

Contemporary market structure and regulatory framework

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trust





TRANSITIONS TO
THE URBAN
WATER SERVICES
OF TOMORROW

Contemporary market structure and regulatory framework

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Contents

Contents	2
List of Figures	3
List of Tables	6
List of Abbreviations	7
1 Preface	8
2 The EU Water Framework Directive.....	9
3 The European Water Market.....	12
3.1 An Overview of Europe's Water and Wastewater Services	13
3.2 Closer Examination of the Water Sector in selected European Countries.....	18
3.2.1 Scotland	18
3.2.2 Portugal.....	32
3.2.2 Norway	49
3.2.2 Germany.....	62
4 Classification within Categories	78
5 Perspective and Starting Points	81
Annex I Excerpts from the Water Framework Directive.....	83
Annex II Management models in the Portuguese water and waste services	85
Bibliography	86

List of Figures

Figure 1: Main economic principles, approaches and instruments	11
Figure 2: Main players in the Water Market	12
Figure 3: Population, EU-27 (at 1 January, million)	13
Figure 4: Demographic balance in 2009 (in 1 000)	14
Figure 5: Total freshwater abstraction by public water supply in m ³ per inhabitant (2007).....	14
Figure 6: Population connected to wastewater treatment, 2007 (% of total).....	15
Figure 7: Countries with regulated water and wastewater sectors in Europe.....	16
Figure 8: Main Structure of the Scottish Water Industry.....	21
Figure 9: Scottish Water Funding 2010/11.....	26
Figure 10: Customer Contacts – Subject heading analysis	30
Figure 11: <i>Customer Contacts – Total Contacts</i>	31
Figure 12: Main principles of the regulation in Portugal	35
Figure 13: Evolution of the population served with drinking water supply services.....	36
Figure 14: Dimension of public drinking water supplies in Portugal	37
Figure 15: Evolution of the population served with drainage and wastewater treatment services	38
Figure 16: General figures for drinking water supply services grouped by management model	39
Figure 17: General figures for wastewater management services grouped by management model	40
Figure 18: Ownership of share capital of multimunicipal and municipal concessions in 2010	42
Figure 19: Average cost per utility in water supply (WS) and wastewater drainage and treatment (WWDT) systems (2005).....	43

Figure 20: Tariff system of the state company EPAL for domestic customers in 2008.....	44
Figure 21: Selection of tariff systems for domestic customers in 2008.....	45
Figure 22: Approved tariffs evolution in water services concessions.....	45
Figure 23: Percentage of water controlled achieving good quality.....	46
Figure 24: Total complaints received by ERSAR in 2010.....	47
Figure 25: Annual available freshwater resources in Norway. Average for 1971-2000. Whole country in million m ³	50
Figure 26: Length of municipal water pipelines by county and time being laid (2010).....	53
Figure 27: Renewal of municipal water pipelines - 3year moving average (2002 - 2010).....	54
Figure 28: Percentage of public water supplies used by various sectors (2006)	54
Figure 29: Share of the population connected to various types of treatment plants (2009).....	55
Figure 30: Sewage system classified by period (2010) and sewage system renewed 3-year average (2008-2010).....	55
Figure 31: Variation in annual water supply fees shown as proportion of municipalities and population in different price classes (2008)	59
Figure 32: Municipal residential charges in 2011.....	60
Figure 33: Development of the average precipitation in Germany	62
Figure 34: Development of the average temperature in Germany.....	63
Figure 35: Development of the per-capita water consumption in Germany (in litres per person and day).....	65
Figure 36: Wastewater connection in Germany in 2007	66
Figure 37: Age pattern in the sewer network.....	67
Figure 38: Development of the types of enterprise in the public water supply (under public/private law).....	68

Figure 39: Types of enterprise in the public water supply 2008 (Shares related to water output)	68
Figure 40: Size structure of water supply utilities in Germany 2007 (Shares as percent).....	69
Figure 41: Organisational form of wastewater disposal (weighted according to the population connected to the sewerage system)	69
Figure 42: Size structure of wastewater treatment facility operators 2007	70
Figure 43: Development of capital expenditure in public water supply from 1990 to 2010 (according to asset areas, in billion Euros).....	71
Figure 44: Development of capital expenditure in public wastewater supply from 1998 to 2010 (in billion Euros)	71
Figure 45: Control of prices and charges	73
Figure 46: Effects of decreasing water deliveries on total and specific costs (Relative evolution over time).....	73
Figure 47: Development of per capita expenditure on drinking water compared to the inflation (Index year 2000 = 100).....	74
Figure 48: Development of per capita expenditure on wastewater compared to the inflation (Index year 2000 = 100).....	75
Figure 49: Customers' satisfaction with the service of their water supplier	76
Figure 50: Customers' awareness on water consumption and water costs.....	77
Figure 51: Overall satisfaction of customers with the services of their wastewater disposal utility	77

List of Tables

Table 1: Tariff structure for standard water and wastewater services	27
Table 2: Fixed and volumetric charges for water and wastewater services	28
Table 3: Meter Related Annual and Volumetric Charges - Water.....	29
Table 4: Meter Related Annual and Volumetric Charges – Foul Sewerage	29
Table 5: Average annual precipitation in Portugal.....	33
Table 6: Water fees, for private dwellings of 120 m ² in NOK	58

List of Abbreviations

AdP	Águas de Portugal
CMA	Central Market Agency
DWRQ	Drinking Water Quality Regulator
ERSAR	Entidade Reguladora dos Serviços de Águas e Resíduos
IRAR	Instituto Regulador de Águas e Resíduos
LP	Licensed providers
MAOTDR	Ministério do Ambiente e do Ordenamento do Território
NPV	Net Present Value
OPA	Overall Performance Assessment
SEPA	Scottish Environment Protection Agency
SW	Scottish Water
WFD	European Water Framework Directive
WHG	Wasserhaushaltsgesetz
WICS	Water Industry Commission for Scotland

1 Preface

*“Water is not a commercial product like any other but, rather, a heritage
which must be protected, defended and treated as such.”*

EU Water Directive, 2000

This diagnosis of the European Parliament and of the Council points out that water *is* an economic good, but *not* a usual one. Water is vital for the people, animals and plants. Furthermore it is indispensable for the agriculture and industry. Nevertheless the water improvement incurs costs which have to be recovered. This poses special challenges to the water management and requires unique measures from an economic point of view.

Cross countries the water industry is bound to an infrastructure which implicates its status as quasi natural monopoly. The lack of a competitive market pricing always implies a discussion of the competition *in* the water market. Furthermore the water sector is very capital intensive and has to face extremely high fixed costs. This raises the question of the right investment and funding strategies. As TRUST focuses on sustainable solutions, economical efficiency is one piece of the puzzle.

The target of this report is to point out the status quo of the European water market and its regulatory framework. Collecting and analysing this general information with focus on the economic, financial aspects, is necessary to have a basis for possible further economic developments.

First, the report will focus on the economic aspects of the European Water Framework Directive, which is valid for all EU countries. After a short, representative overview of the European water market and its regulatory framework the report will give a detailed look at the situation of the water sectors in Scotland, Germany, Portugal and Norway which are characterized by their differentiation. By mapping the European water supply situation in detailed country reports of four of the TRUST relevant case study cities this report creates the starting point for further tasks.

2 The EU Water Framework Directive

The main target of the Directive 2000/60/EC of the European Parliament and of the Council, better known as EU Water Framework Directive (WFD), is to establish “[...] a framework for Community action in the field of water policy”¹. The WFD came into force on 23 October 2000 and confronts the EU states with old and new tasks concerning the environmental and economic water management. Timetables for the aquatic environmental measures are binding for all countries and shall ensure a *good condition* of Europe’s water by the end of 2015. Having a legislation concerning water management on EU level stresses the fact that water resources and environmental problems do not stop at national borders. This makes transnational activities not only useful, but also important.

By pointing out that water services are *general interest services*,² the WFD stresses its significance for life. To guarantee an access to the water supply as an essential service, it is necessary to ensure a sustainable water management. Therefore the Directive aims to protect the natural water resources and to provide good water quality across Europe. Different strategies and measures for resource conservation and against water pollution are required.

Beside of environmental measures, a novel aspect of the Directive is to put value on economic questions and instruments.³ Article 5 and the according Annex III of the WFD underline the importance of an economic analysis of water use. To ensure sustainable business practices in an industry, which is characterized by long life assets and a capital intense infrastructure, it is essential to consider long term forecasts of supply and demand for water and to uncover investment needs. The Member States had to ensure by the end of 2004 that the volume, prices and costs associated with water services, including necessary future investments, were estimated in sufficient detail to examine the Directive-measurements on their cost-effectiveness forming the basis for the target of cost recovery.

The aim of cost recovery for services in the water sector is emphasized in article 9: “Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs [...].” Cost recovery is a main factor to ensure sustainability and quality in the water sector. Although water is a natural occurring resource, its improvement incurs costs that must be paid.⁴ To give incentives for an environment-related engagement it is necessary to consider as well as assess also environmental and resource costs. Recovering these additional costs increases the interest of water operators in environmentally friendly activities. This stresses the fact that one cannot look separately at the environment, but need to take the economic aspects into account to improve the water resource management. To fulfill the high expectations of a sustainable water management, a solid cost accounting and a secure

¹ European Parliament, Council (2000): Water Framework Directive (Directive 2000/60/EC), additional title

² See European Parliament, Council (2000): Water Framework Directive (Directive 2000/60/EC), section I, paragraph 15, p.2.

³ See Chave, Peter (2001): The EU Water Framework Directive, IWA Publishing, London, p.15.

⁴ See Black, Maggie; King, Jannet (2009): The atlas of Water, p. 46.

funding plan is indispensable. Therefore whole-cost recovery should be the aim of the countries' water pricing.

Moreover, “the water pricing policies (shall) provide adequate incentives for users to use water resources efficiently and thereby contribute to the environmental objectives of (the) Directive.”⁵ Furthermore, article 9 stresses that all Member States shall consider the different water use and cost causation of industrial, private and agricultural customers with respect to the target cost recovery. The WFD requires *the polluter pays principle* as basic influence on the water pricing model to distribute the costs of water services more equitable.

