries or providers, we aim to instigate accountability and efficiency in this process. The analysis draws on empirical data to highlight the shortcomings of existing practices and demonstrates the potential benefits of adopting the "user-pays" principle. This principle is able to improve the definition of tariffs aiming for full cost recovery, while still providing for disadvantaged and vulnerable customers through social tariffs or assistance programs. Key findings indicate that coordinated efforts among government agencies, regulators, public and private utilities, and municipalities are essential to develop and promote effective financing strategies. This stakeholder's cooperation is essential for managing the urban water cycle sustainably and addressing the sector's long-term challenges. This research implies that a strategic shift in subsidy allocation is required, to develop accountability, efficiency, and equity in the WSS sector. The allocation of financial resources must be better justified to enhance overall performance in the sector.

Keywords: funding; management models; water and sanitation services; subsidies



Citation: Marques, R.C.; Simões, P.; Marques, E. The Financial Model for Water and Sanitation Services in Portugal: Lessons from Decades of Subsidies and Questionable Public Policies. *Water* **2024**, *16*, 3087.

<https://doi.org/10.3390/w16213087>

Academic Editor: EneDir Ghisi

Received: 19 September 2024

Revised: 22 October 2024

Accepted: 23 October 2024

Published: 28 October 2024



Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Providing WSSs requires significant ongoing expenses, both operational (OPEX) and capital (CAPEX). Concerning the OPEX, the expenses primarily stand out for bulk water purchases and for wastewater treatment (when applicable) at the "upstream" level, along with personnel costs and energy expenses, which typically account for more than three-quarters of total expenditures [1]. CAPEX is usually very high, as the water industry is often referred to as a capital-intensive and sunk-cost industry [2]. These costs must be covered through one or more of three financing (3Ts) sources: tariffs (customers), taxes (taxpayers), and financial transfers from third parties [3]. Ideally, total costs would be recovered through tariffs, but in practice, a combination of these T sources is often used.

In Portugal, WSS financing relies heavily on tariffs, as dictated by legislation that enforces the "user-pays" and "polluter-pays" principles. This system has key advantages: it promotes equity, encourages resource conservation, and releases public funds for other public services like education, healthcare, and housing. However, it is often difficult to charge customers full costs for the WSS, particularly due to political reasons and low willingness to pay. In low-income countries or for vulnerable groups in high-income

nations, paying the full costs through tariffs can be burdensome without proper social policies [4].

As a result, subsidies are common, especially for capital expenses. Portugal's water sector has received billions in subsidies over the years. A subsidy is defined as a government benefit to help overcome financial challenges, often justified by the public interest or controlling externalities. Externalities are costs or benefits arising from an economic activity that affect third parties who did not choose to incur that cost or benefit [5]. In the water sector, subsidies are meant to enhance positive externalities, like ensuring adequate service provision, or mitigate negative ones, such as poor service delivery. However, excessive reliance on subsidies can hinder the sector's long-term sustainability and development, as seen in Portugal. The evolution of the performance in the Portuguese water sector demonstrates this. Despite billions of Euros in subsidies, performance improvement has been lacking. Good governance, especially transparency and clear communication regarding the allocation, objectives, and conditions of subsidies, is crucial to maximize their efficiency and effectiveness, avoid waste, and prevent market distortions. Favoring only certain recipients, such as specific management models—often due to political motivation, suggests deeper issues beyond mere inefficiency problems.

Discussions about the financing and subsidy model for Portugal's water sector have never been adequately conducted, occurring in an ad hoc and discretionary manner. Various stakeholders have always found it difficult to carry out a thorough analysis, evaluating both the negative and positive consequences and the resulting inefficiencies in a constructive, pragmatic, and unbiased manner.

This research, developed with the sponsorship of the Association of Portuguese Companies for the Environmental Sector (AEPESA), aims to address this gap by discussing the subsidy model for WSSs in Portugal and contributing by proposing best practices and policy recommendations [6]. Thus, it allows for reversing past inefficiencies and market distortions caused by the subsidy policies. Lessons from the experience of Portugal can be valuable for other countries facing similar challenges, providing broader contributions to the field. Improving and scaling up financing and closing the investment gap is essential and probably the most decisive issue in the water sector around the world [7,8].

This article is organized as follows. After this brief introduction, the document consists of five additional chapters, which include the characterization of the Portuguese water sector, a conceptual analysis of subsidies, the financing of the water sector, the financial flows in the water sector in the country, and, finally, the main conclusions and recommendations to improve the status quo.

2. Water Sector in Portugal

2.1. Regulatory Framework

In the last three decades, WSSs in Portugal have observed significant developments concerning the access and the quality of service provided. The water sector restructuring, which began in 1993 with its unbundling, separating the 'wholesale' from the 'retail' service in both water and sanitation, the opening to private management, and later the establishment of a dedicated regulatory entity (ERSAR), undeniably marked its quality and progress in the country.

Since 1993, the national government, through the company Águas de Portugal (AdP), has played a crucial role in the water sector reform, supporting the creation of several regional wholesale systems in various regions of the country, both in water supply, where there were issues of scarcity and insufficient water production, and in sanitation, where there were significant pollution and contamination problems.

In the 1990s, private sector participation, especially in the 'retail' systems, reached a significant level, with more than a dozen systems operating by 2000. Starting in 1998, with the publication of the municipal companies' law, the delegated management model was regulated, and several WSSs with this legal and institutional framework were created [9].

Since 2000, various strategic plans have been published outlining the country's development guidelines. Recently, the PENSAARP 2030 plan was approved. This latest plan is based on achieving four global strategic objectives: service effectiveness, service efficiency, service sustainability, and the economic, environmental, and societal value of services.

The various reforms and plans, often with conflicting objectives, have been subsidized by billions of euros from European funds. Although the substantial improvement in the sector's key indicators is undeniable, the question of whether these reforms provided value for money or whether other options would have led to better results remains.

2.2. Market Structure

According to Portuguese legislation, municipalities own WSSs. Although the management of these services can be outsourced or delegated to third parties, it has historically been predominantly associated with the public sector.

Since 1993, the scenario has changed, and there has been a significant growth in private sector participation in the 'retail' segment, eventually reaching over 20% of the Portuguese population. This was important to leverage best practices and improve the performance of the water sector [10].

Since 1998, with the publication of legislation on local government corporatization, it became possible to create municipal companies, which now provide WSSs to more than 20% of the country's population. Along with AdP companies, there has been strong sector corporatization. Today, 52.4% and 46.4% of the Portuguese population have their 'retail' water and sanitation services provided by companies, respectively. In the 'wholesale' systems, these values are 75.1% and 95.6%. Although there is room for improvement concerning the optimization of the Portuguese water market structure, it has improved substantially in the last two decades [11].

2.3. Sector Performance

In Portugal, WSSs have seen significant developments over the last three decades. The various legal milestones, organizational changes, and, most importantly, substantial investments have led to a significant increase in coverage and service quality.

Additionally, the dynamism, high level of expertise, and credibility of various stakeholders in the water sector, including ERSAR, AdP, and the Portuguese private sector, contribute to the national and international recognition of the operational and institutional progress of Portugal. However, there are still doubts about the value for money of the investments made. To illustrate this, Table 1 highlights the evolution of the national average value for a set of performance indicators for WSSs between 2012 and 2021 [12,13].

Table 1. Key performance Indicators (2012–2021).

