



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

March 2023

On behalf of Europa

Anouck ONILLON & Benoît FRIBOURG-BLANC

OiEau – Office International de l'Eau
15 rue Edouard Chamberland - 87100 LIMOGES - France
Mail : b.fribourg-blanc[at]oieau.fr - Web : www.oieau.fr - Tel : 05-55-11-47-90

1. General Introduction	1
2. The political framework	1
2.1 The local institutional organization in Germany	1
2.2 The legal framework for water	2
2.2.1 Levels setting general guidelines	2
2.2.2 Levels in charge of networked water service	3
2.2.3 Forms of organization and management	3
2.2.4 Development in the new Länder (East Germany)	5
2.3 Water situation in Germany	5
2.3.1 Sector characteristic	5
2.3.2 Consumption	6
2.3.3 water losses	6
2.4 The public sanitation service	6
2.4.1 Organization of the sector	7
2.5 The implementation of public water and sanitation services	7
2.5.1 Management mode	7
2.6 Regulatory and legislative framework	2
2.6.1 Water price	3
3. The economic model of water services:	4
3.1 Municipal Taxes Act	4
3.2 The different fees	4
3.3 Anti-trust monitoring	4
4. Principles of Water Pricing in Germany	5
4.1 Comparison of water prices and charges	5
4.1.1 Comparison between German cities	5
4.2 Prices and charges per cubic meter	6
4.2.1 Control	6
4.3 Tariff for water services: example of Berliner Wasserbetriebe	6

4.3.1	Drinking water tariff	6
4.3.2	Sanitation tariff.....	7
4.3.3	Evolution of prices	8
4.4	Details of a water bill: See appendix.....	8
4.5	Costs borne by water utilities.....	8
4.5.1	Operating costs	8
4.5.1	Investment costs	8
4.6	Water price evolution	9
4.7	The elasticity of a household's water demand to the price of water.....	10
5.	Actions to be taken.....	11
6.	Appendix	12

1. GENERAL INTRODUCTION

This document describes the situation in Germany 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, Spain, Latvia and Germany studied here) carried out with the aim of producing a publication 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*".

Germany has an area of 357,580 km², with a population of 83,237,124 inhabitants, it is ranked 19th^{by} population of 196 countries 233 people per km². The GDP per capita in 2021 is 43,290€.

Water is generally not scarce in the country, except for occasional local droughts. A German uses an average of 128 liters of water per day (Destatis, 2022).

2. THE POLITICAL FRAMEWORK

2.1 The local institutional organization in Germany

In Germany, the public supply of drinking water and the disposal of waste water are the responsibility of the municipalities (legal obligations). During the 20th century, local authorities partially "autonomized" the management of services by resorting to public establishments, while mobilizing money from the savings banks they controlled to extend the networks. (Reese, 2013)

In the dynamics of distribution of competences that characterizes the Federal Republic, it is the municipalities that have administrative sovereignty concerning the organization of public service activities on their territory. The Bunds and the Länder have extensive legislative powers: they implement on their territory (transcribe into regional law) the framework legislation of the Bund on water (Wasserhaushaltsgesetz). This competence is coupled with another, which is exclusive: the definition of municipal law and, more specifically, the distribution of competences between the level of the Land and that of the municipalities. As a result, the German water market is characterized by a great diversity of institutional players and a great variety of structures. (Zeller, 2006)

The administrative sovereignty of municipalities includes the choice of the form taken by the provision of public service services. The latter can thus own the water service structures, delegate their management to the private sector or provide them through mixed economy companies. This decision latitude, although subject to the legal framework defined by the Länder and at the federal level, has contributed to the development of a multitude of organizational structures under either public law or private law. Irrespective of the legal status, one often sees a consolidation of the activities of the Daseinsvorsorge into a single municipal service company, called Stadtwerk. (ATT, 2005)

The Stadtwerke are a typically German (and Austrian) communal institution, of public or mixed status. The latter may also belong to groups of municipalities; their legal status is under private law: they are most often organized in the form of joint-stock companies (Aktiengesellschaft, AG) or limited liability companies (Gesellschaft mit beschränkter Haftung, GmbH). Although they have a status of private law, their supervision remains in the hands of the municipality, which as granting authority and shareholder of the company, has a right of surveillance and determines the commercial policy, in particular in terms of pricing of goods and services.

Today, most of these companies remain in the municipal orbit even if they have become LLCs or SAs, in order to benefit from tax and financial advantages. Even if each public service is managed separately from the others, the transversal pooling of financing needs makes it possible to lower the interest rates on loans. (Laure Isnard)

In 2015 more than 12,000 associations are dedicated to the management of soil, water and sanitation, or reservoir and canal systems. They are also responsible for conserving resources under the European Union's Water Framework Directive. There are approximately 6,060 operators providing drinking water, and more than 6,900 sanitation operators. Most of them are run by smaller communities. Unlike the electricity and gas market, which is largely run by private companies, more than 90% of water supply is in the hands of municipalities. (Lehrer, 2022)

2.2 The legal framework for water

2.2.1 Levels setting general guidelines

The European Union imposes itself directly and indirectly in the water sector in Germany through the translation of directives into national law. This transcription is mainly done through joint work between the Federation and the Länder. The two main directives are:

- The Wasserrahmenrichtlinie (WWRL) or the Water Framework Directive. It aims to promote economic and environmental efficiency
- The Trinkwasserrichtlinie (TR) or Drinking Water Directive which focuses on the quality of drinking water.

The Federation oversees the establishment of a framework for a sustainable water policy:

- The Trinkwasserverordnung (TrinkWVO) or Drinking Water Ordinance;
- The Abwasserverordnung (AbWVO), or waste water decree, determines requirements for disposal in waters (lakes, rivers, etc.).

The Land takes care of the quality of drinking water and the exploitation of water resources according to the Basic Law (Grundgesetz).