Adequate water pricing helps to prevent wastage, but “a one-size-fits-all approach may not be appropriate.”⁶ The Directive recommends and allows the Member States to take regional effects and influences into account. Special challenges like climatic and geographic conditions as well as social, environmental and economic effects should be considered while aiming cost recovery and an adequate water pricing.⁷

The deadline for the EU countries to ensure cost recovery in the above sense was set until the year 2010. The Member States were requested to report about their implementation, whereas the European Commission's task was respectively to monitor it. Furthermore, exceptions can be made insofar as Member States can “[...] decide in accordance with established practices not to apply the provisions of [article 9] paragraph 1, second sentence [...] where this does not compromise the purposes and the achievement of the objectives of (the) Directive.”⁸

The main economic principles, approaches and instruments of the Water Framework Directive are summarized in the following illustration.

⁵ *European Parliament, Council (2000): Water Framework Directive (Directive 2000/60/EC), Article 9, paragraph 1, second sentence, p.13.*

⁶ *See European Commission: Water is for life: How the Water Framework Directive helps safeguard Europe's resources, Publications Office of the European Union, Luxembourg 2010, p. 15.*

⁷ *See European Parliament, Council (2000): Water Framework Directive (Directive 2000/60/EC), Article 9, paragraph 1, third sentence, p.13.*

⁸ *European Parliament, Council (2000): Water Framework Directive (Directive 2000/60/EC), Article 9, paragraph 4, p.13.*

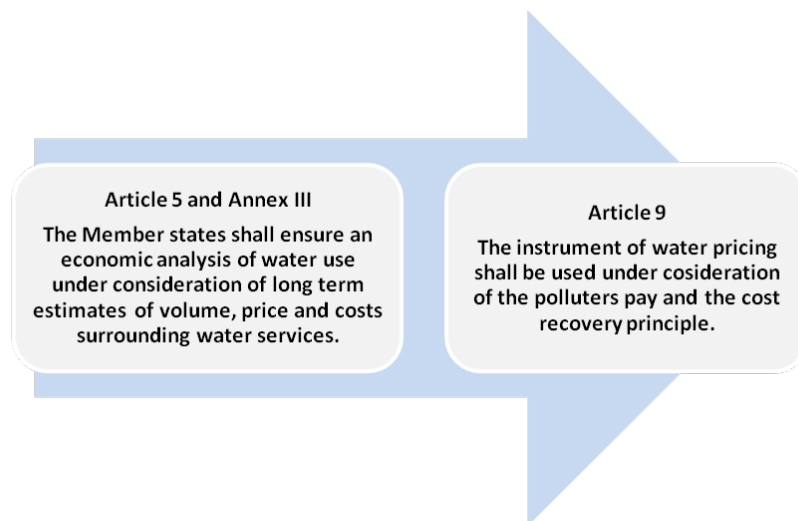


Figure 1: Main economic principles, approaches and instruments⁹

From the economic point of view it is striking that the WFD proposes economic principles and provides an implementation framework, but doesn't set obligatory, detailed guidelines on how to implement these economic principles.¹⁰ For example the WFD requires efficient water pricing, but does not set an obligatory water price for all countries in the EU.¹¹ This and the existing exceptions provide leeway to the actors.

In the following chapter the concrete implementation in various European countries is presented. Beyond the economic aspects the country specific regulatory framework and key indicators of the water market will be represented to reveal future treatment options.

⁹ Own illustration based on the Water Framework Directive. For the whole articles see Annex I.

¹⁰ See *Klawitter, Simone (2006): What price water? Sustainable water pricing and tariff setting for residential water use*, p.33.

¹¹ See *European Commission (2002): The Water Framework Directive – Tap into it!*, p. 9.

3 The European Water Market

In all European countries the water industry has to face the typical challenges of a network industry. “A *network industry* is one that supplies a public or basic service by operating a large infrastructure network whose characteristics are: strongly increasing returns on scale, high levels of capital intensity, and long life of industrial assets.”¹² The delivery of water is bound to pipes, which makes competition in the market very difficult.¹³ On the one hand it is not possible to inject and distinguish the water of two different suppliers within a network. On the other hand it does not make economic sense to have a separated, second pipe system, because of the sector’s capital intensity.

As the end-consumers are dependent on the services of general interest, they have to take the services which are offered in their region. This implicates the utilities’ status as natural monopoly. Different players and circumstances have additional influence on the countries’ water and wastewater service. Beside of the country specific environmental conditions, the services of general interests are mainly influenced by the legislation, the water and wastewater companies, the customers and other stakeholders (see figure 2).

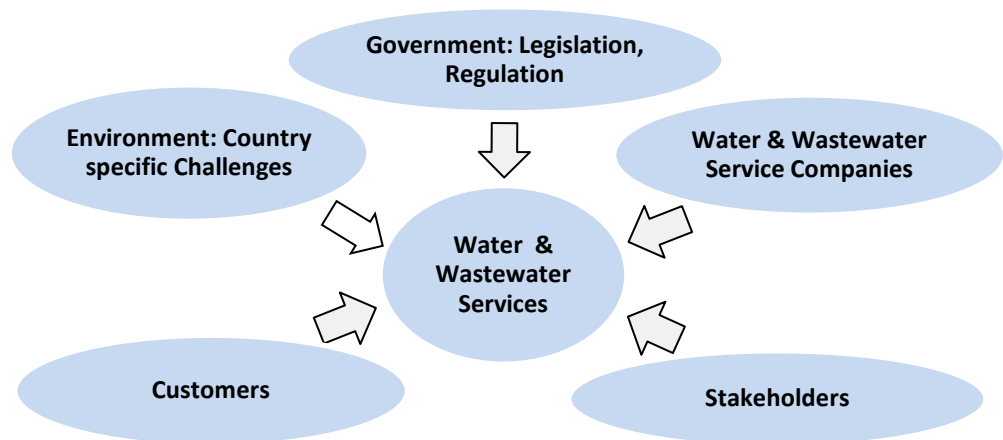


Figure 2: Main players in the Water Market¹⁴

Aim of this chapter is to give a short overview on the general situation in the European water market, before the role and influence of the above mentioned main players is presented in detail for the water markets of the four countries: Scotland, Portugal, Norway and Germany.

¹² Bouttes, Jean-Paul; Leban, Raymond (1995): Competition and regulation in Europe’s network industries from theoretical approach to sectorial application, p.127.

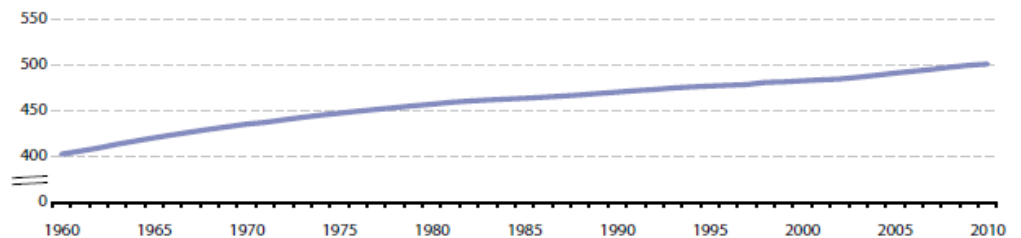
¹³ See Dierkes, Mathias; Hamann, Rolf (2009): Öffentliches Preisrecht in der Wasserwirtschaft, p.17.

¹⁴ Own illustration.

3.1 An Overview of Europe's Water and Wastewater Services

Data on Europe is collected and illustrated by Eurostat, the statistical office of the European Union. The office collects data concerning society relevant topics primarily from the 27 Member States of the European Union, but also from the EFTA as well as the candidate countries.¹⁵ In the following some characteristics of Europe shall be presented, which affect the water and wastewater sectors.

The population of the European Union amounted to around 500 million people in 2010. The development over the last decades is illustrated in the following figure.



(*) Before 1998, excluding French overseas departments; includes provisional data.

Source: Eurostat (demo_gind)

Figure 3: Population, EU-27 (at 1 January, million)¹⁶

Forecasts estimate a population growth, while the people are getting older.¹⁷ Demographic changes like population growth, aging structure and urbanization will have direct influence on the water and wastewater performances in the European countries. Fixed asset capacities in both sectors make adjustments difficult and increasing drug residues can affect the wastewater treatment.

Nonetheless, these general forecasts for Europe can verify among the countries, thus considering country-specific developments is essential. Looking at the total demographic change between 1 January 2009 and 2010, the population growth in Europe is obvious, but at the same time the population is declining in 9 of the countries (see figure 4). The aim is thus to take individual action.

¹⁵ See *European Union* (2011): Eurostat regional yearbook 2011, p. 14.

¹⁶ *European Union* (2011): Eurostat Europe in figures, p.125.

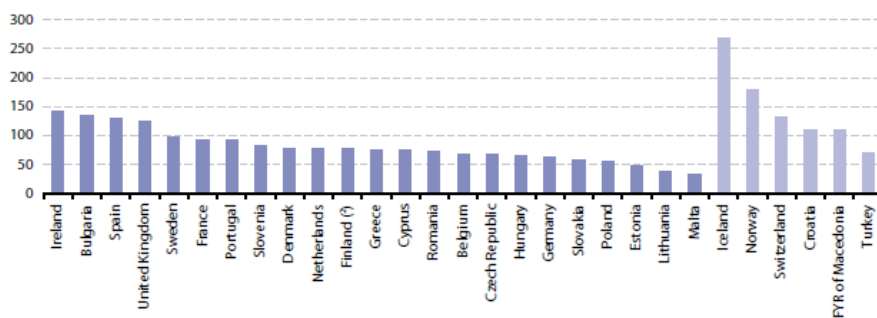
¹⁷ See *European Union* (2011): Eurostat Europe in figures, p.109.