Indicator	2012	2021
Water coverage (%)	81.5	85.9
Wastewater coverage (%)	72.3	77.3
Monthly bill charges (water plus wastewater) (%)	0.61	0.61
Safe water (%)	98.29	99.04
Mains burst (no./100 km)	41.00	41.29
Non-revenue water (%)	30.7	28.8
Physical Losses (l/connection.day)	141	129
Energy efficiency in pumping stations [kWh/(m ³ ·100 m)]	0.47	0.46
Staff productivity (no./1000 connections)	2.60	2.11
Full cost recovery (%)	98.0	100.9

Thus, Portugal continues to face major challenges in the water sector, with significant regional disparities [10,14]. These performance differences among operators and the lack of positive progress are primarily linked to a lack of alignment between policies, institutions, and regulation, as well as issues related to capacity-building and inadequate governance,

influenced by political factors and a lack of accountability and enforcement [15]. Key issues in the Portuguese water sector include the following:

- Implementing a consistent regulatory model for all WSSs, regardless of their management model;
- Clarifying the state's role in separating policy, regulation, and service provision while depoliticizing the sector;
- Improving legislation to standardize rules, making them independent of the WSS management model;
- Ensuring financial sustainability through full cost recovery and a transparent subsidy model;
- Investing in asset rehabilitation, resilience, modernization, and decarbonization;
- Enhancing efficiency in non-revenue water, energy use, and staff productivity;
- Strengthening system resilience through new water sources and promoting circularity, addressing climate change, water scarcity, and poor asset management;
- Tackling challenges related to stormwater drainage, including financing and institutionalization;
- Promoting digitalization, innovation, and increased investment in research and development;
- Enhancing the societal value and recognition of WSSs.

3. Subsidies

3.1. The Concept

A subsidy is a benefit generally provided by the government to an individual, company, or institution. Subsidies are typically granted to remove or mitigate some form of difficulty or burden, and their allocation is often justified based on public interest, either to promote and facilitate access to public goods or services or to advance a specific socioeconomic policy.

By their very nature, subsidies are temporary, meaning they are designed to overcome a particular difficulty or barrier and are not intended for long-term use. For this reason, investment subsidies are considered isolated or one-time grants. They are more widely accepted than operational subsidies, which tend to be more structural and systematic, often failing to fully address or resolve an issue in the long term.

From an economic theory perspective, subsidies are implemented to compensate for market failures. They are deemed necessary and beneficial due to the negative externalities they mitigate or the positive externalities they promote.

These externalities also justify providing subsidies in the water sector, both in Portugal and globally. WSSs meet essential collective needs but suffer from market failures, presenting negative (and positive) externalities when they are not adequately provided [9]. In the case of water supply, for example, this imbalance would be evident in the absence of, or distortions in, supply and demand. Subsidies aim to ensure that production, consumption, and quality are sufficient and appropriate.

3.2. Subsidizing the Water Sector

The WSS provision implies substantial levels of OPEX and CAPEX, which tend to escalate over time. Based on tariffs to cover these costs, they can reach an excessive burden on household budgets, particularly for vulnerable and poor populations.

Subsidies are commonly employed around the world to address the externalities associated with WSSs and to promote equitable access. They represent a significant financial commitment, typically up to 2.4% of GDP in low- and middle-income countries [5]. However, total costs are rarely recovered only through the corresponding tariffs or, in another way, customers often do not pay the 'full cost' of WSSs. Commonly, cross-subsidization is a prevalent practice.

Several subsidies intended to support vulnerable or disadvantaged groups can be "blind", inadvertently benefiting wealthier customers disproportionately. For instance, a

World Bank study found that, on average, 56% of subsidy amounts are captured by the richest quintile, while only 6% go to the poorest quintile [5].

Additionally, intergenerational transfers, such as deferring necessary investments and operational cost recovery, are common. This approach postpones current financial responsibilities, creating future liabilities.

The allocation of subsidies often lacks transparency and rationality, with designs that may not be efficient or effective. There is a pressing need to balance subsidy distribution more equitably, as funding frequently favors specific operators based on political considerations rather than genuine needs. Subsidies in the water sector can be classified according to their purpose, design, form, and funding source [16,17]. They are often categorized as demand subsidies and supply subsidies [18]. Demand subsidies aim to ensure a minimum level of consumption or usage and directly benefit customers, either by covering part of their tariff or by providing a certain amount of free water. Supply subsidies, on the other hand, are channeled directly to the operator, allowing them to reduce their costs and, therefore, the required revenue and tariff system.

Subsidies can take the form of explicit financial transfers, such as between the provider and the customer covering part or all of a bill, or implicit transfers, such as the non-payment of electricity or deferred maintenance of a particular asset.

Subsidies can also be categorized based on their targeting, i.e., whether they are specific to a certain group of customers or a target segment or whether all customers are treated indiscriminately and benefit from the support provided. In practice, targeting is limited by eligibility criteria, which are difficult and costly to implement and are never completely effective [19].

Regarding the form and nature of subsidies, they can be directed toward tariff adjustments or cost reductions. Funding can come from governments and/or donor or philanthropic entities or through cross-subsidization (between consumption levels, customers, sectors, and places/municipalities).

Figure 1 presents the categorization of subsidies adopted in the water sector (adapted from [18]).

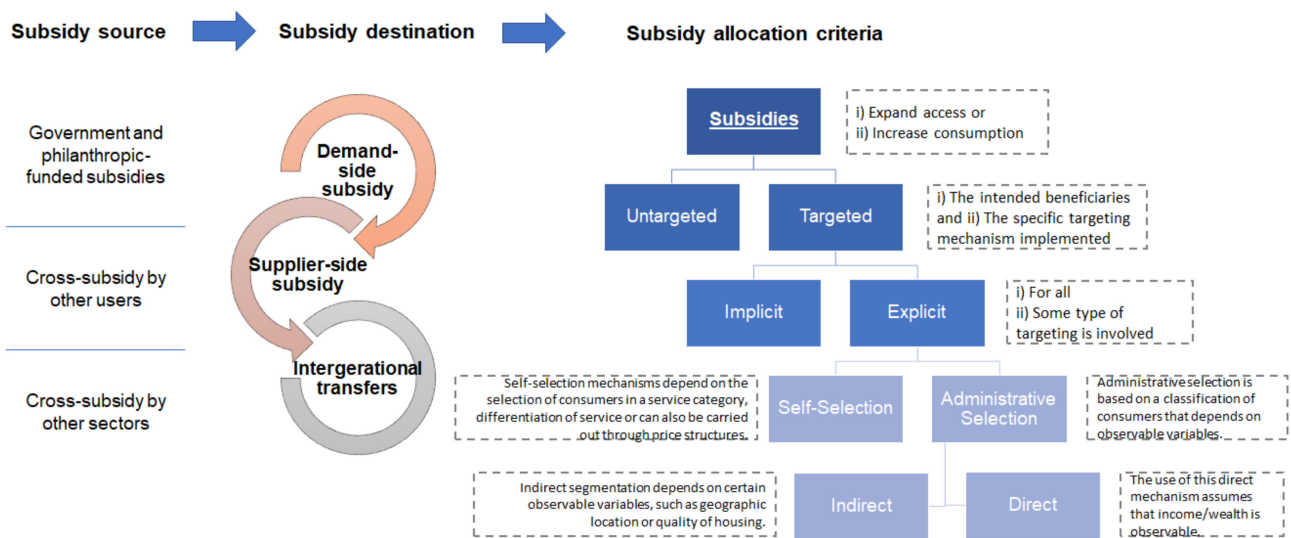


Figure 1. Categorization of subsidies in the water sector.