The Ministry of the Environment leads the water sector. It sets regulations concerning the ownership, monitoring, maintenance and use of water. Each Land has a Water Act which, together with the Federal Water Budget Act, forms the main part of the legal framework. It

is responsible for the regional water plan and for setting up all the procedures for regulation, expertise and permission, in particular for the conduct of wastewater.

2.2.2 Levels in charge of networked water service

Municipalities have the right to choose their institutional and organizational structures to fulfill this task and can call on private companies for this, depending on the legal form they choose. Water drainage is considered a task of public sovereignty, unlike water supply. In both cases, the municipalities set rules for the use and amount of consumer charges.

Thus, in the management of water in Germany, one finds forms of companies under public law and private law coexisting. In European comparison, the German water sector is distinguished by a small number of large companies and a multitude of small and medium-sized water supply and wastewater management companies. (BMWK, 2022)

The associations support innovation processes, represent political and economic interests and can go so far as to define technical standards. The best known are Deutsche Vereinigung für Wasserwirtschaft, Abwasser und Abfall (DWA), Verband communalize Unternehmen (VKU) and Bundesverband der Energie und Wasserwirtschaft (BDEW). They act on different territorial levels and constitute observatories of the sector by notably offering statistical databases.

2.2.3 Forms of organization and management

➤ **Legal forms of public law**

Eigenbetrieb (municipal service): this form of municipal enterprise has the particularity of being part of the municipality, but with its own budget and its own organization, where the municipality retains significant control. The participation of a private third party is not possible.

Regiebetrieb (service managed by the State): is the concentration of technical means and personnel for the accomplishment of tasks, within the framework of the general administration and it is included in the municipal budget. Unlike the Eigenbetrieb form, it is legally and organizationally integrated into the municipal administration.

Zweckverband (special purpose association): when a municipality does not have enough personnel or capital, it can decide to cooperate with other neighboring municipalities. The Zweckverbände are able to fulfill the tasks which traditionally belong to the local authorities and which can be transferred. It is the most widespread form of intermunicipal cooperation for water network services and also the only one, under public law, which allows the participation of a private third party.

Kommunalunternehmen / Anstalt des öffentlichen Rights (Establishment under public law): Compared to the first two forms, the AÖR is more independent while retaining the advantages of public law, namely the control of the municipal body.

The first three forms are legally dependent on the municipality: they cannot conclude contracts with other legal subjects without the consent of the municipality.

➤ **The legal forms of private law**

The 1st: Aktiengesellschaft – **AG** = Société Anonyme and the 2nd: Gesellschaft **mit beschränkter Haftung – GmbH** = Limited Liability Company.

Under these two legal forms, we find the **Eigengesellschaft** (municipal companies), which are legally independent companies, in which the municipalities hold a share, and the **öffentliche Gesellschaft** (public law companies).

By adopting one of the two forms, companies are independent and can establish rights and duties in their own name. These companies can conclude demarcation contracts and thus delimit their supply territories. They can also allow themselves to be conceded by the municipalities, the transport and the operation of the water pipeline.

Companies under public law	Supply	Sanitation
public company run according to public management principles (<i>Regiebetrieb</i>)	0.4%	19.7%
public company run according to commercial management principles (<i>Eigenbetrieb</i>)	14.9%	42.7%
establishment under public law (<i>Anstalt des öffentlichen Rechts</i>)	-	17.0%
water association and intermunicipal syndicate (<i>Wasser - und Zweckverband</i>)	22.2%	12.8%
Companies governed by private law (SA/SARL)	Supply	Sanitation
public company under private law (<i>öffentliche Gesellschaft / Eigengesellschaft</i>)	30.2%	-
public company (<i>öffentlich-private Beteiligungsgesellschaft</i>)	28.8%	-
private company (most often of SA or SARL status)	3.5%	-
Others	-	7.8%

Table 1: Market share of different companies. Source: Branchenbild der Deutschen Wasserwirtschaft , 2005.

For supply, there is a trend towards privatization: the share of private law companies rose from 17% in 1986 to 62.5% in 2003. Conversely, in the sanitation sector, public law are in the majority (more than 90% in 2003).

Also, based on surveys carried out in 2015, 64% of the companies entrusted by the municipalities with the execution of drinking water and sanitation services were organized under public law and 36% under private law. (économie de l'eau, s.d.)

➤ **Example of public services in Germany**

- Berliner Wasserbetriebe (BWB): Municipal Water Company. They supply water and ensure the disposal of waste water in Berlin and parts of Brandenburg. They supply water to 3.5 million people and evacuate wastewater for 3.9 million.

- The Bodensee- Wasserversorgung : association with a specific purpose based in Stuttgart. Today, as one of the largest long-distance water supply systems in Germany, it supplies around four million people in around 320 cities and municipalities in large parts of Baden-Württemberg with drinking water. from Lake Constance.

- One of the largest purely private water companies is Gelsenwasser AG, which supplies around 3.2 million inhabitants with water and gas and disposes of their waste water. This is done within the framework of concession contracts with 39 municipalities...

2.2.4 Development in the new Länder (East Germany)

After reunification: In the mostly sparsely populated eastern German states, systems have been built but cannot be operated economically and impose high contributions and costs on consumers.

In the GDR, municipal water management was divided into 15 water and sanitation companies (VEB: state enterprise), each corresponding to a district of the GDR. With reunification, the VEBs were transferred to 660 communal companies (remunicipalisation). At the same time, oversized factories, especially sewage treatment plants, were often built, so that new municipal enterprises could barely bear the costs and were barely economically viable. Moreover, during the reunification, the West German wastewater model was adopted without any changes: central processes with kilometers of main sewers were set up.

All of these reasons have led to the emergence of systems in eastern states that impose disproportionate levies and fees on consumers. According to the BBU (the Federal Association of Citizens' Initiatives for Environmental Protection), politicians, experts and citizens are now faced with the paradoxical situation that water and sanitation associations are in many cases too small , but their systems are often way too big.