	Population 1 January 2009	Live births	Deaths	Natural change (live births - deaths)	Net migra- tion and statistical adjustment (total change - natural change)	Total change between 1 January 2009 and 2010	Population 1 January 2010
EU-27	499 695.2	5 353.1	4 843.9	509.2	857.2	1 366.4	501 061.5
Belgium	10 750.0	126.0	104.0	22.0	55.0	77.0	10 827.0
Bulgaria	7 606.6	81.0	108.1	-27.1	-15.7	-42.8	7 563.7
Czech Republic	10 467.5	118.3	107.4	10.9	28.3	39.3	10 506.8
Denmark	5 505.5	62.8	54.9	7.9	21.3	29.2	5 534.7
Germany	82 002.4	651.0	841.0	-190.0	-12.8	-202.8	81 799.6
Estonia	1 340.4	15.8	16.1	-0.3	0.0	-0.3	1 340.1
Ireland	4 450.0	74.8	29.2	45.6	-39.9	5.8	4 455.8
Greece	11 260.4	117.9	110.3	7.6	27.0	34.6	11 295.0
Spain	45 828.2	494.6	391.3	103.3	57.6	160.8	45 989.0
France	64 367.0	821.9	546.2	275.8	71.1	346.8	64 713.8
Italy	60 045.1	568.9	591.7	-22.8	318.1	295.3	60 340.3
Cyprus	796.9	9.7	5.4	4.4	-3.2	1.2	798.1
Latvia	2 261.3	21.7	29.9	-8.2	-4.7	-12.9	2 248.4
Lithuania	3 349.9	36.7	42.0	-5.4	-15.5	-20.8	3 329.0
Luxembourg	493.5	5.6	3.7	2.0	6.6	8.6	502.1
Hungary	10 031.0	96.5	130.4	-33.9	15.9	-18.0	10 013.0
Malta	413.6	4.1	3.2	0.9	-1.6	-0.6	413.0
Netherlands	16 485.8	184.8	134.2	50.7	41.2	91.8	16 577.6
Austria	8 355.3	76.3	77.4	-1.0	21.1	20.0	8 375.3
Poland	38 135.9	417.6	384.9	32.6	-1.2	31.5	38 167.3
Portugal	10 627.3	99.5	104.4	-4.9	15.4	10.5	10 637.7
Romania	21 498.6	222.4	257.2	-34.8	-1.6	-36.4	21 462.2
Slovenia	2 032.4	21.6	18.7	2.9	11.7	14.6	2 047.0
Slovakia	5 412.3	61.2	52.9	8.3	4.4	12.7	5 424.9
Finland	5 326.3	60.4	49.9	10.5	14.6	25.1	5 351.4
Sweden	9 256.3	111.8	90.1	21.7	62.6	84.3	9 340.7
United Kingdom	61 596.0	790.2	559.6	230.6	181.5	412.1	62 008.1
Iceland	319.4	5.0	2.0	3.0	-4.8	-1.7	317.6
Liechtenstein	35.6	0.4	0.2	0.2	0.1	0.3	35.9
Norway	4 799.3	61.8	41.4	20.4	38.6	58.9	4 858.2
Switzerland	7 701.9	78.2	62.6	15.6	65.6	81.2	7 783.0
Croatia	4 435.1	44.6	52.4	-7.8	-1.5	-9.3	4 425.7
FYR of Macedonia	2 048.6	23.7	19.1	4.6	-0.5	4.1	2 052.7
Turkey	71 517.1	1 270.0	461.0	809.0	235.2	1 044.2	72 561.3

Source: Eurostat (demo_a1nd)

Figure 4: Demographic balance in 2009 (in 1 000)¹⁸

The long term annual average of water resources verifies significantly between the countries, primarily due to the size of the countries, but also because of the countries' climate.¹⁹ Figure 5 shows the total freshwater abstraction by public water supply in m³ per inhabitant.



(¹) Spain, France, Hungary, the Netherlands, Switzerland and Turkey, 2006; Finland and Iceland, 2005; Denmark, Estonia and the United Kingdom, 2004; Austria, Italy, Latvia and Luxembourg, not available.
(²) Estimate.

Source: Eurostat (env_watq2_1)

Figure 5: Total freshwater abstraction by public water supply in m³ per inhabitant (2007)²⁰

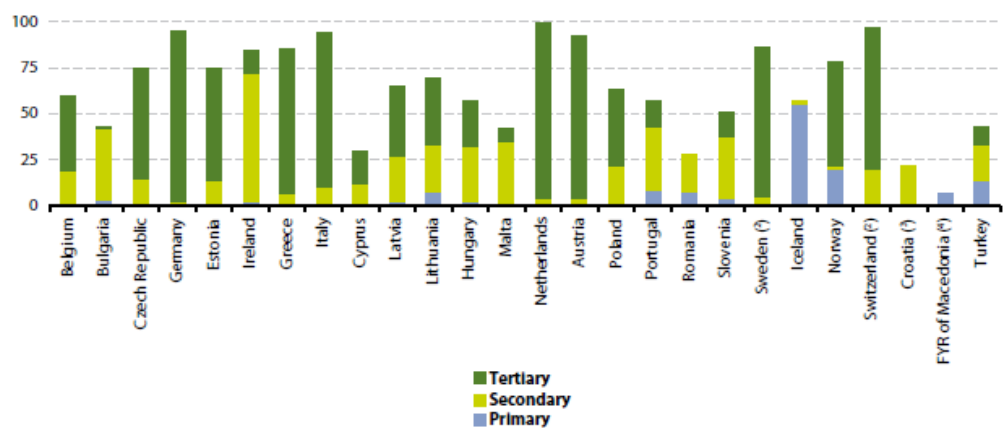
¹⁸ European Union (2011): Eurostat Europe in figures, p.126.

¹⁹ See for detailed country-specific water resources: European Union (2011): Eurostat Europe in figures, p. 495.

²⁰ European Union (2011): Eurostat Europe in figures, p. 497.

“Most EU Member States calculate annual rates of freshwater abstraction of between 50 m³ and 100 m³ per capita [see figure 5], although extremes reflect specific conditions: for example, in Ireland (141 m³ per capita) – where the use of water from the public supply is free; or Bulgaria (134 m³ per capita) – where there are particularly high losses from the public network. Abstraction rates were also rather high in some Nordic and Alpine non-member countries, notably Iceland, Norway and Switzerland, where water resources are abundant and supply is hardly restricted. At the other end of the scale, Estonia and Lithuania reported low abstraction rates, in part resulting from below-average connection rates to the public supply, while Malta has partially replaced groundwater by desalinated seawater.”²¹

The quality of life depends crucially on an adequate connection to the water supply network as well as the wastewater system. Whilst the connection rate to the drinking water network is in most countries nearly 100 %, ²² the number of people connected to the wastewater pipe system is capable of improvement (see figure 6).



(*) Malta, 2008; Hungary, the Netherlands, Austria, Sweden and Turkey, 2006; Ireland, Italy, Cyprus, Romania (only tertiary treatment), Iceland and Switzerland, 2005; Denmark, Spain, France, Luxembourg, Slovakia, Finland and the United Kingdom, not available.
 (*) Primary, not available.
 (*) Primary and tertiary, not available.
 (*) Secondary and tertiary, not available.

Source: Eurostat (env_watq4)

Figure 6: Population connected to wastewater treatment, 2007 (% of total)²³

The general framework for water and wastewater related questions are the aforementioned requirements of the Water Framework Directive and in addition the Urban Wastewater Directive (Council Directive 91/271/EEC concerning urban waste-water treatment). The Urban Wastewater Directive makes requirements to the collection, treatment and discharge of wastewater to protect the environment. Planning, regulation, monitoring as well as information and reporting are the main principles.²⁴ Nevertheless, detailed requirements concerning water and wastewater services are regulated on national level to facilitate a flexible, individual reaction on country specific challenges. This has the consequence that various legislations and

²¹ European Union (2011): Eurostat Europe in figures, p. 491.

²² European Union (2010): Eurostat Europa in Zahlen, p. 536.

²³ European Union (2011): Eurostat Europe in figures, p. 499.

²⁴ See European Commission (n.d.): Urban Wastewater Directive Overview. http://ec.europa.eu/environment/water/water-urbanwaste/index_en.html.

regulation models are found in Europe. In the context of this report it is unfortunately not possible to present the legal framework, ownership structures and characteristics of all Member States. Nevertheless, some general statements can be made before four representative countries are examined in detail.

In general the water and wastewater services across Europe require high investments for maintenance, repairs and renewal of assets and pipes to ensure sustainability. Because of the high investment respectively financing needs, private actors play an even greater role in Europe. Whilst in the past the services of general interests were traditionally duties of the municipalities, now many countries enable a participation of private companies. The organizational structures of water and wastewater services differ widely among the European countries. The occurring ownership models can be grossly divided into:

- Public
- Public-public partnership (different models)
- Public-private partnership (different models)
- Private

Regardless of the ownership structure, the natural monopoly as well as the according lack of competition leads to the risk that this provision is economically exploited by the serving companies. The problem is handled differently among the European countries. The introduction of a regulatory body is one way to monitor and regulate the markets.



Figure 7: Countries with regulated water and wastewater sectors in Europe²⁵

²⁵ Marques, Rui Cunha (2010): Regulation of Water and Wastewater Services, p. 192.

If one considers the map of regulated countries in Europe (figure 7), it is obvious that many countries have established a regulatory authority for water and wastewater services during the last years.²⁶ Nevertheless, the focus of regulation varies between the countries. Possible duties are among others:

- Monitoring of drinking water quality
- Supervision of market entries
- Consultative role
- Economic regulation (e.g. price caps, specification of investment budgets)
- Contact for customer complaints

In summary, it can be deduced that the organisation of the water and wastewater sector are not homogenous among Europe. Although rough guidelines apply to all Member States, there is further national scope for the regulatory and legal design. As aforementioned, the countries make use of the possibilities, so that different models emerge. Therefore a generalization of the sector's structure is not possible. Furthermore, it makes only limited sense, because of the country specific challenges and circumstances. Nevertheless, it is of interest to have a closer look on the detailed regulatory frameworks and contemporary market structures of four representative countries, which are also directly related to the project TRUST, to identify potentials for further development.

²⁶ In his recent book 'Regulation of Water and Wastewater Services' Rui Cunha Marques deals especially with countries over the world, which are having a regulatory authority.

3.2 Closer Examination of the Water Sector in selected European Countries

This paragraph is dealing with detailed country reports of four TRUST members. In focus are the water markets and regulatory frameworks of Scotland, Portugal, Norway and Germany.