3.3. Subsidizing the Water Sector in Portugal

In Portugal, there is a significant amount of supply and demand subsidies. However, there is no well-thought-out and structured policy for the financing and subsidization of the water sector. The overlap of subsidies and other sources of financing, their application in non-priority or even unsuitable locations, discrimination against certain management models, lack of accountability for recipients, and the absence of countermeasures and results

with the allocation of subsidies, among other aspects, have led to significant inefficiency and waste of financial resources.

Considering the investments made over the last 25 years, amounting to about EUR 13 billion [20], where approximately 2/3 were non-reimbursable subsidies, and the baseline of the WSSs (with a water service coverage of around 85% and a coverage of 62% for wastewater collection and 35% for wastewater treatment), more than EUR 4 thousand were invested per unserved resident in the country, which is higher than international benchmarks for necessary investments to enable access.

Supply subsidies, reflected in infrastructure investments, have led to a residual improvement in water service coverage and a moderate improvement in sanitation (mainly in treatment). These subsidies have allowed for the restructuring of the water sector through the aggregation of systems in wholesale and various retail systems. EU programs, such as the Operational Program for Territorial Enhancement (POVT) and the Operational Program for Sustainability and Efficiency in Resource Use (PO SEUR), among others, have channeled several billion euros into the water sector [13]. Except for about 20% of the Portuguese population, where municipalities chose private management models and had minimal access to subsidies, almost all other WSS systems, particularly those managed by the AdP group, financed most of their CAPEX through non-reimbursable subsidies from the EU.

Regarding supply subsidies, in Portugal, ERSAR's decision to promote system adoption led to the removal of tariffs for new connection branches up to 20 m, both for water supply and sanitation [21].

Consumption subsidies are mainly provided through cross-subsidies (primarily between non-domestic and domestic customers and secondarily between consumption levels) and social tariffs.

Traditionally, Portugal has adopted a two-part tariff system for WSSs, consisting of an availability fixed tariff and a variable tariff, with increasing consumption tiers. The proposed and current tariff structure model promotes cross-subsidization. ERSAR has issued several tariff recommendations outlining the tariff system, including standardizing its structure and special tariffs (social and for large families) and encouraging cross-subsidization [21].

Regarding social tariffs, ERSAR recommends an exemption from the fixed tariff and a discount on variable tariffs. Until recently, the social tariff was funded through cross-subsidization, i.e., by other customers [22]. However, a 2017 Decree-Law defined that this subsidy should be borne directly by the municipalities (not the WSS).

For large families, ERSAR has also recommended procedures, such as expanding the tiers based on the additional number of people in the household (beyond four), to avoid penalizing them.

Municipal budgets usually subsidize operational costs in direct management models. They can also finance investments, although this is less common. With the implementation of the Environmental Fund, this has also started to occur in other management models, especially those involving AdP group companies and delegated management companies.

It should be noted that operational subsidies are not only 'blind' and opaque but also send incorrect and distorted signals to the market and are, therefore, widely regarded as highly damaging. Furthermore, they differentiate and discriminate against management models, as private management models cannot and do not benefit from these possibilities, and legally delegated management models should not be able to as well.

Also, direct management and delegated management models have different tax regimes, such as Value-Added Tax (VAT) and corporate tax (direct management is exempt). The same applies to some regulatory fees that are only universally paid concerning drinking water quality regulation.

Finally, intergenerational transfers are highlighted. On the one hand, replacing existing assets is being deferred to the future. On the other hand, in some cases (e.g., AdP), it is contractually possible to consider a tariff deficit (surplus), which customers will sooner or later have to pay.

4. Water Sector Financing

4.1. Financing Needs

The WSS provision involves significant expenses for both OPEX and CAPEX. The sum of OPEX and CAPEX (total expenses) represents the financial costs associated with these services.

Therefore, the sector's need for financing is high and constitutes one of the main challenges. Essentially, there are three different sources of financing for covering total expenses (financial costs): tariffs, taxes, and transfers, referred to as the 3Ts [23].

4.2. Financing Through the 3Ts

WSS expenses must always be paid and recovered. Their payment source must be one of the three Ts: tariffs, taxes, and/or transfers.

Tariffs (first T) refer to payments or contributions made by WSS customers in exchange for consuming or using these services.

The second T concerns taxes and the fact that WSS providers are financed by the municipalities' (government) budget. While subsidies from municipalities are the most visible form of fiscal sources directed towards financing, there are other less clear forms of subsidies, which may include tax reductions or exemptions, subsidized loans, donations, and other benefits, such as subsidies for production factors (e.g., electricity) or capital investments with reduced or no remuneration. Although subsidies are primarily allocated to WSSs, they can also be granted directly to customers, for example, through vouchers for bill payments or direct subsidies for household connections.

The third and final T corresponds to financial transfers, including contributions from donors through community funds, bilateral or multilateral entities, or philanthropic organizations. In Portugal, EU financial transfers have been very important in increasing the WSS coverage. This last option cannot only create excessive dependence on external entities but also undervalue the financing, especially when it is easily obtained and involves little accountability.

4.3. The 3Ts in Portugal

4.3.1. Tariffs

According to the Portuguese legal framework, and notwithstanding the existence of subsidies, WSSs must be financially self-sustainable, with customers covering their costs, adhering to the principles of user-pays and polluter-pays. It is worth noting that it is legally possible in Portugal to use operational or capital subsidies, provided they are properly accounted for.

4.3.2. Taxes

In the WSS direct management model, a significant portion of operational expenses has been recovered through fiscal means via municipal budgets. Although these subsidies are sometimes not adequately recognized in accounting, they constitute operational subsidies.

As discussed in the next chapter, in 2021, operational subsidies amounted to over EUR 121 million in Mainland Portugal, meaning that each Portuguese citizen paid at least EUR 12.3 in taxes that year to subsidize WSSs. In recent years, the Environmental Fund has also been used to support WSS's operational costs.

4.3.3. Transfers

WSSs in Portugal regularly receive investment subsidies from the EU. The billions of euros received have funded the country's infrastructure and nearly universalized the provision of these services.

In the last 25 years, the Portuguese state has invested more than EUR 13 billion [20], with EUR 1.3 billion contributed by private entities [24]. Of the remainder, the vast majority originated from non-reimbursable funds from various EU funding programs, such as the

Cohesion Fund, POVT, PO SEUR, and Portugal 20–30. Table 2 presents the investments made since 1994 according to PENSAARP 2030.

Table 2. Summary of planned and completed investments from 1994 [13].

Investment		PLAN 1994–1999	PEASAAR I 2000–2006	PEASAAR II 2007–2013	PENSAAR 2014–2020	Total
Planned investment (mEUR)						
State Systems	W	-	1100	242	361	
	S	-	1270	1027	785	
	Total	-	2370	1269	1146	
Municipal Systems	W	-	680	-	-	
	S	-	1180	-	-	
	Total	-	1860	2200	2350	
Others		-	-	170	240	
TOTAL		4230	3639	3736	3736	15,341
Completed investment (mEUR)						
State Systems	W	415	736	722	277	
	S	108	817	1223	180	
	Total	522	1554	1945	457	
Municipal Systems	W	-	-	-	368	
	S	-	-	-	723	
	Total	1485	2036	>677	1090	
Others		-	-	-	-	
TOTAL		2007	3590	>2622	1547	9766
Completed investment (%)		47	99	>70	41	64
Planned investment (mEUR/year)		705	520	534	534	568
Completed investment (mEUR/year)		335	513	>375	221	362

4.4. Tariff System and Affordability

In Portugal, as in other countries, the poorer and more vulnerable population with lower affordability benefits from consumption subsidies, known as social tariffs.