Also according to the BBU, it would have been logical to set up decentralized or semi-decentralized systems, which would have been centrally managed and controlled by larger water and sanitation associations with more know-how.

2.3 Water situation in Germany

2.3.1 Sector characteristic

- In Germany, the total use of available water is 13.5%, of which 2.8% is for public water supply.((ATT), 2020)

- 94% of urban wastewater is treated in accordance with European standards.

- Very low losses of only 7% in 2001 against 19% in England or 26% in France.

- The royalties per m³ are in Germany, together with those of Denmark, the highest compared to the 16 industrialized countries. Nevertheless, the average water bill is not higher than in other countries due to lower water consumption. In recent decades, there has been a trend away from public enterprises towards private municipal enterprises. (Lehrer, 2022)

2.3.2 *Consumption*

About 80% of public drinking water consumption is for domestic consumption and small contractors. The remaining share is represented by industrial companies that are supplied by the public network (14%) and other users (6%).

Despite the prognosis of increasing water consumption, it has actually increased from 145 litres/inhabitant/day in 1990 to 128 litres/inhabitant/day in 2022 (Statista, s.d.). In the same period, water withdrawal decreased by 26%. That is a reduction of 1.75 billion m³.

Reducing water consumption can have negative effects. It may be necessary to occasionally introduce potable water into the sewer system in order to avoid stagnation of waste water. Slow-flowing drinking water can increase the likelihood of health-hazardous contamination in the pipe network. Public drinking water supply companies take only 2.7% of renewable water resources. Overall, the annual water withdrawal of all water users amounts to 32.3 billion cubic meters (about 17%). About 83% of the available water supply is unused. (ATT, 2005)

2.3.3 *water losses*

Water losses in the distribution network were estimated at only 7% in 2001 against 11% in 1991. According to a study commissioned by BGW, the equivalent losses are 19% in England and Wales, 26% in France and Italy 29% This means that water losses in Germany are not only the lowest of these four countries, but also the lowest in the world. The study claims that its methodology allows for an accurate comparison, including excluding water used to extinguish and clean pipes from losses in all comparator countries. This corresponds to the definition of non-revenue water established by the International Water Association.

2.4 **The public sanitation service**

The disposal of waste water is exempt from sales tax, business tax and corporation tax. This also means that only public companies can be responsible for sewerage and stormwater management. Most communities therefore directly operate sewage disposal and stormwater management in the form of public enterprises. However, municipalities or municipal companies can enter into contracts with private companies.

2.4.1 Organization of the sector

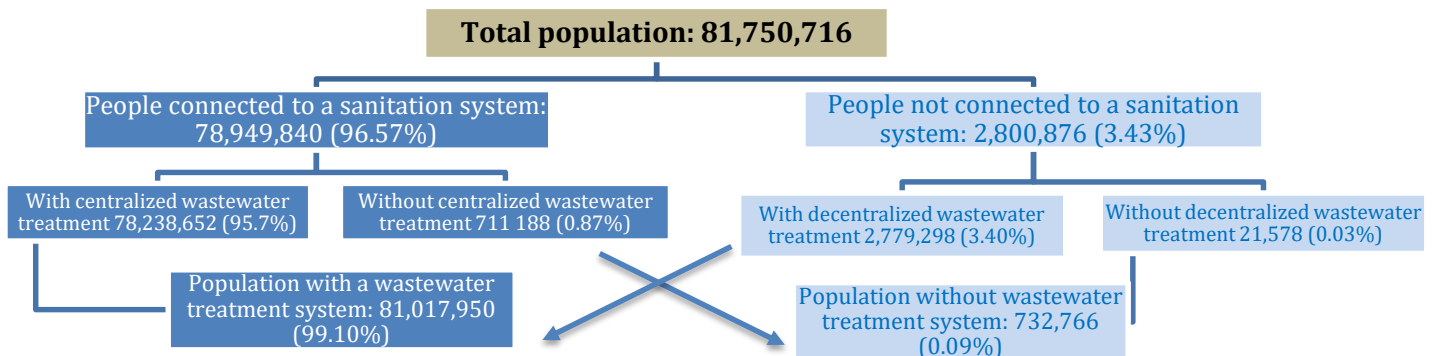


Figure 1: Sanitation organization in Germany ..Source : Ecologic Institute 2010

In 2016, all wastewater is collected and treated with a compliance rate of 100% (slight fluctuation, but in general the country is fully compliant). (OiEau, 2020) In 2020, Germany has 3,811 wastewater treatment plants, including 235 plants with primary and secondary treatment and 3,576 plants with more rigorous treatment than secondary.

2.5 The implementation of public water and sanitation services

2.5.1 Management mode

➤ Drinking water supply

About 15% of the 1,266 largest drinking water suppliers are private; 16% associations with a specific vocation; 63% held public, mixed or private companies. 6% of drinking water suppliers are water and soil associations. Only 3.5% of drinking water suppliers are private. Many drinking water suppliers are companies that also offer electricity, gas and/or district heating and make the bulk of their sales in these areas. (Lehrer, 2022)

➤ The sources

- 65% groundwater
- 9% Sources
- 5% by bank filtrate
- 21% surface water: (Lehrer, 2022)

➤ Access to drinking water supply and sanitation

More than 99% of the population is connected to a drinking water network. The remaining part is self-sufficient thanks to wells. 93% of the population is connected to the public sanitation network. While households in southern and western Germany are mainly connected to a mixed system, the majority of households in the north and east (with the exception of Thuringia) are connected to a separate system. As of 2020, sewer pipe systems have a total length of approximately 590,000 kilometers. (VKU), 2020)

➤ Qualitative requirement of services

The quality of drinking water supply service is generally good. While the Water Framework Directive, the Water Resources Management Act and the water laws of the Länder regulate the role of water supply and waste water disposal within the hydrological cycle, **the German Drinking Water Ordinance** , which transposed the Drinking Water Directive into national legislation, defines the legal requirements for drinking water, for example in terms of quality (chemical parameters...) , treatment (admissible substances, etc.), service obligations (analysis, etc.), the obligations of the responsible authorities (monitoring...) and the obligation to minimize chemical substances in drinking water (strengthening of European standards).