3.2.1 Scotland

Discussions about water and wastewater services in the United Kingdom focus mostly on the unique, private water market model of England and Wales. The water market of Scotland always seems to be of minor interest, although the Scottish water industry was the first to establish a competitive retail water market for non-household customers. Since April 2008 business customers and non-profit organisations are no longer bound to a monopoly company, but are able to choose between different licensed retail providers of water and wastewater services.²⁷

A) Country specific Characteristics and Challenges

Scotland is part of the United Kingdom and is localised in the Northwest of Europe. The land area of Scotland is about 80,000 km² with around 18,000 km of coastline. There are many islands belonging to mainland. 118 are inhabited islands whereas more than 800 islands are uninhabited.²⁸ The Scottish population is fortunate to have extensive freshwater resources. Over 90 % of the total freshwater volume in the United Kingdom is available in Scotland. Particularly Scotland's fresh water resources represent around 2 % of its land area.²⁹ The total rainfall over Scotland is, with 113,150 million cubic meters of rainwater per year, high compared to the United Kingdom as a whole. But it is significant that about 73 % of the total rainfall is estimated to runoff into the sea.³⁰ All in all the climate of Scotland can be described as mild and wet. The absence of temperature extremes and rainfall during the whole year, without longer draught periods are characteristic for Scotland.³¹

The population density of Scotland is with around 65 people per square kilometre extremely low. Therefore it is a challenge to provide around 5,194,000 inhabitants over partially long distances with water and wastewater services. Studies concerning the demographic development in Scotland expect a population rise during the next 20 years. By 2033 there are estimated about 5,540,000 inhabitants, which means an increase of 6,7 %.³² This development will also influence the performances in the water sector.

²⁷ See *Water Industry Commission for Scotland* (2010): Competition in the Scottish water industry, p.3.

²⁸ See *The Scottish Government (Publisher)* (2011): Scotland's Marine Atlas, p.22.

²⁹ See *Scottish National Heritage* (2002): Fresh Waters, p.7.

³⁰ See *The Scottish Government (Publisher)* (2011): Scotland's Marine Atlas, p.26.

³¹ See for detailed climate datasets over the last 100 years *Met Office* (2011): Scotland Rainfall; *Met Office* (2011): Scotland Mean Temperature.

³² See *Scottish Government Social Research* (2010): Demographic Change in Scotland, p. 9.

B) Regulatory Framework

This chapter is introducing the current regulatory framework of the Scottish water industry, which is mainly influenced by the work of five actors. Several of these actors were established by legislation during the last 10 years to ensure a regulated, more efficient work in the water sector respectively the water management.

B1) Legislation

The legal basis of the current regulatory framework is mainly characterised by the *Water Industry (Scotland) Act 2002* and the *Water Services etc. (Scotland) Act 2005*. Before 2002 the water and wastewater services in Scotland were managed by three public water authorities. They were responsible for the regions North, East and West and had a monopoly status in their local draw area. By the Water Industry Act, which was passed in 2002, the three public water authorities were consolidated and thereby Scottish Water was established.³³ "The Scottish Executive argued that a single authority was better placed to avoid regional price disparities, financial capital investment and maximise economies of scale."³⁴ Furthermore, the establishment of a monopoly water and sewerage service provider for whole Scotland gave the chance for more competition in the market, which at first glance is not visible. But considering the efforts of the Scottish Parliament in 2005 the competitive opportunities of this situation are obvious.

The Water Services Act was implemented in 2005 among other

- "[...] to establish the Water Industry Commission for Scotland [...],
- to provide for licensing for provision of certain water and sewerage services,
- to amend the system for fixing charges for services provided by Scottish Water,
- to make provision as to Scottish Water's functions [...]"³⁵

The full, detailed content cannot be covered here, but it should be noted that the Water Services Act permits and regulates the wholesale of water and sewerage services from Scottish Water to licensed providers and establishes the Water Industry Commission for Scotland as economic regulator concerning charges and competition.

By implementing this unique regulatory framework the Scottish Parliament paved the way for a limited network opening. Before chapter C3 will focus on the competitive retail market in Scotland in detail, following the main actors in the water market shall be presented and be set in relation to each other.

³³ See *The Scottish Parliament (2002): Water Industry (Scotland) Act 2002*, p.1 and p.11.

³⁴ *Lobina, Emanuele; Terhorst Philipp (2005): D19: Water Time Case Study – Edinburgh, UK.*

³⁵ *The Scottish Parliament (2005): Water Services etc. (Scotland) Act 2005*, p.1.

B2) Main Actors in the Water Market

This section is representing the role and work of the five key actors in the Scottish water market: The Ministers and Scottish Parliament, Scottish Water, the Water Industry Commission of Scotland, the Drinking Water Quality Regulator and the Scottish Environment Protection Agency. Furthermore, the role of the Central Market Agency and the recent abolition of Waterwatch Scotland in August 2011 will be addressed.

The public company *Scottish Water* (SW), which offers water and wastewater services to all household customers in Scotland, is owned by the *Ministers and Scottish Parliament* and is thereby accountable to them. Beside of delivering potable water to all Scottish household customers and removing their sewerage, SW also provides these services as wholesale to different licensed providers, which offer water and wastewater services to business customers and non-profit organisations.³⁶

In contrary to many other countries, the Scottish water market has an economic regulator called the *Water Industry Commission of Scotland* (WICS). The main task of the WICS, which was established by the Water Services Act in 2005 “[...] is to ensure that the Scottish water industry provides a high-quality service and value for money to customers.”³⁷ Pursuing this target the WICS is setting prices for water and sewerage services, facilitating competition in the field of business customers and non-profit organisations as well as licensing the new providers.

In addition to the aforementioned economic regulator WICS, there are the *Drinking Water Quality Regulator* (DWQR) and the *Scottish Environment Protection Agency* (SEPA), which influence the performance of the water industry. The DWQR was established by the Water Industry Act in 2002 to ensure a good tap water quality around Scotland by monitoring the performance of Scottish Water and enforcing higher quality standards. In this Act the main competencies of the DWQR were set and specialised. The DWQR acts independent and is authorised to get relevant data from Scottish Water and to make technical inspections to ensure a high standard of drinking water quality. This information is available for the Scottish Parliament and the public in form of an annual report.³⁸

SEPA was established by the Environment Act 1995 to protect and improve the Scottish environment. This includes the subtask of water environment protection.³⁹ In contrary to the DWQR, who monitors the potable water quality for end users, SEPA controls the quality of Scotland’s water resources. SEPA regulates activities which have direct influence on the water environment and gives hints for future investment needs to the Scottish Ministers. The main target concerning water is a sustainable protection and improvement of the Scottish water

³⁶ See for this and the next paragraphs *Water Industry Commission for Scotland* (2011): Who’s who in the Scottish water industry.

³⁷ *Water Industry Commission for Scotland* (2011): Who’s who in the Scottish water industry, p.2.

³⁸ See *Drinking Water Quality Regulator* (2008): Charter of the Office of the Drinking Water Quality Regulator for Scotland, pp.3-5.

³⁹ See *Parliament of the United Kingdom* (1995): Environment Act 1995, Introductory Text and paragraph 34.

resources for the future.⁴⁰ To monitor the right handling of Scottish Water’s discharges is one way to improve the environment.

The illustration below gives an overview of the structures of the Scottish water industry. Especially the competitive retail market for business customers and public bodies is presented. The next chapter will deal with this issue in detail.

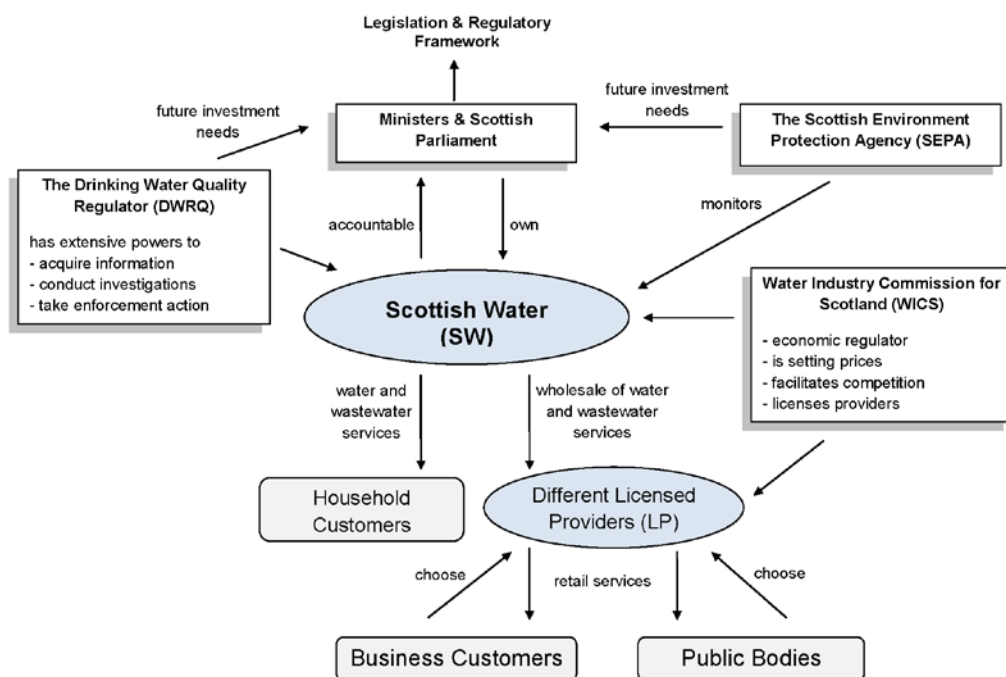


Figure 8: Main Structure of the Scottish Water Industry⁴¹

C) The Water Market

The water market in Scotland is particularly characterized by its unique, competitive retail market. Before having a closer look at this specific competition forcing system, a few numbers of the markets dimension and structure shall be presented.

C1) Dimension

Scottish Water, who is the monopoly provider of the physical water and wastewater services, provides around 2.4 million household customers and 124,000 business customers. The Scottish drinking water network consists currently of 47,575 km water pipes. The sewer network is even 50,412 km long. More than 1,800 wastewater treatment works (including about 1,200 septic tanks) and around 284 water plants ensure that 1.3 billion litres of drinking water are

⁴⁰ See *Scottish Environment Protection Agency (2011): Annual Reports and Accounts 2010-2011*, p.2 and the tab ‘Water’ on the Homepage of the *Scottish Environment Protection Agency (2011)*.