These tariffs are targeted consumption subsidies that include discounts on the regular tariff, allowing eligible customers to improve their economic accessibility. This means reducing the burden of WSS bills on household income and lowering and less impacting their economic situation. In some instances, the reduction in the bill can reach up to 80% of the total amount.

International best practices and recommendations in other countries suggest that customers should not pay more than 3 to 5% of their household income for WSSs [25–27].

ERSAR recommends that the ideal limit for good performance in Mainland Portugal should be set at 0.5% for each service (water supply and sanitation), resulting in a total of 1%. A median performance is deemed acceptable with a limit of 1% for each service (totaling 2%). According to ERSAR [13], the national average for affordability was 0.64% (0.37% for water supply and 0.27% for sanitation), with only 13 WSSs exceeding the 1% threshold and none reaching 1.5%, indicating a significant gap from the recommended levels.

Consequently, it is evident that the tariff systems of Portuguese WSSs have the potential to be adjusted to enhance investments in the water sector, reduce the third “T”, and aim for the definitive elimination of the second “T”. Furthermore, as pointed out, safeguarding disadvantaged and vulnerable communities and people are safeguarded by the existence of social tariffs [22].

5. Water Sector Financial Flows and Subsidization in Portugal

5.1. Tariff System

In Portugal, analyzing the data and indicators from ERSAR presented in the 2022 RASARP report, it is observed that 131 retail water services did not recover their total costs despite EUR 15.8 million in capital subsidies being recognized in the sector that year. This fact led to the need to transfer approximately EUR 44.8 million in operational subsidies. Table 3 summarizes the primary data and indicators related to retail water services in Mainland Portugal from 2019 to 2021.

Table 3. Cost-recovery and operational and capital subsidies for the retail water services.

Data or Indicator	2019	2020	2021
Tariff revenues (EUR)	824,862,666	808,022,590	848,032,064
Other revenues (EUR)	62,559,868	60,469,004	58,690,344
Total expenses (EUR)	834,124,070	833,388,117	875,064,504
Capital subsidies (EUR)	17,901,021	17,694,167	15,793,234
Operational subsidies (EUR)	41,091,932	38,871,575	44,766,517
Cost-recovery WSS (no.)	96	85	90
Non-cost recovery WSS (no.)	141	117	131
Full cost recovery (-)	1.09	1.06	1.05
Capital subsidies (%)	1.98%	2.00%	1.71%
Operational subsidies (%)	4.54%	4.39%	4.85%

Table 4 highlights the same data and indicators for retail sanitation services. The situation is even more unfavorable for these services, with 163 sanitation services not covering their total costs, approximately EUR 29 million in capital subsidies, and nearly EUR 70 million in operational subsidies.

Table 4. Cost-recovery and operational and capital subsidies for the retail sanitation services.

Data or Indicator	2019	2020	2021
Tariff revenues (EUR)	528,896,130	539,828,821	566,558,511
Other revenues (EUR)	52,360,255	45,123,213	49,351,520
Total expenses (EUR)	649,727,859	646,360,084	679,060,363
Capital subsidies (EUR)	29,817,419	31,177,400	28,998,210
Operational subsidies (EUR)	58,608,921	68,110,263	69,292,905
Cost-recovery WSS (no.)	54	54	56
Non-cost recovery WSS (no.)	182	148	163
Full cost recovery (-)	0.94	0.95	0.95
Capital subsidies (%)	4.88%	5.06%	4.50%
Operational subsidies (%)	9.59%	11.05%	10.74%

When analyzing the wholesale systems in Portugal, the cost recovery landscape is naturally different, with almost all entities recovering their total costs. However, this is only possible due to substantial investment subsidies and the existence of a cost recovery deviation (DRG in the Portuguese acronym), which allows for the deferral (or anticipation) of expenses. For the year 2021, the value of capital subsidies was close to EUR 32 million, while operational subsidies amounted to EUR 0.1 million.

The situation is similar for wholesale sanitation systems, which received EUR 31.7 million in capital subsidies and EUR 0.9 million in operational subsidies.

Significant differences regarding cost recovery and coverage exist based on the management model. Tables 5 and 6 illustrate these disparities for WSSs in 2021, respectively.

Table 5. Cost-recovery and operational and capital subsidies for retail water services by management model (year 2021).

Data or Indicator	Direct Management	Delegated Management	Concession
Tariff revenues (EUR)	343,262,050	330,240,780	174,529,234
Other revenues (EUR)	18,987,653	25,446,815	14,255,876
Total expenses (EUR)	395,746,077	322,104,732	157,213,695
Capital subsidies (EUR)	10,021,941	5,436,747	334,546
Operational subsidies (EUR)	42,084,703	2,681,814	0
Cost-recovery WSS (no.)	43	25	22
Non-cost recovery WSS (no.)	119	7	5
Full cost recovery (-)	0.94	1.12	1.20
Capital subsidies (%)	2.69%	1.51%	0.18%
Operational subsidies (%)	11.30%	0.74%	0.00%

Table 6. Cost-recovery and operational and capital subsidies for retail sanitation services by management model (year 2021).

Data or Indicator	Direct Management	Delegated Management	Concession
Tariff revenues (EUR)	291,319,367	183,224,123	92,015,021
Other revenues (EUR)	11,991,928	21,421,599	15,937,993
Total expenses (EUR)	361,219,352	212,110,212	105,730,799
Capital subsidies (EUR)	17,383,252	10,686,899	928,059
Operational subsidies (EUR)	60,011,206	9,281,699	0
Cost-recovery WSS (no.)	22	19	15
Non-cost recovery WSS (no.)	144	11	8
Full cost recovery (-)	0.89	1.02	1.03
Capital subsidies (%)	5.42%	4.96%	0.85%
Operational subsidies (%)	18.71%	4.31%	0.00%

WSSs based on a concession management model naturally achieve full cost recovery (with a profit margin), resulting in no operational subsidies. Private concessions are typically not eligible to receive capital funding, while WSSs under delegated management generally recoup their costs but do benefit from EU subsidies. In contrast, WSSs with direct management show much lower cost recovery, rely heavily on operational subsidies, and receive a significant share of capital subsidies.

For WSS wholesale services, the analysis reveals significant differences between public and private utilities. Private concessions have not received any kind of subsidies for investment or operations. In contrast, public utilities received approximately EUR 64 million in 2021, with nearly EUR 63 million for CAPEX and about EUR 1 million for operational subsidies.

In total, subsidies for WSSs in mainland Portugal exceeded EUR 223 million in 2021, with EUR 93.9 million (42.1%) for water and EUR 129.8 million (57.9%) for sanitation. Of these, 28.8% were for wholesale systems, while 71.2% went to retail systems. Operational subsidies made up 51.6%, and capital subsidies accounted for 48.4%. The true total of subsidies is likely higher, as some costs may not have been accurately reported in accounting, and a few WSSs did not submit data, particularly those with poorer performance.

5.2. Subsidization

5.2.1. Categorization

In Portuguese WSSs, the main subsidies received are categorized into non-costly and costly categories. Non-cost subsidies include EU funding and third T financing, while costly subsidies encompass fiscal support for operations, the Environmental Fund, and cross-subsidies. Among the cross-subsidies, they include the DRG and added tariff component (CTA) for AdP companies, as well as cross-subsidies among customers with varying consumption levels. Additionally, other financial flows and particularities can be

highlighted, such as regulatory fee payments, corporate taxes, VAT impacts, and specific accounting rules, which also function as subsidies, affecting various management models.