2.6 Regulatory and legislative framework

Germany acts jointly with the European Union (EU), the Bundestag and the parliaments of the Länder to define the political framework and to regulate the supply of drinking water and the disposal of waste water. The EU determines the framework legislation for water quality and management. Water prices charged are regulated by state authorities.

The Länder play a key role in deciding whether the sanitation obligation incumbent on municipalities can be transferred to legal entities under private law. Among other things, they set the legal framework for the approval of prices. Municipalities exert an indirect influence on policy-making through their associations.

With regard to German legislation, it is worth mentioning:

- **The Act on the Prevention and Control of Infectious Diseases in Humans** (IfSG): basis for ensuring and controlling the quality of drinking water. (BDJ, 2001)
- **The German Drinking Water Regulation** (TrinkwV) aims to ensure the quality of drinking water and to protect consumers against health risks associated with contaminated drinking water.(BDJ, 2009)
- **Water Management Act** (WHG): important basis of German water law - numerous amendments, in particular due to provisions of European law.

The Federation has the power to fully regulate the management and protection of water resources. The WHG contains provisions on the protection and use of surface water and groundwater, as well as prescriptions on the development of rivers and water management planning and on flood protection.

With regard to the water laws of the Länder, deviating regulations are possible. For example, the **Water Regime Act for Baden-Württemberg** (WG): [Law of Baden-Württemberg](#) i is intended to implement and supplement the WHG provisions, in their current version, concerning the areas that the WHG has not regulated or that it has not definitively regulated or areas of regulation expressly reserved for Land law. The municipal codes of the Länder also contain regulations concerning water management, for example: obligation of citizens to be connected to the public water supply and the disposal of water and to make use of them .

The laws of the Länder allow for regulations that deviate from the national framework. Water supply, like waste water disposal, is part of the municipal public services of general interest. Cities and municipalities therefore enjoy organizational sovereignty in the field of water supply, ie they have the right to regulate their own internal administrative organization taking into account local practical considerations. This right to municipal self-government is protected by the Basic Law (Article 28, paragraph 2 of the Basic Law). This also applies when third parties are responsible for supplying consumers, as long as cities and municipalities retain decisive influence over the establishment. (Baden-Württemberg)

In contrast to Anglo-Saxon countries, there are no autonomous regulatory authorities for water and wastewater in Germany. The Federal Network Agency is responsible for regulating telecommunications, post, electricity, gas and rail transport, but not the supply of drinking water and the disposal of waste water, which are regulated by federal states.

2.6.1 Water price

Water prices charged by companies are regulated by state authorities, usually by state economic departments, which act as the state's antitrust authorities. Water and sewerage charges levied directly by municipal companies or municipalities, on the other hand, are not directly subject to state control, but are set by municipalities, which are in turn ultimately regulated. by state interior ministries.

While antitrust law allows economics departments to lobby for lower water prices, local government oversight does not provide state interior departments with a tool to reduce water charges and sanitation. In Hesse, out of 399 water suppliers, only 47 are companies that charge prices, while 352 are owners that charge fees. However, without exception, the larger towns in Hesse are supplied by their own companies.

In city-states such as Berlin, Hamburg and Bremen, the senator for economics, both as chairman of the public service supervisory board, makes the request for a fee increase and reviews and approves it. approves in his role as an economics senator, which creates a conflict of interest.

In the case of some private companies (such as Gelsenwasser), disputes over fee increases are decided by a jointly appointed arbitrator based on reports by auditors.

Drinking water quality is monitored by the utilities themselves and by community and county health authorities.

Since the early 1990s, the cost of drinking water and wastewater has been the subject of increased debate in Germany and much public attention, which some describe as "increasing politicization". Particular attention is paid to the large regional differences in the price of water. Critics object that a high share of fixed costs in the price of water is often the consequence of poor management of the company.

3. THE ECONOMIC MODEL OF WATER SERVICES:

3.1 Municipal Taxes Act

According to the law (municipal tax or operating laws of the federal states), the prices and charges for water and wastewater in Germany must cover the full costs of supply and disposal, including the value capital investment and return on equity. Extensions of the supply and sewerage network must be covered by a special connection fee. (Reese, 2013)

We speak of prices when the supply is provided by communal companies governed by private law and of royalties when it is carried out by communal companies governed by public law.

3.2 The different fees

- **Indirect costs:** Water abstraction fees and wastewater fees are paid by the utility companies to the respective federal state. They are part of utility costs and are indirectly charged to the consumer.

- **Water abstraction charges:** The design of the charge structure is not uniformly regulated and differs for ground and/or surface water, volume, purpose of use and exceptions for different groups of users.

- **Wastewater Charges:** According to the Wastewater Tax Act, utility companies are required to pay a tax for the discharge of wastewater into water bodies (to cover environmental costs). Its amount depends on the harmfulness of the wastewater measured by chemical oxygen demand, levels of phosphorus, nitrogen, organic halogens and metals, and toxicity to fish eggs. This fee is intended to create an incentive to purify wastewater beyond the legally required level.

3.3 Anti-trust monitoring

The laws do not provide for a review of investment and operational efficiency as part of the approval process for price and fee adjustments. The Ministry of Economic Affairs, as the antitrust authority, has the ability to prohibit excessive pricing. For this purpose, article 103 old version of the [Law against restrictions on competition](#) (BGW), provides for the notion of comparative market. A water company is compared to other similar suppliers. If it is too expensive, it must lower its prices. The purpose of antitrust law is to simulate competitive pressure on the monopolist and thereby create an incentive to eliminate business inefficiencies.