⁴¹ Own illustration based on *Water Industry Commission for Scotland (2011): Who’s who in the Scottish water industry*.

produced and 800 million litres of wastewater are removed per day.⁴² “[...] The average person in Scotland uses approximately 150 litres of tap water per day and creates approximately 140 litres of waste water.”⁴³

The entire population of Scotland has access to the water and wastewater services, which is equivalent to a connection rate of nearly 100 %.⁴⁴ Since 2006 the leakage across Scotland was reduced by 37 %.⁴⁵ The baseline in 2006 was 1,104 million litres of water a day, which reduced to 699 million litres of water a day in 2010/11.⁴⁶ Nevertheless, there is need for further improvement.

C2) Structure

As mentioned before, the population of Scotland is served without exception by the publicly owned company Scottish Water. Scottish Water is responsible for both the physical tap water supply and the sewerage removal. Its monopoly status on the physical level gave the opportunity for a competitive retail market opening in the business sector. Four private companies buy the water and wastewater services as wholesale from Scottish Water and supplement them with additional, customer related services, which the business customers and public bodies have to pay for.⁴⁷ This unique, competition forcing market structure gives incentives for further development, which is presented in detail in the following section.

C3) Intensity of Competition

As mentioned before, competition in water markets is an often discussed, controversial issue in the sector. The high capital intensity, the dependence of drinking and waste water pipes and the long lifetime of assets lead traditionally to the fact that only one provider prevails in one region. One possibility to force more competition in the market can be a network opening. “In substance, to foster competition by network opening means allowing consumers to contract directly with suppliers of their choice for the services they require, and to force the network operators that lie ‘on the way’ to convey the resource in return for a ‘fair and reasonable’ toll.”⁴⁸ The situation in the Scottish water market is not a pure network opening in the above sense, but at least the opening of the retail market in the field of non-domestic customers. Business customers, public bodies and not-for-profit organisations have the opportunity to choose between different licensed providers.

The Water Services etc. (Scotland) Act 2005 laid the legal foundation for the opening of the competitive retail market on 1st April 2008.⁴⁹ The role of Scottish Water, which has been the

⁴² See *Scottish Water* (2011): Annual Reports and Accounts 2010/11, p.0.

⁴³ Email request Scottish Water, answer by Richard Duncan in August 2011.

⁴⁴ See *Marques, Rui Cunha* (2010): Regulation of Water and Wastewater Services, p.162.

⁴⁵ See *Scottish Water* (2011): Annual Reports and Accounts 2010/11, p.13.

⁴⁶ Email request Scottish Water, answer by Richard Duncan on 29th November 2011.

⁴⁷ See *Water Industry Commission for Scotland* (2011): Are you planning to switch?, pp.1-2

⁴⁸ *Bouttes, Jean-Paul; Leban, Raymond* (1995): Competition and regulation in Europe's network industries from theoretical approach to sectorial application, p.128.

⁴⁹ See *Water Industry Commission for Scotland* (2011): Introducing retail competition in Scotland: Lessons learned, p.1.

monopoly provider of water and sewerage services for all customers around Scotland until then, changed.

Scottish Water still controls the publicly owned water and sewerage network and all related assets. Furthermore, it is responsible for the physical delivery of water and removal of wastewater. But SW is only the direct provider of all 2.4 million household customers. The 124,000 business customers and public bodies are able to choose between the retail services of four licensed providers. This is possible, because SW acts as wholesaler of water and wastewater services to different retailers. These retailers complement the pure physical services with customizing services like water metering, billing and contact opportunities, which the end-consumer has to pay for. Depending on how much they are willing to pay for the additional services, the non-domestic customers can choose between all providers regardless of their location.⁵⁰

The four active retailers in the Scottish water industry are Aimeria, Business Stream, Osprey and Satec.⁵¹ They were licensed by the Water Industry Commission for Scotland, which is responsible to check, if the providers possess adequate knowledge, expertise and experience. Furthermore, the applicants require financial acumen and business viability.⁵²

The non-domestic customers are able to switch between two of the licensed providers by contacting the new provider and giving him their supply point identification number. The chosen retailer will coordinate the switch in cooperation with the *Central Market Agency* (CMA).⁵³ The CMA is responsible for administering the competitive retail market. Keeping a customer register, recording the switch of non-domestic customers between two retailers and calculating the wholesale charges which have to be paid to Scottish Water are the main tasks of this independent organization. The members of the CMA are all licensed providers and Scottish Water as founding member. Further duties of the CMA are recorded in the 'Market Code' and the 'Code Subsidiary Documents'.⁵⁴

Beside of the opportunity to choose a retailer, non-domestic customers are able to get a self supply license. In this case the customer pays the wholesale charges to Scottish Water, but does not receive any additional services as for example meter reading or incident assistance from any retailer.⁵⁵

The explanations above demonstrate how the opening of the competitive retail market was implemented and how it currently works. Nevertheless, the structure of the water market implies that Scottish Water has still a monopoly status. The retailers are bound to the wholesale services of SW and thereby to its prices. To avoid the misuse of this lack of competition on the wholesale level is one of the main challenges of the Water Industry Commission for Scotland. As economic regulator, who shall facilitate the competition in the Scottish water market, the WICS

⁵⁰ See *Water Industry Commission for Scotland* (2011): Are you planning to switch?, pp.1-2.

⁵¹ See *Water Industry Commission for Scotland* (2011): Scotlandontap.

⁵² See *The Scottish Parliament* (2005): Water Services etc. (Scotland) Act 2005, p.8.

⁵³ See *Water Industry Commission for Scotland* (2011): Are you planning to switch?, p.1.

⁵⁴ See *Central Market Agency Scotland* (2008): Business water market goes alive, press release.

⁵⁵ See *Water Industry Commission for Scotland* (2011): Are you planning to switch?, p.2.

regulates the wholesale prices of Scottish Water to protect the customer's interests. More precisely the WICS regulates the prices for SW's wholesale services. On the one hand to ensure low price volatility and on the other hand to make sure that the costs which are related to the drinking water quality and environmental issues can be recovered.⁵⁶

On the retail level also exists a safety net to protect the interests of non-domestic customers. Every retailer has to offer standard services for a default tariff. This default charge is the maximum price non-domestic customers had to pay for Scottish Water's water and wastewater services, if the retail market opening did not take place.⁵⁷

As Scotland was the first country worldwide to open the competitive retail market in the water sector, it is of major interest to have a closer look at the costs and benefits of the Scottish system which was implemented three years ago. This gives the opportunity to weigh up the advantages and disadvantages. A system, which forces more competition on the retail level, offers a lot of benefits. The engagement for customers has a direct influence on the water and wastewater pricing. The retailers are asked to deliver better performance for lower prices. More cost-effective measures and additional services are important to survive in the market.

The non-domestic customers can choose between the retailer's offers and extra services, finding the best price to value ratio for their own. Expanded services are for example e-services like e-billing, easier contact opportunities and quicker responses to customer requests, incident assistance as well as services to identify and reduce leaks. Aiming best customer satisfaction, the retailers as informed buyers of wholesales put pressure on Scottish Water to improve its performance as well. This has also an indirect, positive influence on the water and wastewater services for household customers, because if SW improves its performance, it will not only affect the non-domestic level. The Overall Performance Assessment (OPA) score indicates the performance quality of SW among others by the improvement of the drinking water quality, the reduction of supply interruptions and the numbers of homes with adequate water pressure. The OPA score of SW has increased significantly since 2008.⁵⁸ Further advantages are the simple switching between retailers and the environmental benefits, because the retailers offer more information about the customer's detailed water consumption and how to reduce it.⁵⁹

Beside of these benefits, the success of implementing a competitive retail market has also to be measured from the financial point of view, because of the high costs linked to the implementation. In its audit trail the WICS has broken down the costs and benefits in detail.

In the first step the calculations were made under consideration of the actual set up and ongoing costs and the one-off savings achieved from 2006/07 to 2009/10. The set up costs for SW's preparation for competition, the establishment of the CMA and the cost which incurred for the WICS by establishing the whole competitive framework amount to £ 22.5 million.

⁵⁶ See *Water Industry Commission for Scotland* (2010): Competition in the Scottish water industry, p.5.

⁵⁷ See *Water Industry Commission for Scotland* (2011): Are you planning to switch?, p.3.

⁵⁸ See *Scottish Water* (2011): Annual Reports and Accounts 2010/11, p.9.

⁵⁹ See for the whole paragraph *Sutherland, Alan D.A.*(2011): Water retail market savings: the experience in Scotland, p.5; *Water Industry Commission for Scotland* (2010): Competition in the Scottish water industry; *Water Industry Commission for Scotland* (2011): Are you planning to switch?

Furthermore, the actual ongoing costs incurred by the CMA, the annual levy, which has to be paid by the licensed providers to WICS for overseeing the market, and the additional return for Business Stream were collected. It turned out, that the ongoing costs until 2009/10 have been around £ 8.5 million. In contrast the one-off savings caused by the competitive retail market are estimated to amount £ 18.4 million in the same period. This value includes savings in operating costs and financing costs. The second step was to use the existing datasets for an adequate estimation of future costs and savings. Taking into account the Net Present Value (NPV) of the ongoing costs and the one-off savings from 2010/11 onwards as well as the NPV of future dynamic efficiencies in the retail business and in the wholesale business, the WICS estimates significant savings as result of the audit. Including the costs and savings of step 1, the savings in the future are approximately £ 332.8 million.⁶⁰

Nevertheless the opening of the competitive retail market is not only connected with benefits. In its annual report 2009 – 2010 Waterwatch Scotland, who was representing the customer views and interests until August 2011, pointed out several difficulties concerning the system implementation. According to Waterwatch there has been a significant increase of customer contacts. “Many business users are still not aware of competition or experience difficulties switching supplier.”⁶¹ The analysis of incoming customer inquiries has shown that many users were frustrated by the additional bureaucracy. Furthermore, the licensed providers were not always delivering the services the customers expected them to do.⁶²

Although Waterwatch Scotland underlined that these matters are primarily teething problems,⁶³ which can be solved, there has to be a higher effort to facilitate competition. The current market shares of the retailers might give a hint that full competition on the retail level has not been reached yet. It is striking that Business Stream, who is the licensed subsidiary of Scottish Water,⁶⁴ is the leading retail service provider by serving around 90 % of the non-domestic customers.⁶⁵

⁶⁰ See *Water Industry Commission for Scotland* (2011): Retail competition in Scotland: An audit trail of the costs incurred and the savings achieved.

⁶¹ *Waterwatch Scotland* (2010): Annual Report 2009 – 2010, p.22.