5.2.2. Non-Cost Subsidies

Accurate identification of the total amounts received from the EU for WSSs in Portugal has not been possible. The funds came from various sources and began in the late 1980s and 1990s. The amount is estimated to be about two-thirds of the total invested (more than EUR 13 billion), but the exact value is unknown. This situation also reflects the water sector's governance issues, lack of transparency, and control. Nevertheless, the two most recent community programs that allocated the most funds, respectively, PO SEUR and POVT, are analyzed below. It should be noted, however, that their scale is nothing compared to that of the past, specifically the 1990s and the early years of this century, which were characterized by significant investments in infrastructure.

The EU financing started in 1986 with Portugal's entry into the then European Economic Community (EEC). Between 1986 and 1989, Portuguese beneficiary entities could apply directly for community financing by project. In 1989, Cohesion Funds were introduced to reduce disparities between richer and poorer countries in Europe. The first Cohesion Fund was in effect from 1989 to 1993, corresponding to the first Community Support Framework (CSF). The second Cohesion Fund was from 1996 to 1999, related to the second CSF, and the third Cohesion Fund was from 2000 to 2006, associated with the third CSF. This was followed by the National Strategic Reference Framework (NSRF), which included POVT from 2007 to 2013, and later the Partnership Agreement, which included PO SEUR from 2014 to 2020.

(a) PO SEUR

PO SEUR was launched in 2014 as one of the programs created to implement the Portugal 2020 Strategy, which involved an amount of around EUR 25 billion. For this purpose, Thematic Objectives for growth and job creation, the necessary interventions to achieve them, and the expected results through this program were defined.

Regarding financing in the 'Urban Water Cycle' category, by the end of 2021, the program had a completion rate of 72%. The PO SEUR website provides a space for more up-to-date monitoring of the program globally and by intervention type, including the urban water cycle. Thus, by September 2023, 1005 applications had been approved under this program, corresponding to the financing of EUR 661 million for an eligible expenditure of EUR 816 million, representing about 81% of non-costly funding from PO SEUR.

Figure 2 shows the distribution of PO SEUR financing by management model [28].

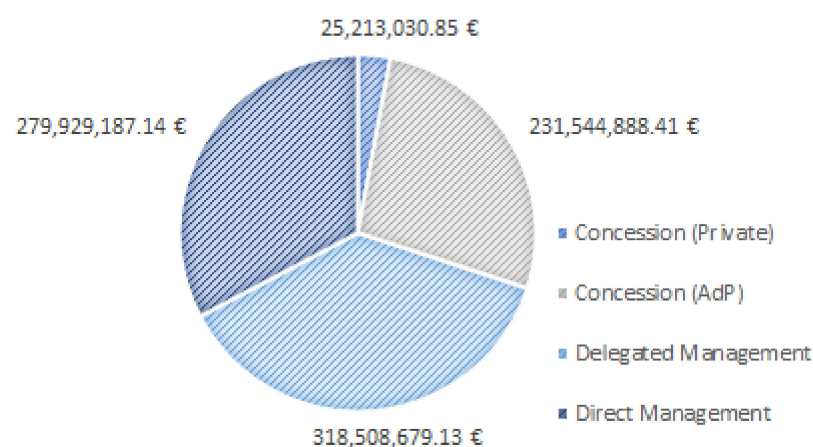


Figure 2. PO SEUR financing distribution by management model.

The figure shows that PO SEUR funding is allocated to direct management, delegated management, and concessions (AdP in the wholesale segment). Only about EUR 8 million

was approved for the private sector, corresponding to about 1.2% of the total. Notably, the weight of PO SEUR funding for the private sector indicates differential treatment relative to this management model.

When examining the distribution of PO SEUR funding according to the WSS geographical location, it is observed that most of the funding is allocated to coastal and more developed areas. Although there may be some justification due to the larger population size, it is concluded that the funding is not directed towards the neediest regions. Thus, the social and territorial cohesion effect that should guide the allocation of investment subsidies through PO SEUR is not observed.

Lastly, it should be noted that PO SEUR's project selection criteria are vague and discretionary, allowing any beneficiary to be chosen. The supposed contractual goals mentioned above did not improve sector performance, as evidenced by the evolution of ERSAR's performance indicators during this period (2014–2022).

(b) POVT

The POVT was one of the three thematic operational programs of QREN, approved on 12 October 2007.

The POVT, defined for the period between 2007 and 2013, focused on the priorities of the Thematic Agenda for Territorial Enhancement, which aimed to improve the living conditions of the population and make productive investment more attractive to enhance the qualification of territories and reinforce economic, social, and territorial cohesion.

According to the 2014 annual execution report (the latest available), by 2014, the program had approved of approximately EUR 877.4 million. The completion rate reached 71.9% that year. On the POVT website, a document listing the WSSs that benefited from EU funding is available. This document identifies that a total eligible investment of about EUR 1.15 billion for the urban water cycle was approved, corresponding to a total (non-reimbursable) contribution of approximately EUR 855 million, with concessionaire (private) WSSs having access to only about 3%.

The POVT funding aligns with what occurred in PO SEUR, where there is evident prioritization of non-reimbursable EU funding for certain management models. Similarly, in the POVT, there is an asymmetric distribution of funding geographically across the country, which does not promote the country's social and territorial cohesion.

5.2.3. Onerous Subsidies

(a) Fiscal Subsidies

WSSs, primarily those with direct management, benefit from significant fiscal subsidies for operational costs. Taxpayers pay taxes to the state, making the necessary transfers to municipalities. The municipalities, in turn, allocate part of their budgets to activities and expenses associated wholly or partially with WSSs.

These subsidies are allocated to consumption, allowing for a reduction (or exemption) of the tariff applied to the end user. They are also non-targeted subsidies, as all customers benefit equally, regardless of their ability and willingness to pay for the services. Thus, poorer/vulnerable populations receive the same subsidy as wealthier populations. These subsidies are also implicit subsidies, as they are not accounted for as operational subsidies in financial records.

Table 7 presents the fiscal (operational) subsidies received by wholesale and retail water service (W) and sanitation service (S) between 2012 and 2021.

(b) Environmental Fund

Decree-Law No. 42-A/2016 established an Environmental Fund in Portugal, setting the rules for its allocation, management, monitoring, and execution of its revenues and support. The Environmental Fund aims to support environmental and climate action policies to achieve sustainable development goals. It funds entities, activities, or projects in various areas, including 'efficient use of water and protection of water resources' and 'sustainability of water services.'

Table 7. Operational subsidies between 2012 and 2021.

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	TOTAL
Operational subsidies (mEUR)											
W-Wholesale	9.7	6.2	2.2	13.6	1.9	0.2	0.0	0.0	0.0	0.1	34.0
W-Retail	70.6	66.3	60.1	52.5	46.8	45.0	40.9	41.1	38.9	44.8	506.9
S-Wholesale	8.6	5.6	13.1	27.8	1.6	0.2	0.1	0.0	0.0	0.9	58.0
S-Retail	97.2	101.2	112.1	82.6	77.6	56.0	68.4	58.6	68.1	69.3	791.1
TOTAL	186.1	179.3	187.5	176.5	128.0	101.4	109.4	99.7	107.0	115.1	1390.1

According to its 2023 budget, the water resources tax (TRH in the Portuguese acronym) contribution to the Environmental Fund is approximately EUR 24.3 million, representing 2.0% of the total funds. The TRH was created to compensate for the non-financial economic costs associated with the use and consumption of water (environmental and scarcity costs).

According to financial information, the Environmental Fund funds have been primarily used as operational subsidies. These funds have mainly been used to indirectly cover the WSS's salaries, energy, and other operational and maintenance expenses.