In May 2007, Hesse was the first federal state in the history of the Federal Republic to take action against what it considered to be excessive water prices. The State Ministry of Economics commissioned a study in which the water prices in selected towns in Hesse were compared with those in towns outside Hesse. Based on the results of the study, the ministry decreed that municipal companies in Wetzlar, Frankfurt and Kassel should reduce their water prices by up to 37%.

4. PRINCIPLES OF WATER PRICING IN GERMANY

4.1 Comparison of water prices and charges

The formation of fees in Germany is subject to specific legal requirements. The municipal tax laws (KAG) and municipal ordinances (GO) of the Länder determine the framework for calculating the fees. According to this, the principles of public finance management essentially apply, such as the principle of equivalence (proportionality), the principle of cost recovery, the prohibition of cost overruns, the principle of equal treatment and implementation according to business principles.

According to the case law of the Federal Court of Justice, the principles applicable to the calculation of fees must also be applied accordingly to the calculation of prices. This is also sometimes regulated by the KAG. For the collection of fees or prices, a consistent and verifiable cost calculation is required. The associations offer various aids such as guidelines and calculation tools. ((VKU), 2020)

4.1.1 Comparison between German cities

According to a 2007 Spiegel Online study (Waldermann, 2007), the annual water and wastewater bill for a one-person household consuming 125 l/day averages €151 in all cities studied (84 cities). However, there are big differences between regions. Water is particularly expensive in eastern Germany and North Rhine-Westphalia. In the north and south it is relatively cheap. In Essen, a one-person household pays €256/year. In the neighboring town of Bochum, the same amount of water costs half as much. In total, the inhabitants of Essen have to pay 340% of what the citizens of Augsburg pay, water is the cheapest there in national comparison.

Essen	256 €
Jena	248 €
Rostock	241,49 €
Leipzig	205,96 €
Dresde	195 €
Moyenne 2007	151 €
Cottbus	136,23 €
Potsdam	120,41 €
Berlin	104,53 €
Freibourg	98,16 €
Augsbourg	75,59 €

Figure 2: Comparison of drinking water prices in 2007 for 125 L/day according to cities in Germany (> 100,000 inhabitants). Source:(Waldermann, 2007)

Different regional costs are due to several factors: topography, population density and the type of raw water used differ from region to region and play a decisive role in setting prices and fees. One of the explanations for the high water prices in the new Länder is the high investment costs after reunification.

4.2 Prices and charges per cubic meter

In 2004, water prices and charges amounted on average to 1.81€/m³, including VAT, and sanitation charges to 2.14 €/m³.

The average price in 2022 for combined services is just over 4 €/m³. (Bonnafous, 2022)

In 2022, the tariff for the drinking water service in Berlin is 1,694 €/m³ excluding VAT. That of the sanitation service also for Berlin is 2,155 €/m³ excluding VAT.

Prices and fees vary greatly depending on the operator. In 2005, according to the BGW, these were 2.34 €/m³ on average in Saxony, but only 1.31 €/m³ in Schleswig-Holstein.

The high prices and fees per cubic meter in Germany can be explained by the fact that water consumption in the country is relatively low and most of the costs of supplying drinking water and sewage disposal are independent volume. Lower consumption can therefore lead to higher prices and charges after a while due to the requirement for cost recovery, so that the amount of the water bill ultimately hardly changes.

4.2.1 Control

Prices and fees are subject to extensive scrutiny by public authorities and courts. The type of control mechanisms taking effect depends on the respective royalty model.

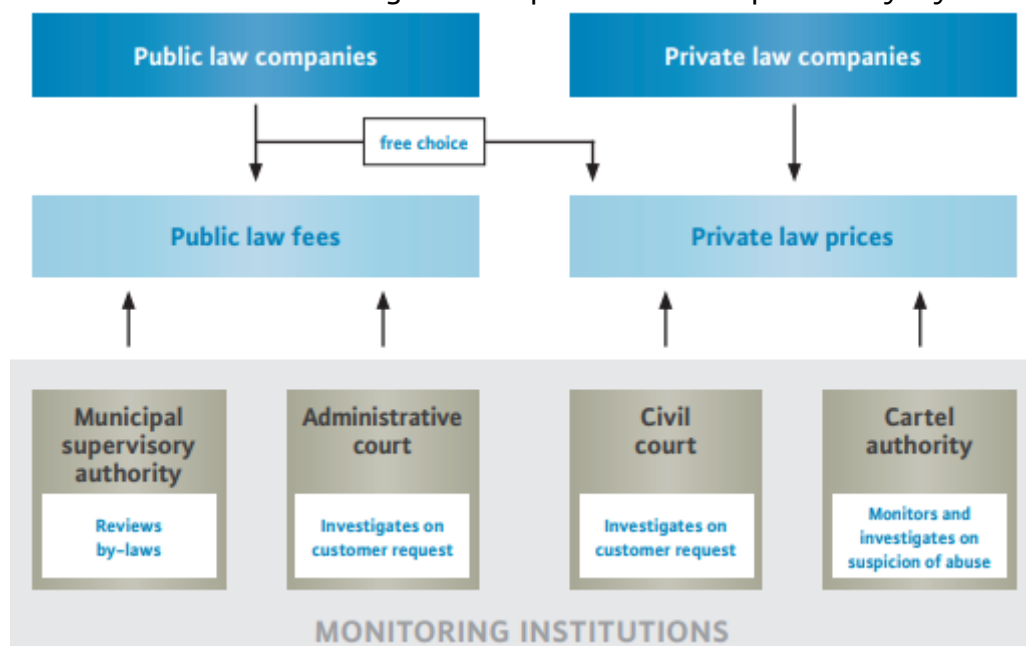


Figure 3:
Organization
of cost and
price control.
Source : ((VKU),
2020)

4.3 Tariff for water services: example of Berliner Wasserbetriebe

4.3.1 Drinking water tariff

The drinking water supply tariff is made up of a basic tariff and a quantitative tariff. The base rate is charged for the supply of the water supply system (aqueduct, pumping stations, pipes, etc.) and the water meter.