⁶² See Australian Government – Productivity Commission (2011): Australia’s Urban Water Sector, p.510 with reference to *Waterwatch Scotland* (2010): Scope for Improvement in Retail Water Competition in Scotland, says Waterwatch Scotland.

⁶³ See *Waterwatch Scotland* (2010): Annual Report 2009 – 2010, p.22.

⁶⁴ See *Scottish Water* (2011): Annual Reports and Accounts 2010/11, p.16.

⁶⁵ See Australian Government – Productivity Commission (2011): Australia’s Urban Water Sector, p.508 with reference to *Waterwatch Scotland* (2010): The Introduction of Competition into the Scottish Water Industry: a Customer Perspective.

C4) Finance

The funding system of Scottish Water is mainly based on the customer charges. In 2010/2011 the funding amounted to £ 1,150 million, of which around £ 1,050 million were attributed to revenues from customer charges and only £ 100 million resulted from borrowing from the Scottish Government. This is in the first row a result of the strict regulation of the Water Industry Commission of Scotland.⁶⁶ “The combination of regulated price caps and firm constraints on borrowing from the Scottish Government creates a clearly defined limit on the financing available to Scottish Water.”⁶⁷ Furthermore, SW is bound to a Delivery Plan, which regulates the planned level of investments and expenditures.

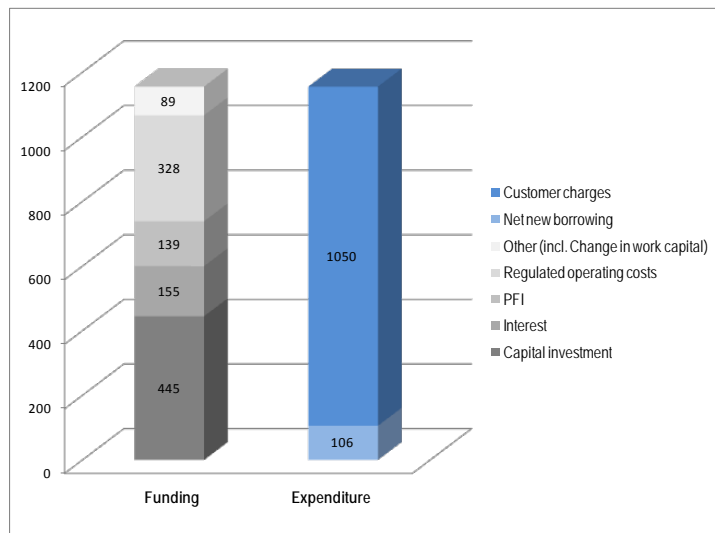


Figure 9: Scottish Water Funding 2010/11⁶⁸

In the Scottish water industry there is a strong need for capital investment. During 2010/11 Scottish Water “[...] delivered £ 443 million of Quality and Standards (Q&S) investment to improve treatment works, water mains, sewers and networks across Scotland.”⁶⁹ Mainly to ensure the maintenance of the current level of services and quality and to further improve its overall performance.

As aforementioned, the funding system of the Scottish water industry is mainly based on the regulated customer charges. Every property which is connected to the public water and/or sewer network has to cover the associated costs. Depending on the customer type different charges have to be paid. The household charges for water and wastewater services depend on the question if the property has got a water meter or not. The most essential elements of the tariff structure can be removed from the following illustration.

⁶⁶ See *Scottish Water* (2011): Annual Reports and Accounts 2010/11, p.18.

⁶⁷ *Scottish Water* (2011): Annual Reports and Accounts 2010/11, p.18.

⁶⁸ See *Scottish Water* (2011): Annual Reports and Accounts 2010/11, p.18.

⁶⁹ *Scottish Water* (2011): Annual Reports and Accounts 2010/11, p.10.

Type of Charge	Has the property got a water meter?	What do I pay?
Household Water	No	A charge based on the property's Council Tax band.
	Yes	<p>a) An annual fixed charge based on the size of your meter to cover our fixed costs; and</p> <p>b) A charge, based on the size of your meter, for every 1,000 litres of water you use.</p>
Household Waste Water	No	A charge based on the property's Council Tax band.
	Yes	<p>a) An annual fixed charge based on the size of your meter to cover our fixed costs;</p> <p>b) A charge, based on the size of your meter, for every 1,000 litres of waste water from the property;</p> <p>c) A charge covering Property Drainage based on the property's Council Tax band; and</p> <p>d) A charge covering Roads Drainage based on the property's Council Tax band.</p>

Table 1: Tariff structure for standard water and wastewater services⁷⁰

All prices which are raised by the publicly owned company Scottish Water are regulated by the Water Industry Commission for Scotland. In its Strategic Review of Charges 2010-15, the commission presents its charge cap strategy. "These charge caps are set on the basis of the 'lowest reasonable overall costs' of discharging Scottish Water's obligations to its customers and the environment."⁷¹ By regulating the prices, the WICS ensures a rise of household charges by 5 % below of the inflation rate over the five-year period 2010-2015, to make the level of charges as stable as possible.⁷²

Table 1 shows, that households, who have a water meter, have to pay a fixed annual charge, which depends on the size of the water meter, plus a volumetric water respectively wastewater charge for each cubic metre. Hereby Scottish Water is assuming that the wastewater volume is around 95 % of the water volume. The standard charges for water and wastewater services in 2011/2012 for metered households, which were approved by the Water Industry Commission for Scotland⁷³, can be seen in the following tables.

⁷⁰ Out of *Scottish Water* (2011): Your charges explained – scheme of charges 2011/2012, p. 5.

⁷¹ *Water Industry Commission for Scotland* (2009): The Strategic Review of Charges 2010-2015: The Final Determination, p.1.

⁷² See *Water Industry Commission for Scotland* (2009): The Strategic Review of Charges 2010-2015: The Final Determination, pp.2, 9.

⁷³ See *Scottish Water* (2011): Your charges explained – scheme of charges 2011/2012, pp.4, 8.

Fixed Charges - based on size of water meter (mm)	Water £/meter	Waste Water £/meter
up to 20 mm	£ 136.42	£ 140.10
25/30 mm	£ 405.00	£ 417.00
40 mm	£ 1,148.00	£ 1,178.00
50 mm	£ 2,551.00	£ 2,620.00
Volumetric Water Charges		£/m ³
for the first 25 m ³ - up to 20 mm meters only		£ 2.1420
for volumes after the first 25 m ³ - up to 20 mm meters only		£ 0.7761
Volume charge for larger meters		£ 0.7761
Volumetric Waste Water Charges		£/m ³
for the first 23.75 m ³ - up to 20 mm meters only		£ 2.7696
for volumes after the first 23.75 m ³ - up to 20 mm meters only		£ 1.3097
Volume charge for larger meters		£ 1.3097

Table 2: Fixed and volumetric charges for water and wastewater services (2011/2012)⁷⁴

Based on the smallest water meter and an estimated average annual tap water consumption of 54.75 m³ per person⁷⁵, this means a water bill of around £ 340.53 for the pure water supply services for four persons living in a single-family house.⁷⁶ Furthermore, there have to be paid property and road drainage charges based on the property's Council Tax Band⁷⁷ and, if necessary, secondary charges for example for standpipes, septic tank services or new property connections.⁷⁸ In the case above, the wastewater bill is around £ 442.48⁷⁹ at an average annual wastewater production of 51.10 m³ per person.⁸⁰ As water utilities have to face extreme high fixed costs, it is an often discussed topic, whether the share of fixed and variable revenues on the total income reflects this situation. In the aforementioned case of four persons living in a single-family house, 40 % (31.7 %) of the water (wastewater) revenue is fixed and 60 % (68.3 %) is variable. In fact the revenue is strongly dependent on the actual amount of water and wastewater. Nevertheless it should be emphasised that the additional fixed drainage charges help to recover the costs, which occur alongside the actual supply and disposal for instance caused by rainwater.

Beside of the household charge caps, the Water Industry Commission for Scotland also determines price limits on the wholesale level. The WICS estimates Scottish Water to save around £ 8 million a year, because of transferring activities, which cover for example metering services, trade effluent sampling and consent monitoring and new connections to licensed providers. These savings shall be represented in the wholesale charges and take effect at least in April 2012.⁸¹ The methodology for Scottish Water's current wholesale charges for the period

⁷⁴ Out of *Scottish Water* (2011): Your charges explained – scheme of charges 2011/2012, pp.7,8.

⁷⁵ See chapter *Dimension*.

⁷⁶ Fixed charges (£ 136.42) plus volumetric charges (25· £ 2.1420 + 194· £ 0.7761 = £ 204.12).

⁷⁷ Not yet included in the above calculation.

⁷⁸ See *Scottish Water* (2011): Your charges explained – scheme of charges 2011/2012, pp.9 – 21.

⁷⁹ Fixed charges (£ 140.10) plus volumetric charges (23,75· £ 2.7696 + 180,65· £ 1.3097 = £ 302,38).

⁸⁰ See chapter *Dimension*.

⁸¹ See *Water Industry Commission for Scotland* (2009): The Strategic Review of Charges 2010-2015: The Final Determination, p. 15.

2011/2012 is explained in the Scottish Water Charges Scheme (2011) part 1, whereas in part 2 the concrete wholesale charges are listed. To get a feeling for the magnitude Scottish Water's wholesale charges for the standard services/primary services can be seen in the tables below.

	Meter Based Annual charge (£/meter)	Capacity Volume Threshold (m ³)
20 mm	65	100
25 mm	127	500
40 mm	500	1,000
50 mm	903	2,500
80 mm	1,755	7,500
100 mm	1,903	25,000
150 mm	4,008	75,000
200 mm	30,060	100,000
250 mm	80,159	150,000
300 mm	99,198	300,000
Standard Volume Charges		p/m ³
Greater than 0 up to and including 20 m ³ (Allocated Tranche)		0
Greater than 20 m ³ up to and including 250,000 m ³		67.03
Greater than 250,000 m ³ up to and including 1,000,000 m ³		56.60
Greater than 1,000,000 m ³		34.74

Table 3: Meter Related Annual and Volumetric Charges – Water (2011/2012)⁸²

	Meter Based Annual charge (£/meter)	Premium Capacity Volume (m ³)
20 mm	57	50
25 mm	115	250
40 mm	454	500,000
50 mm	677	1,500
80 mm	1,834	3,000
100 mm	3,257	10,000
150 mm	10,436	20,000
Volumetric Foul Sewerage Charge		p/m ³
0 - 20 m ³ (Allocated Tranche)		0
Standard Volume Charge		92.25
Capacity Volume Charge		76.94

Table 4: Meter Related Annual and Volumetric Charges – Foul Sewerage (2011/2012)⁸³

Comparable to household customers the licensed providers have to pay property and road drainage charges and, if necessary, secondary charges for example for standpipes, septic tank services or new property connections.⁸⁴ Furthermore, the Water Industry Commission for

⁸² See *Scottish Water* (2011): Scottish Water Charges Scheme: Part 2 - Wholesale Charges for the Supply of Water and Sewerage Services for the Fiscal Year 2011-12, p. 3.