Figure 3 shows the subsidies allocated by the Environmental Fund in 2020 (left) and 2021 (right) to WSSs based on their management model. In 2020, approximately EUR 24.4 million was allocated, while in 2021, EUR 28.5 million was allocated [29].

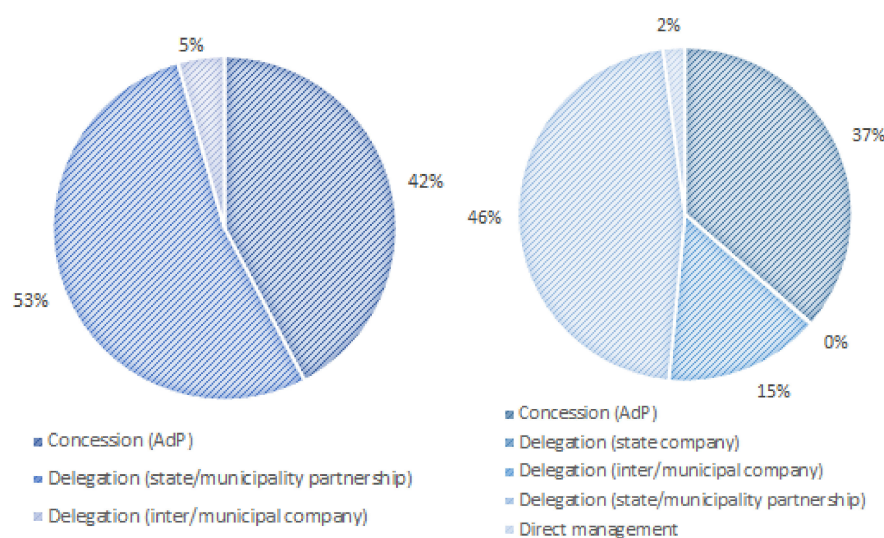


Figure 3. Subsidies allocated by the Environmental Fund in 2020 (left) and 2021 (right) by the WSS management model.

It should be noted that, besides disagreeing with the criteria for subsidy allocation, both in terms of purpose and recipients, it is not understood why those specific WSSs were chosen over others with similar needs. As has been made public, only 2.6% are allocated through a call for proposals, a situation that seems normal but is not, given that this is public money that WSS customers paid for a specific purpose [30].

(c) Cross Subsidies Related to the Tariff System

i. Customers

A key type of cross-subsidy in Portugal's water and sanitation services involves the relationship between different customer categories, particularly domestic and non-domestic customers. Generally, tariffs for non-domestic customers are considerably higher than those for domestic users.

Considering the WSS tariffs in mainland Portugal (ERSAR website with 217 WSS), it is identified that, on average, the variable tariff for non-domestic customers corresponding to the third tier is three times higher than the first tier for domestic customers for water services, and two times higher for sanitation services. Regarding the fixed tariff, it was identified that the relationship between the fixed tariff for non-domestic customers and domestic customers for the first tier exceeded 50%, with this difference growing exponentially depending on the tier. In the case of sanitation services, the fixed tariff is, on average, twice as high for the first tier of non-domestic customers. For higher tiers, the difference is much more significant.

In summary, although the number of non-domestic customers is much lower than that of domestic customers, the revenues generated from non-domestic customers are crucial in Portugal for covering total costs and ensuring the WSS's financial sustainability.

ii. Consumption

Another significant cross-subsidy in WSS tariff systems is related to the adoption of increasing tariffs with consumption tiers for domestic customers.

Thus, analyzing the current WSS tariffs in Portugal, it is observed that, on average, the last tier of the tariff for domestic customers is about five times higher than the first tier for water services. For sanitation services, the ratio between domestic customers' last and first tiers is about three times higher.

iii. Services

Although the opposite situation can occur, water services often subsidize sanitation services and, even more frequently, urban waste management services (when managed by the same entity). They also commonly fund other activities like stormwater, urban cleaning, and green spaces.

According to the latest ERSAR report from 2021, water services subsidized 40 sanitation services with EUR 19.6 million, and sanitation services subsidized 14 water services with EUR 4.4 million. There was a financial flow of EUR 24.0 million in cross-subsidies between services provided (water and sanitation).

iv. Other Cross-Subsidies

Other cross-subsidies include differentiating tariff systems based on the time of year, with higher tariffs in the summer than in the winter, or differences between resident and non-resident domestic customers (second and third homes). Both situations occur in some coastal municipalities of the country.

(d) Cross-Subsidies to AdP

i. DRG

The Cost Recovery Deviation (DRG) constitutes an intergenerational cross-subsidy where today's customers do not pay what they should (more or less), with the differential being offset by payments from future customers. The DRG represents a financial instrument intended to recognize the difference between the financial results achieved and those expected from a contractual perspective. This value results from the WSS reform within the AdP group and is determined by the current legislation and AdP concession contracts.

The DRG is determined annually and must be submitted for ERSAR's review.

In this context, the AdP group recorded a negative accumulated DRG of approximately EUR 457 million in 2021 (with only five WSSs showing a positive DRG balance), with the distribution among the different WSSs presented in Figure 4 below.

The critical issue with this subsidy model is the assumption of risks and whether the WSS can include all expenses, even inefficient ones, in the DRG. A contract, even a public partnership, always implies a sharing and assumption of risks by both parties, generating incentives, and expenses cannot be entirely transferred to customers, especially when unreasonable [31].

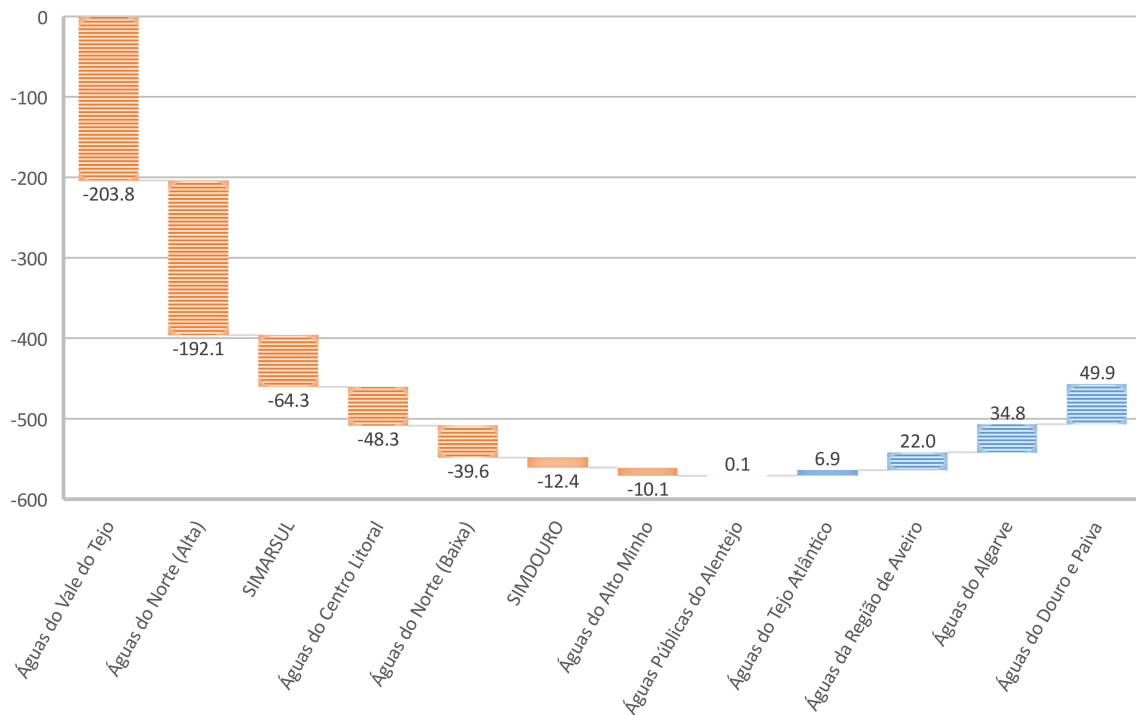


Figure 4. Distribution of the DRG by WSS (values in millions of euros). Source: Based on Companies' Account Report.

ii. CTA

With the reform/aggregation of the AdP group's wholesale systems that occurred in 2015, a tariff compensation mechanism, known as the Additional Tariff Component (CTA), was created and subsequently reinforced during the splitting processes of some systems in 2017.