The basic tariff is calculated per day and depends on the size of the main water meter (QN/Q3) as well as the additional annual water consumption in the case of water meters up to a size of QN6/ Q3. The larger the water meter, the higher the base tariff.

The quantitative tariff is calculated per m³ on the basis of drinking water consumption. In this case, the quantitative tariff is 1.694 € (net) / 1.813 € (gross)* / m³. (Wasserbetriebe, s.d.)

Water meter size up to QN	Water meter size up to Q ₃	Annual consumption in m ³	Basic net daily rate for drinking water*	Basic gross daily rate for drinking water*
2.5	4	0 – 100 m ³	0.045 €	0.048 €
		101 – 200m ³	0.060 €	0.064 €
		201 – 400 m ³	0.099 €	0.106 €
		401 – 1000 m ³	0.198 €	0.212 €
		from 1001 m ³	0.300 €	0.321 €
6	10	0 – 400m ³	0.480 €	0.514 €
		of 401 m ³	0.720 €	0.770 €
10	16	-	1.200 €	1.284 €
15	25	-	1.800 €	1.926 €
40	63	-	4.800 €	5.136 €
60	100	-	7.200 €	7.704 €
150	250	-	18.000 €	19.260 €

Table 2: Basic tariffs according to the size of the water meter. Source :(Wasserbetriebe, s.d.)

Q_n nominal flow in m³/h Q₃ – constant flow in m³/h

* The water tariff is subject to VAT according to the reduced rate for food (7%).

Germany has very strict calibration laws for water meters. They must be recalibrated every 6 years for cold water meters and every 5 years for hot water meters. Operating costs can no longer be charged for meters for which this period has expired. It is not possible to recalibrate a meter when it is installed, for this reason water meters are always exchanged for new meters after the period of authorized use has expired. If a lessor does not comply with the calibration obligation, a heavy fine can also threaten: according to the specifications of the EichG , fines of up to 10,000 € can be expected.

As a result, utilities have improved their performance in safety, quality, customer service, sustainability and economic efficiency. (Bonnafous, 2022)

- For people benefiting from Hartz IV (minimum income), certain housing costs, including the costs for water and its disposal, are covered by the Jobcenters (structures supported by the Employment Agency and the municipal level).

4.3.2 Sanitation tariff

Sanitation tariffs include charges for the disposal of waste water (sewage and rainwater) as well as the disposal of faecal water and faecal sludge. It should be noted that utility companies in Germany calculate sewage charges on the basis of drinking water consumption, with for example rainwater, sometimes flowing into sewer pipes, which is often not taken into account.

- ❖ **Wastewater:** Invoiced with a basic tariff corresponding to the drinking water supply tariff (table 3) and a quantitative tariff of 2,155 €/m³ since 01/01/2022.
- ❖ **Rainwater:** The fee is 1,840 €/m² of surface area drained since 01/01/2022.

- ❖ **Faecal water:** Billed 2,045 €/m³ since 01/01/2022 for the evacuation of faecal water from the collection pits. In addition, there is an individual charge for transportation.
- ❖ **Faecal sludge:** Invoiced 11,361 €/m³ since 01/01/2022 for the disposal of faecal sludge from small wastewater treatment plants. In addition, there is an individual charge for transportation.

4.3.3 Evolution of prices

In 2020, the average price of drinking water in Germany increased by 1% compared to 2019. If in 1993 the price of drinking water had still increased by almost 12% compared to 1992, the increase in price has remained between 0.5 and 1% in recent years.

	Water tariff per m ³	Wastewater charge per m ³	Rainwater charge (m ² /year*)
01.2018	1,694 €	2.210 €	1.840 €
01.2016	1,694 €	2.303 €	1.804 €
01.2015	1,694 €	2.307 €	1.744 €
01.2014	1.694 €	2.464 €	1.825 €
01.2013	2.027 €	2.464 €	1.825 €
01.2012	2.027 €	2.464 €	1.897 €
04.2010	2.027 €	2.464 €	1.897 €
01.2009	2.038 €	2.543 €	1.840 €
01.2008	2.071 €	2.567 €	1.717 €
07.2007	2.076 €	2.487 €	1.637 €
01.2007	2.141 €	2.551 €	1.637 €
01.2006	2.158 €	2.465 €	1.533 €

Table 3: Sanitation tariffs. Source :(Wasserbetriebe, s.d.)

*The emptying prices are not subject to VAT.

4.4 Details of a water bill: See appendix

4.5 Costs borne by water utilities

4.5.1 Operating costs

The maintenance and development of existing sewer and sewer networks will be a crucial challenge for supply and disposal companies in the years to come.

According to the VKU association (2017), although the majority of companies assume that the funds currently raised for the maintenance of the substance are sufficient for current needs, the majority point out at the same time that the expenditure on infrastructure will again have to increase significantly in many regions in the coming years. In addition, legal and technical requirements and changing framework conditions, such as rising costs in civil engineering and pipeline construction, increasingly affect the use of available funds.

4.5.1 Investment costs

The German drinking water network has a total length of approximately 540,000km and that of public sewers approximately 590,000km. Investments in the sector amount to approximately 8 billion euros (100 €/inhabitant) per year, including 5.5 billion for sanitation and 2.5 billion for drinking water supply. The KfW (Bank aus Verantwortung) grants long-

term loans of up to 30 years, which can be used for the supply of drinking water and the disposal of waste water. According to the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, water suppliers invest around 2 billion euros per year in the maintenance of their installations. (Lehrer, 2022)

Given that much of the current infrastructure was last built or substantially renovated in the 1950s and 1960s, there is a significant need for renovation and replacement.

However, water companies / municipalities regularly invest a large part of their turnover in infrastructure (in 2016, 2.8 billion euros were invested). The exact condition of the pipes is often not known. This is a challenge for targeted and effective investments. (DVGW, s.d.)