⁸³ See *Scottish Water* (2011): Scottish Water Charges Scheme: Part 2 - Wholesale Charges for the Supply of Water and Sewerage Services for the Fiscal Year 2011-12, p. 5.

⁸⁴ The detailed charges can be found in *Scottish Water* (2011): Scottish Water Charges Scheme: Part 2 - Wholesale Charges for the Supply of Water and Sewerage Services for the Fiscal Year 2011-12.

Scotland forces the licensed retailers to offer their customers (businesses and public bodies) at least a standard default level of service for a maximum default price. “The default tariff is no more than the maximum charge that customers would have paid to Scottish Water had competition not been introduced.”⁸⁵

C5) Reputation of the Water Utility

Until 15th August 2011 the Scottish water customers were able to report difficulties concerning their water supply and/or their sewerage services to *Waterwatch Scotland*. This authority, which was dealing with customer’s complaints against their water providers, representing their view’s and influencing policy, was closed recently by the Public Services Reform (Scotland) Act 2010. Customers are now asked to contact *Scottish Public Services Ombudsman (SPSO)* if they want to make complaints against their water provider and *Consumer Focus Scotland* if they wish their interests to be represented.⁸⁶

The latest numbers published by Waterwatch before its abolishment show the customer complaints and requires concerning different subjects. Sorted by the fields *Billing, Charges, Customer Service, Environmental Concerns, Industrial Framework, Wastewater Services, Water Quality* and *Water Services* the following results were obtained.

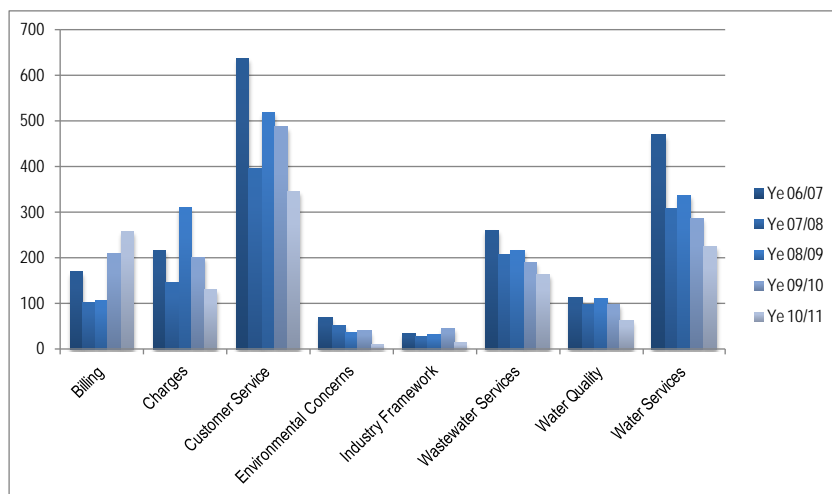


Figure 10: Customer Contacts – Subject heading analysis⁸⁷

⁸⁵ *Water Industry Commission for Scotland* (2011): Are you planning to switch?, p.3.

⁸⁶ See *Waterwatch Scotland* (2011): Important Information.

⁸⁷ See *Waterwatch Scotland* (2011): Quarterly Report – Quarter 3 – 2010/11, p.6.

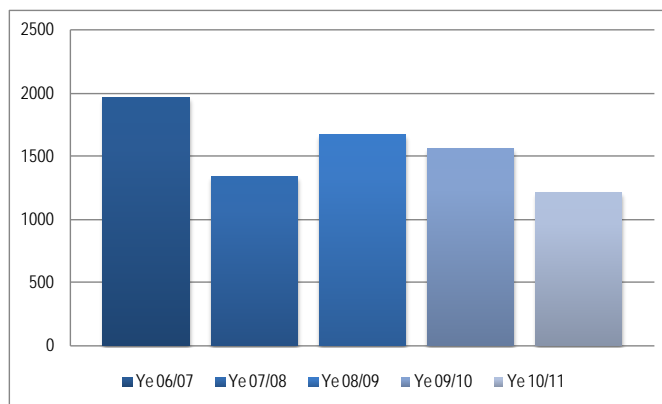


Figure 11: Customer Contacts – Total Contacts⁸⁸

It is striking that the category *Billing* is the only one with increasing complaint numbers, whereas for all others are reported lower customer complaints. Overall, the numbers are declining, which of course is a positive, desirable result. Nevertheless, it is significant, that the administrative categories *Billing*, *Charges* and *Customer Services* amount together over the half of the whole complaints. This raises the question, if there is a need for more transparency and information.

Considering the customer satisfaction, the achieved drinking water quality is one key factor. Unlike many other indicators the tap water quality is measurable and provides information concerning the water utility’s performance. In 2010 a decrease of contacts from customers, who were concerned about the drinking water quality, could be observed. 20,495 concerned consumer requires were reported at Scottish Water, which means a reduction of over 15 % compared with the results of 2009. 70 % of the customer contacts were dealing with discoloured tap water.⁸⁹ Beside of the significant decrease in complaints, Scottish Water achieved its best drinking water quality test results ever in 2010. SW “[...] carried out more than 320,000 scientific tests on regulatory water samples from water treatment works, service reservoirs and customers’ taps. Of these samples, 99.86 % were compliant with stringent microbiological and chemical regulatory standards.”⁹⁰

⁸⁸ See *Waterwatch Scotland* (2011): Quarterly Report – Quarter 3 – 2010/11, p.6.

⁸⁹ See *Drinking Water Quality Regulator* (2011): Drinking Water Quality in Scotland 2010 – Annual Report, p. 5.

⁹⁰ *Scottish Water* (2011): Annual Reports and Accounts 2010/11, p.15.

3.2.2 Portugal

Portugal is part of the Iberian Peninsula in the south west of Europe. Its location implicates drought risks; therefore water services play a special, significant role. Furthermore, a lot of information on water and wastewater services in Portugal is presented in English, which emphasizes the interest and attention beyond the country.

A) Country specific Characteristics and Challenges

Portugal consists of the mainland and the two archipelagos Madeira and the Azores. The total area of the mainland is approximately 89,000 km² and is located in the south-westernmost part of Continental Europe. The country is limited to the south and west by the Atlantic Ocean and to the north and east by the border to Spain. Both the coastline and the land frontier to Spain are around 1,300 km long, such that the total perimeter of the mainland amounts to 2,600 km. Furthermore the Azores and Madeira are part of Portugal. The archipelagos are located in the Atlantic Ocean and consist of an area of around 2,300 km² (the Azores) and 801 km² (Madeira).⁹¹

“Provisional results for the 2011 Census, with reference to 21 March 2011, show that the population residing in Portugal amounted to 10,561,614 persons, which corresponds to an increase of around 2% from the past decade. The demographic characteristics of the population reveal that ageing increased in this past decade. In 2011 around 19% of the Portuguese population is aged 65 and over.”⁹² Population forecasts see migration as a significant factor on the future number of inhabitants. Taking into account an average migration development the total population will increase until 2036 to around 10,928 thousands, whereas afterwards the number of inhabitants will decrease until the level is estimated to be with 10,515 thousands in 2060 nearly the same than nowadays. In the low migration scenario the decline is estimated to start in 2018. In contrast the decline will not begin before 2054 if the high migration scenario occurs.⁹³

The “topography in Mainland Portugal differs from north to south, roughly divided by the river Tejo. To the north, mountains predominate, with higher average altitudes, while to the south vast plains predominate and mountains are scarcer.”⁹⁴ The longest river flows (Tejo and Duoro) have their source in Spain and flow both from east to west. The Barragem de Alqueva, which is located at the border to Spain, is not only the largest lake of Portugal, but also the biggest artificial lake in Europe. It has a surface of around 250 km² and with 1000 km of 1200 km lakeside, the largest part lays in the Portugese territory.⁹⁵ Referring to the World Bank the total renewable internal freshwater resources of Portugal were 38 billion m³ in 2009.⁹⁶

⁹¹ See *Instituto Nacional de Estatística* (2010): Statistical Yearbook of Portugal 2009, Lisbon, pp. 35-37.

⁹² *Instituto Nacional de Estatística* (2011): Censos 2011 – Resultados Provisórios, p.5.

⁹³ See *Da Graça Magalhães, Maria; Peixoto, João* (2008): The impact of different migratory scenarios in the demographic ageing in Portugal, 2009-2060, *Revista de Estudos Demográficos*, nº 44, p.100.

⁹⁴ *Instituto Nacional de Estatística* (2010): Statistical Yearbook of Portugal 2009, Lisbon, p. 36.

⁹⁵ See *Project Alqueva Dam* (n.d.): Dimensions.

⁹⁶ See *The World Bank* (2011): Data – Portugal: Renewable internal freshwater resources, total (billion cubic meters).

The climate of Portugal is characterized by mild winter and warm and dry summer. In the mainland of Portugal there was measured an average temperature of 15.7 °C in 2009, which means an increase by 0.7 °C compared to 2008. The hottest month was August with an average temperature of 30.4 °C and the coldest months with an average temperature of 4.3 °C were January and February. In 2009 the precipitation in Portugal was about 827.4 mm, which implies 827 liter rainwater per m² (~74,430 m³ rainwater). 251 days were without rain in the mainland.⁹⁷ The following table shows the development of precipitation over several years. It is significant that the number of days with no rain is declining. Nevertheless, 251 rainless days are still a lot and indicate the problem of (seasonal) drought in the mainland of Portugal.