The CTA is a cross-subsidy mechanism between WSSs. It transfers from financially sustainable WSSs to those with structural deficits in economic-financial terms, aiming to balance regional tariffs.

Although this cross-subsidy model between WSSs of the same group (AdP) is inherently negative, it is not insignificant, provided that the calculation of the transfer values considers the efficiency of expenses and generates incentives for these asymmetries to diminish over time.

(e) Social Tariff

As mentioned, in WSSs, a specific Decree-Law governs the application of the social tariff to domestic customers. According to the information on ERSAR's website, 206 WSSs apply the social tariff, although not fully complying with the provisions of the referred diploma or ERSAR's tariff recommendation. Analysis of the current tariffs shows that the impact of applying the social tariff varies widely among the analyzed tariff systems, with reductions of up to 80% compared to the standard domestic customer tariff.

(f) Intergenerational Subsidies

As previously highlighted, the principle of 'saving' expenses from the public decision-makers perspective is recurrently associated with postponing necessary investments in WSS, with a particular focus on rehabilitating and replacing existing assets. These postponements constitute intergenerational subsidies. In this context, according to the information available in PENSAARP 2030, several future projection scenarios (10 years) for sector investments were developed:

- ‘Scenario 0 (business as usual, BAU): Corresponds to maintaining the current situation, where pipe rehabilitation is 0.5% per year and collector rehabilitation is 0.3% per year, with the perception that this is insufficient to ensure infrastructural sustainability.
- Scenario 4 (ideal): To improve current rehabilitation practices, achieving pipe and collector rehabilitation rates between 2 and 3% per year, values resulting from the assumption that there is an intention to recover the backlog from past inaction over the next ten years.’

Thus, while new investments may have been adjusted to the needs and evolution of the population, the same cannot be inferred about the rehabilitation of existing assets. In this case, it effectively involves intergenerational subsidies. Table 8 below summarizes these scenarios (built on PENSAARP data).

Table 8. Summary of investment for asset rehabilitation.

Asset Rehabilitation (mEUR)	Scenario 0 (BAU)	Scenario 4 (Ideal)	Δ
State systems			
Water	248	248	0
Wastewater	307	307	0
Municipal systems			
Water	420	1875	1455
Wastewater	165	1416	1251
TOTAL	1140	3846	2706

In this context, the missing investment amount is approximately EUR 2.7 billion, representing an annual value of about EUR 135.3 million at current prices. Considering the values at constant prices, this situation would represent an increase of about 8.8% in the current tariff revenues of the retail WSSs to support this additional investment and avoid the existence of these intergenerational subsidies.

5.3. Other Distortions in the Financing Model

In the water sector in Portugal, other distortions unjustifiably penalize specific management models, particularly private companies and their customers. For example, while there is no difference in the VAT application for water supply across management models, it is only charged for concessionary companies in the sanitation sector and not for direct management models. In this context, considering the reported tariff revenues for direct and delegated management WSSs for the year 2021, applying a 6% VAT rate to sanitation services would represent an amount of approximately EUR 28.8 million that was not charged and could have been redistributed. Conversely, EUR 5.5 million in VAT was charged to customers of concessionary WSSs, discriminating against them and decreasing their customers’ affordability, as well as affecting the image of those WSSs.

From a fiscal perspective, corporate income tax only applies to commercial companies. Considering the WSS average, the universal application of this tax to other WSSs could generate a tax exceeding EUR 31 million in the country, which could be used to reduce tariffs or redistribute to different activities. Alternatively, if those who pay IRC do not pay it, their tariffs could be reduced.

Regarding regulatory fees, ERSAR’s financing has always been supported by WSSs with concession contracts and by some delegated management models (e.g., EPAL). If the universal application of the regulatory fee were established, it would reduce the burdens on WSSs that currently pay the regulatory fee, reducing their tariff systems.

There are also discrepancies concerning accounting frameworks, particularly in the accounting of amortizations and depreciations of investments made by WSSs. Concessionary WSSs are required to depreciate all investments throughout the contract term, which has a maximum duration of 30 years, resulting in much higher values during the contractual period.

Lastly, concessionary WSSs pay fees to the grantor (municipality) as compensation for providing WSSs. Considering the concession contracts in force in the country, approximately EUR 295 million has been agreed upon for the payment of fees. Assuming an average contract term of 30 years, this amount represents 3.7% of the respective WSS's annual tariff revenues.

6. Conclusions and Recommendations

From 2016 to 2021, Portugal allocated at least EUR 1.31 billion in subsidies to the water sector and over EUR 1.4 billion in operational subsidies in the past decade. Despite these investments, the subsidies have not been temporary solutions and have failed to remove existing barriers or enhance utility performance. Some KPIs for WSSs in 2021 (e.g., non-revenue water volume and staff productivity) show only modest improvements since 2012.

Operational and capital subsidies are often untargeted consumption subsidies. Although they imply lower tariffs (for users), they do not effectively tackle utility efficiency issues. This reliance on subsidies has fostered complacency with long-term EU funding and created dependency rather than driving financial and operational improvements.

The current subsidy framework is characterized by equity and transparency absence, boosting the negative impacts even more. The absence of clear, non-discretionary rules has distorted the WSS market, allowing some management models to evade full cost recovery while benefiting from additional subsidies that further reduce tariffs.

To address these issues, the following recommendations are proposed:

Eliminate Operational Subsidies: These untargeted financial transfers should be removed due to their financial impact and the wrong incentives they create. Their continuation is legally questionable and socially unjust.

Revise Capital Subsidies: While investment subsidies should not be eliminated, their allocation needs reform. Subsidies should have clear objectives for service effectiveness, efficiency, and sustainability. They should be targeted based on need, with equitable treatment of recipients. Minimum criteria should be established for eligibility, and subsidies should be tied to performance metrics. The allocation process must be transparent and accountable.

Control Cross-Subsidies: Although some cross-subsidies are permitted, their limits should be regulated. Cross-subsidies between services (e.g., water supply, sanitation, and waste management) should be prohibited. Best practice values for customer cross-subsidies should be recommended, focusing on transparency and good governance.

Address Sector Distortions: Existing distortions penalize performance and equity. Regulatory fees and VAT on sanitation services should be standardized and reduced. Although changes to Corporate Income Tax (IRC) and standardizing accounting practices across management models are challenging, they should be pursued.

Reform Environmental Fund Subsidies: As the Water Framework Directive stipulated, the Environmental Fund should focus on recovering scarcity and environmental costs and not subsidizing operational expenses.

Eliminate Intergenerational Subsidies: Investments needed today should not be deferred to future customers or taxpayers. Reforming or discontinuing subsidies like DRG and CTA should be based on efficiency and impact.

Expand Social Tariffs: The social tariff should be universalized across all WSS, following legislation and regulatory recommendations. It should be well-publicized and accessible.