4.6 Water price evolution

Residential water consumption has changed significantly over time. While forecasts from the 1970s predicted an increase to more than 200 l/day/capita, water consumption between 1991 (144 l/capita) and 2004 actually decreased by around 13% (to 126 l) . However, water consumption in the new states is 93 l compared to 132 l in the old ones.

Interestingly, per capita consumption levels in the old and new states were nearly the same in the early 1990s. fell by only 9% in the old states. The drop in water consumption can be justified by a substantial increase in water and wastewater prices in the early 1990s, which were significantly higher in the new states. But more detailed analyzes are lacking.

Germany's drinking water and waste water pricing law distinguishes between public and private companies: the prices of public companies must cover the costs, while the prices of private companies are controlled by the antitrust agencies of the state. 'State. In 2005, the average price for water was 1.81 €/m³ and 2.14 €/m³ for waste water. On average, these prices approximately cover the costs(Hillenbrand, 2009)

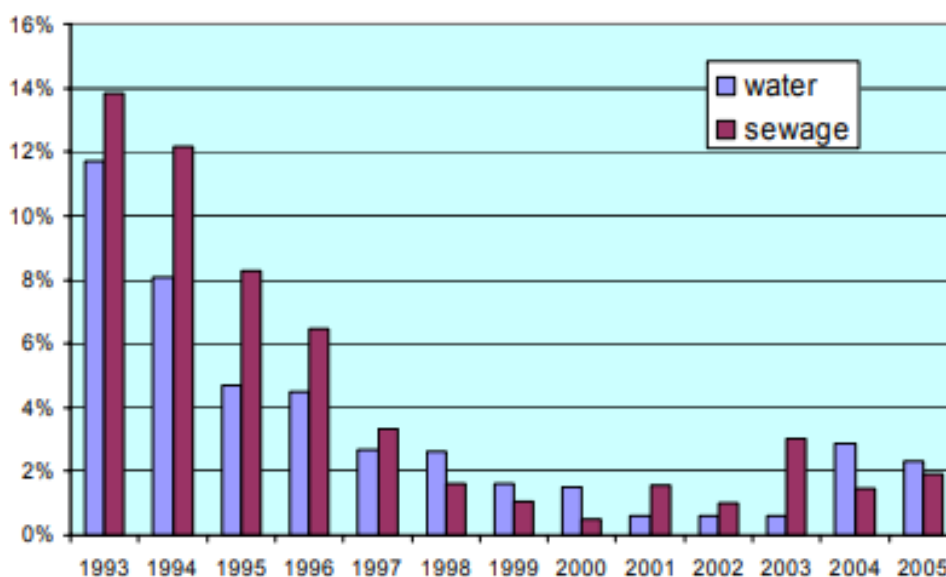


Figure 4: Evolution of drinking water and wastewater prices in Germany. Source: BGW, National Statistical Office Baden-Württemberg (2006)

Prices shown are nominal prices. In addition, since wastewater prices are not available for Germany, data from a "representative" federal state, Baden-Württemberg, is used.

Furthermore, water price developments are not available separately for the former East and West Germany.

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

Since German regulations require water and wastewater prices to be set to cover full costs, consumers are faced with average cost prices rather than marginal prices.

According to the study conducted by Thomas Hillenbrand and Joachim Schleich , the estimate of -0.229 for the price elasticity suggests that residential water demand in Germany is rather inelastic. Price elasticity appears to be the same for average households in the new and old federal states, but estimates of income elasticities differ significantly across regions (Hillenbrand, 2009).

Previous studies also demonstrate low price elasticity. For example, the average price elasticity in the studies reviewed in the meta-analysis by Dalhuisen et al. (2003, p. 95) is -0.41 and the median is -0.35 for a standard deviation of 0.86. The low estimates of water price elasticities can be justified by a relatively low share of water (and wastewater) costs in total household expenditure, and are more likely to be associated with countries in the l OECD

Another study conducted in 2021 analyzes the price elasticity of household water consumption, differentiating between households that have an approximate knowledge of water prices and households that do not. Based on around 1,100 observations of households living in private houses, and using the sum of the prices per cubic meter for water and wastewater as a price measure, we find a moderate but statistically significant and not zero of -0.102.

Households that know water prices tend to show higher elasticity, while households that do not know prices show no statistically significant response in their water consumption. Prices can therefore only be used to a limited extent as a means of controlling water consumption. (Manuel Frondel, 2021)

The price elasticity may be lower in Germany than in other OECD countries because, as the relatively low level of water consumption per capita suggests, the water saving potentials have already been further increased. operated in Germany.

5. ACTIONS TO BE TAKEN

Despite a decrease in drinking water consumption in Germany, additional savings may be required. The requirements in this area arise above all at regional level and have a seasonal character. It is therefore a subject that must be discussed and implemented at the local level. Households are invited to reduce their water consumption by adopting simple measures (using rainwater to water the garden, etc.).

In 2021 the National Water Strategy was adopted. With this strategy, the Federal Ministry for the Environment wants to safeguard Germany's natural water reserves, protect against water shortages, prevent conflicts of use and improve the status and quality of water. 57 measures are to be implemented gradually by 2030, among others:

- Expand the database, strengthen forecasting capacity;
- Develop and define rules for conflicts of use (water hierarchy);
- Establish a supraregional water supply: Principle of a water supply as close as possible to the place of residence to remain valid in the future. In addition, long-distance interconnections and pipelines will be required to compensate for regional differences in water availability.
- "Smart water pricing": often it is not the total quantity demanded that is the problem, but the tap pressure, when the demand for water is too high at the same time. If it is known when demand is low, water can be offered at a lower price. (Bonnafous, 2022)

The German water sector is undergoing a constant modernization process. It is essential for the country to maintain and refine high standards and ensure adequate pricing for customers.