Improve Communication: Effective communication about tariffs, subsidies, and related issues is crucial. WSSs should clearly explain these matters to the stakeholders to facilitate understanding and support for necessary reforms.

Implementing these measures will significantly enhance the efficiency, equity, and sustainability of the Portuguese water sector. It will address existing challenges and improve the overall WSSs. In addition, it can create a more resilient water sector that benefits all citizens.

Author Contributions: Conceptualization, R.C.M.; methodology, R.C.M. and P.S.; validation, R.C.M., P.S. and E.M.; investigation, R.C.M. and P.S.; writing—original draft preparation, R.C.M. and P.S.; writing—review, E.M. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by AEPSA—Associação das Empresas Portuguesas para o Sector do Ambiente.

Data Availability Statement: The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding author.

Conflicts of Interest: Rui Cunha Marques and Pedro Simões were employed by RPG. The remaining author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

References

1. Marques, R.C. *Regulation of Water and Wastewater Services: An International Comparison*; IWA Publishing: London, UK, 2010; 340p.
2. Cowan, S. Regulation of Several Market Failures: The Water Industry in England and Wales. *Oxf. Rev. Econ. Policy* **1993**, *9*, 14–23. [[CrossRef](#)]
3. Pinto, F.P.; Marques, R.C. Tariff structures for water and sanitation urban households: A Primer. *Water Policy* **2015**, *17*, 1108–1126. [[CrossRef](#)]
4. Fagundes, T.; Marques, R.C.; Malheiros, T. Water Affordability Analysis: A Critical Literature Review. *AQUA-Water Infrastruct. Ecosyst. Soc.* **2023**, *72*, 1431–1445. [[CrossRef](#)]
5. Tsur, Y. Optimal water pricing: Accounting for environmental externalities. *Ecol. Econ.* **2020**, *170*, 106429. [[CrossRef](#)]
6. Marques, R.C. *O Modelo de Subsidição dos Serviços de Abastecimento de Água e de Saneamento Residuais em Portugal*; Associação das Empresas Portuguesas para o Sector do Ambiente (AEPSA): Lisbon, Portugal, 2024; 133p.
7. Machete, I.; Marques, R. Financing the water and sanitation sectors: A hybrid literature review. *Infrastructures* **2021**, *6*, 9. [[CrossRef](#)]
8. McCoy, W.; Schwartz, K. The Water Finance Gap and The Multiple Interpretations of ‘Bankability’. *J. Water Sanit. Hyg. Dev.* **2023**, *13*, 19–29. [[CrossRef](#)]
9. Marques, R.C. *Regulação de Serviços Públicos*, 1st ed.; Edições Sílabo: Lisbon, Portugal, 2005; 404p.
10. Marques, R.; Simões, P. Revisiting the comparison of public and private water service provision: An empirical study in Portugal. *Water* **2020**, *12*, 1477. [[CrossRef](#)]
11. Carvalho, P.; Marques, R. Optimising the water sector market structure in Portugal. *J. Water Supply Res. Technol.* **2014**, *63*, 303–310.
12. ERSAR. *Relatório Anual dos Serviços de Águas e Resíduos em Portugal 2011*; Water and Waste Services Regulatory Authority (ERSAR): Lisbon, Portugal, 2012; Available online: <https://www.ersar.pt/pt/site-publicacoes/Paginas/edicoes-anuais-do-RASARP.aspx> (accessed on 4 September 2023).
13. ERSAR. *Relatório Anual dos Serviços de Águas e Resíduos em Portugal 2021*; Water and Waste Services Regulatory Authority (ERSAR): Lisbon, Portugal, 2022; Available online: <http://www.ersar.pt/pt/publicacoes/relatorio-anual-do-setor> (accessed on 4 September 2023).
14. PENSARP 2030. *Plano Estratégico para o Abastecimento de Água e Gestão de Águas Residuais e Pluviais 2030*; Resolution of the Council of Ministers no. 23/2024; Governo de Portugal: Lisbon, Portugal, 2024.
15. Marques, R.C.; Saltiel, G. The Role of Policies, Institutions and Regulation for the Portuguese Water Utilities. In *Water Resources and Economic Processes*; DiStefano, T., Ed.; Routledge: London, UK, 2021; pp. 199–210.
16. Beato, P. Cross Subsidies in Public Services: Some Issues. In *Technical Papers Series, Sustainable Development Department*; Inter-American Development Bank (IDB): Washington, DC, USA, 2000.
17. Angel-Urdinola, D.; Wodon, Q. Does Increasing Access to Infrastructure Services Improve the Targeting Performance of Water Subsidies? *J. Int. Dev.* **2011**, *24*, 88–101. [[CrossRef](#)]
18. Narzetti, D.; Marques, R.C. Models of subsidies for water and sanitation services for vulnerable people in South American countries: Lessons for Brazil. *Water* **2020**, *12*, 1976. [[CrossRef](#)]
19. Andres, L.A.; Thibert, M.; Lombana Cordoba, C.; Danilenko, A.; Joseph, G.; Borja-Vega, C. *Doing More with Less: Smarter Subsidies for Water Supply and Sanitation*; World Bank: Washington, DC, USA, 2019.
20. Galamba, J. Speech of Secretary of State on 29 July 2022. Available online: <https://www.portugal.gov.pt/pt/gc23/comunicacao/noticia?i=portugal-investiu-13-mil-milhoes-de-euros-no-setor-da-agua-nos-ultimos-25-anos> (accessed on 25 July 2023).
21. Pinto, F.S.; Marques, R.C. Tariff recommendations: A panacea for the Portuguese water sector? *Util. Policy* **2015**, *34*, 36–44. [[CrossRef](#)]
22. Martins, M.R.; Antunes, M.; Fortunato, A. Regulatory Changes to Portugal’s Social Tariffs: Carrying Water in a Sieve? *Util. Policy* **2020**, *64*, 101038. [[CrossRef](#)]
23. OECD. *Managing Water for All: An OECD Perspective on Pricing and Financing*; Organisation for Economic Co-Operation and Development: Paris, France, 2009.

24. Marques, R.C. *Análise do Desempenho dos Operadores Privados e Públicos*; Associação das Empresas Portuguesas para o Sector do Ambiente (AEPISA): Lisbon, Portugal, 2017; 99p.
25. UNDP. *Human Development Report 2006. UNDP Beyond Scarcity: Power, Poverty and the Global Water Crisis*; United Nations Development Programme 1: New York, NY, USA, 2006.
26. World Bank. *Do Pro-Poor Policies Increase Water Coverage? An Analysis of Service Delivery in Kampala's Informal Settlements*; World Bank: Washington, DC, USA, 2014.
27. OECD. *Pricing Water Resources and Water and Sanitation Services*; Organisation for Economic Co-Operation and Development: Paris, France, 2010.
28. PO SEUR. Candidaturas Aprovadas. 2023. Available online: <https://poseur.portugal2020.pt/pt/projetos/candidaturas-aprovadas/> (accessed on 1 September 2023).
29. EF. Relatório de Atividades, Gestão e Contas. *Environmental Fund*. 2022. Available online: <https://www.fundoambiental.pt/balanco-fa/2021.aspx> (accessed on 4 September 2023).
30. Água e Ambiente. Fundo Ambiental. *News Published in Journal Água e Ambiente*. July 2023. Available online: <https://www.ambienteonline.pt/noticias> (accessed on 1 September 2023).
31. Marques, R.C.; Berg, S. Risks, contracts, and private sector participation in infrastructure. *J. Constr. Eng. Manag.* **2011**, *137*, 925–933. [[CrossRef](#)]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.