Faced with the reduction in water consumption and certain problems, in particular demographic, which call into question the model of the networks, the question arises as to whether Germany must face a real change of system in the action urban collective (urban planning, development, management and urban policies).

On the one hand, the country is indeed faced with a fall in consumption linked both to the demographic decline and to that of income, which leads to the distribution of fixed costs among fewer consumers, and therefore to increase their bill again. .


On the other hand, the rise in fixed costs linked to the overcapacity of the networks which lead to direct and indirect costs, also contributing to the increase in tariffs.

In response to this situation, some investors expressly ask for the possibility of setting up their own water distribution and sanitation systems before building in a municipality; perhaps for ecological reasons, but above all because of the high cost of connection to the central network. It is also a question of turning more and more willingly to decentralized, semi-collective and/or autonomous systems.

6. APPENDIX



Technische Dienste Kehl

Technische Dienste Kehl • Rathausplatz 2 • 77694 Kehl
47 42C4 1B00 1E 8000 BBDC
DV 01.22 0,85 Deutsche Post  *K4000*

Kaufm. Bereich
Kundencenter, Zimmer 814

Rathausplatz 2, 77694 Kehl
www.technische-dienste.kehl.de

17.01.2022

Kundennr.: [redacted]
Rech.Nr.: [redacted]
(bitte bei Rückfragen/Zahlungen angeben)

Verbrauchsstelle: [redacted]
(1)

Verbrauchsabrechnung / Gebührenbescheid
vom 01.01.2021 bis 31.12.2021

Sehr geehrter Kunde,
wir berechnen Ihnen

Abrechnung Verbrauch	Abrechnung Grundpreis
Tarif Wasser 183,34 EUR	Grundpreis Zähler Wasser 33,38 EUR
Tarif Abwasser 219,65 EUR	
<hr/>	
Gesamtbetrag Netto: 422,20EUR MwSt: 14,17EUR	436,37 EUR Abschlagszahlungen in EUR
abzüglich der gezahlten Abschläge	-440,00 EUR
Gutschrift	3,63 EUR

Zahlungen wurden berücksichtigt bis 31.12.2021


wird überwiesen am 31.01.2022 auf Konto DEXXXXXXXXXXXXXXXXXX991 Volksbank Bühl (BLZ GENODE61BHL), Mandatsreferenz S-10000000000000630

künftiger Abschlag	Netto EUR	MwSt %	EUR	Brutto EUR
Wasser	18,69	7,0	1,31	20,00
Abwasser	18,00	0,0	0,00	18,00
Gesamt:	36,69		1,31	38,00

Fälligkeit der Abschläge: 31.01.2022, 28.02.2022, 31.03.2022, 30.04.2022, 31.05.2022, 30.06.2022, 31.07.2022, 31.08.2022, 30.09.2022, 31.10.2022, 30.11.2022

Bitte halten Sie die Zahlungstermine ein und zahlen Sie den genannten Abschlagsbetrag, um unnötige Mahnungen zu vermeiden.
Wir empfehlen, uns ein SEPA Lastschriftmandat zu erteilen.

Einzelheiten über die Abrechnung entnehmen Sie bitte der Rückseite



Kehl
AM NUN

Bankverbindung:
Sparkasse Hanauerland Kehl (BLZ 664 518 62) 00-045 600
(Steuer-Nr. 14050/23000) DE 142215509
IBAN: DE55 6645 1862 0000 0456 00 BIC: SOLADES1KEL

Kundennr.: [REDACTED]		Rech.Nr.: [REDACTED]			
		Verbrauch	Tage	Vergleich zur Vorperiode	Tage
Wasser	cbm	115	365	129	366
Abwasser	cbm	115	365	129	366
Abwasser	m ²	230	365	230	366

Zähler- nummer	von	bis	Tage	Zählerstand alt	Zählerstand neu	Ablese- hinweis	Faktor	Verbr. in cbm/m ²
W [REDACTED]	01.01.2021	28.12.2021	362	637	751	N	1	114
W [REDACTED]	29.12.2021	31.12.2021	3	751	752	G	1	1
A [REDACTED]	01.01.2021	28.12.2021	362	637	751	N	1	114
A [REDACTED]	29.12.2021	31.12.2021	3	751	752	G	1	1
A [REDACTED]	01.01.2021	31.12.2021	365	230	230	N	1	230

Preis gültig bis von bis	Tage	Tarif	Verbr. in cbm/m ²	Preis cbm/m ²	Netto betrag	MwSt.		Brutto betrag
						%	Betrag	
01.01.2021 - 31.12.2021	365	W Wasser/ Abw Haushalt	115	1,49	171,35	7,00	11,99	183,34
01.01.2021 - 31.12.2021	365	A Abwassergebühr	115	1,47	169,05	0,00	0,00	169,05
01.01.2021 - 31.12.2021	365	A Niederschlagswasser	230	0,22	50,60	0,00	0,00	50,60
Summe Verbrauch:					391,00		11,99	402,99

Preis gültig bis von bis	Monate	Beschreibung	Preis	Netto betrag	MwSt.		Brutto betrag
					%	Betrag	
01.01.2021 - 31.12.2021	12	W Grundpreis Zähler	31,20	31,20	7,00	2,18	33,38
Summe Grundpreis:				31,20		2,18	33,38

Summe Verbrauch: Netto: 391,00EU MwSt: 11,99EU **402,99 EUR**
Summe Grundpreis: Netto: 31,20EU MwSt: 2,18EU **33,38 EUR**
Gesamtbetrag: Netto: 422,20EU MwSt: 14,17EU **436,37 EUR**

Rechtsbehelfsbelehrung:
Gegen diesen Bescheid kann innerhalb eines Monats nach Bekanntgabe Widerspruch bei der Stadt Kehl erhoben werden.

Legende:

NW = Niederschlagswasser Ablesehinweis "K" = Ablesung Kunde Ablesehinweis "G" = geschätzt