Year	Annual	
	Total (mm)	Rainless Days (No.)
1990	695.8	294
1995	956.8	289
2000	1,091.8	275
2005	505.1	311
2006	925.0	280
2007	525.0	296
2008	623.6	270
2009	827.4	251

Table 5: Average annual precipitation in Portugal⁹⁸

B) Regulatory Framework

The semi-presidential system of Portugal is organized via four organs of sovereignty:⁹⁹

- The President of the Republic/Head of State (*regulatory power*)
- The Assembly of the Republic (*legislative power*)
- The Government (*executive power*)
- The Courts (*judicial power*)

The legislation, concerning water and wastewater related issues, is extensive and cannot be fully represented in this chapter. Nevertheless, the most important laws and acts shall be illustrated in the following sections.

⁹⁷ See *Instituto Nacional de Estatística* (2010): Statistical Yearbook of Portugal 2009, Lisbon, p. 38.

⁹⁸ See *Instituto Nacional de Estatística* (2010): Statistical Yearbook of Portugal 2009, Lisbon, p. 53, source: Instituto de Meteorologia IP Portugal.

⁹⁹ See (also for further information concerning the regulatory framework) *Marques, Rui Cunha* (2010): Regulation of Water and Wastewater Services, p. 117.

The highest authority for environmental policy issues is the Ministério do Ambiente e do Ordenamento do Território (MAOTDR), which means the Ministry for the Environment, Territorial Planning and Regional Development. Its responsibilities include among others the water policies. Furthermore it supervises the Instituto da Água (Water Institute). The Water Institute was created in 1993 and manages first and foremost the country's water resources and the application of the Water Act. The EU Water Framework Directive was implemented in Portugal in 2005. In particular, Law No. 58 of 2005 considered the regulations on EU level and Law No. 54 of 2005 adjusts the water resources ownership. Both laws improved the Water Act and built the basis for a sustainable water management in Portugal. Two years later, in 2007, the Agência Portuguesa do Ambiente was created. The merge of water and waste issues should ensure a greater effectiveness in the environmental management. Among others the main tasks of the Portuguese Environmental Agency are integrated pollution strategies, environmental education and the implementation of climate change related policies.¹⁰⁰ The investigation and monitoring of the raw water quality is the duty of the Administração de Região Hidrográfica (River Basin District Authorities).¹⁰¹

In addition to these laws and responsibilities from the environmental point of view, there are several laws which had influence on the structure and organisation of the drinking water and wastewater sector as well as its economic regulation. Before 1993 both sectors were not operating sustainable and efficient. Therefore Portugal had problems to meet the requirements, which were connected with the entry into the EU. Main target of the sector reorganisation by the Portuguese Government in 1993 was to ensure continuous services of high quality, affordable prices and environmental sustainability. Thereby the operating effectiveness should be improved significantly on the physical and economic level. Principally Law No. 372 and Law No. 379 of 1993 make requirements for the two sectors. The municipalities are still responsible for water distribution and wastewater management. But since 1993 the municipalities have provided these services not compellingly directly. The involvement of appropriate private companies e.g. by concessions has been allowed generating access to further capital and expertise. Furthermore, the conditions for shared management between different municipalities (multimunicipal systems) were created. The main aim of intermunicipal solutions is to offer economies of scales in the fields of technic, finance and management.¹⁰² The legal reframing has given the municipalities the opportunity to react more flexible on the individual circumstances.

Already in 1997, Portugal established a regulatory body, the Instituto Regulador de Águas e Resíduos (IRAR). The institute was the regulator of the drinking water and wastewater sector as well as the urban waste management. Its task was to monitor and control the quality of drinking water and the services provided in each sector ensuring an economic viability and a sustainable performance under applicable laws.¹⁰³ Under the Decree Law No. 277 in 2009 the IRAR was converted into the Entidade Reguladora dos Serviços de Águas e Resíduos (ERSAR). This new

¹⁰⁰ See also for further players Marques, Rui Cunha (2010): Regulation of Water and Wastewater Services, pp.117-119.

¹⁰¹ See Vieira, Jose M. P. (2011): Water Safety Plans Implementation in Portugal, p. 110.

¹⁰² See Entidade Reguladora dos Serviços de Águas e Resíduos (ERSAR) (2011): Annual Report on Water and Waste Services in Portugal 2010, p. 74.

¹⁰³ See Marques, Rui Cunha (2010): Regulation of Water and Wastewater Services, pp.117-118.

water and waste service authority is essentially meeting the same aims like the previous institute. Protecting the customers' interests means beside of the control of quality and service standards also the regulation of prices to avoid inequality. "Securing affordable prices, whilst at the same time ensuring the economic and financial sustainability of operators, requires firm action by the regulator. Economic regulation also includes the evaluation of operators' investments. The transition from IRAR to ERSAR has expanded this regulation to the entire sector, whilst IRAR covered only the concessions."¹⁰⁴ Beside of the technical and economic regulation, the ERSAR also manages the structure of the market e.g. by entry barriers for new operators and requirements concerning the entities activities in the sector. Preparing proposals for new legislations completes the most essential tasks.

While regulating the different market fields, ERSAR considers the customers' interest mainly via monitoring the quality of services. Thereby the principles presented in Figure 12 play an important role. Furthermore the regulator acts competent, fair, impartial and transparent. Its annual report informs about the status quo and development of the water and wastewater sector as well as about the evaluation results. Thereby the pressure on the operating entities increases, forcing more performance efficiency.¹⁰⁵ Through its close contact to all players and its versatile involvement, the ERSAR is very important in the organization of the Portuguese water and wastewater sector.

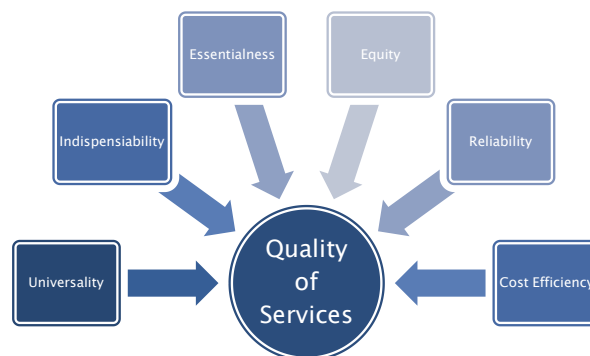


Figure 12: Main principles of the regulation in Portugal¹⁰⁶

Furthermore the company Águas de Portugal (AdP) plays a significant role in the Portuguese water market. "The AdP company, which belongs to the State corporate sector, is the main corporate group in the environmental sector in Portugal. Its mission is to contribute towards resolving national problems in the areas of the water supply and wastewater services [...] within a framework of economic, financial, technical, social and environmental sustainability. Presently, it encompasses more than 50 companies in the scope of its activities, including some international activity."¹⁰⁷

¹⁰⁴ ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p. 77.

¹⁰⁵ See ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p. 77.

¹⁰⁶ Own illustration based on ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p. 77.

¹⁰⁷ Marques, Rui Cunha (2010): Regulation of Water and Wastewater Services, p. 120.

Finally it should be noted that in Portugal exists a strategic plan for water and wastewater services (PEAASAR). PEAASAR presented requirements for both sectors for the period of 2000 – 2006. Main objective was to facilitate social, environmental and economical solutions, but also to ensure structural benefits. After completion of PEAASAR it was determined that there is still a need for management improvements in both sectors. Therefore PEAASAR II was established with focus on the optimization of the management of bulk and retail services. This includes among others the minimization of inefficiencies and costs affecting the period from 2007 – 2013.¹⁰⁸

C) The Water Market

As aforementioned the Portuguese water market is regulated by the ERSAR and there is an implemented strategic plan for both sectors. Therefore many surveys and investigations are made and evaluated to inform the customers in order to enhance the pressure on the operators' performance efficiency. In the following sections the key numbers of the mainland's water market shall be presented to get an impression of the current situation.¹⁰⁹

C1) Dimension

The total annual fresh water abstraction in Portugal is about 729,990 m³. 227,366 m³ of this water is extracted from groundwater, whereas 502,624 m³ are surface water.¹¹⁰ 97 % of the population was connected to the drinking water supply in 2009. This high connection rate even outperforms the requirements of PEAASAR II, which lie at 95%. Especially in comparison to a connection rate of around 80 % in 1990, this means an enormous improvement, which can be traced in the following figure.¹¹¹

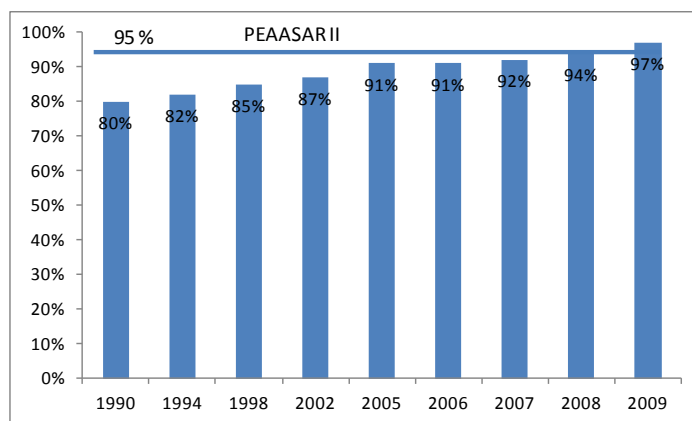


Figure 13: Evolution of the population served with drinking water supply services¹¹²

¹⁰⁸ ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p. 75.

¹⁰⁹ The Azores and Madeira will not be considered in detail.

¹¹⁰ See *Instituto Nacional de Estatística* (Statistics Portugal) (2008): Fresh water abstraction (m³).

¹¹¹ See ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p.86.

¹¹² ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p. 86, source INAG – Inventários Nacionais de Saneamento Básico, PNA e INSAAR 2010 – campanha 2009.

Nonetheless, the efficiency of the water supply security is not satisfying in Portugal. The reduction of water losses because of leakage is important from both points of view, the economic and the environmental.¹¹³

The annual water consumption was approximately 61 m³ per inhabitant in 2008. This corresponds to an average daily consumption of around 167 liter.¹¹⁴ In Portugal around 4,652 water supply systems serve the population. Having a closer look at figure 14 it is striking that 93 % of these water supply systems are very small. They provide services for only 0 to 5,000 inhabitants, which means in total just 19 % of the population. In conclusion 7% of the water supply systems provide approximately 81% of the population.¹¹⁵

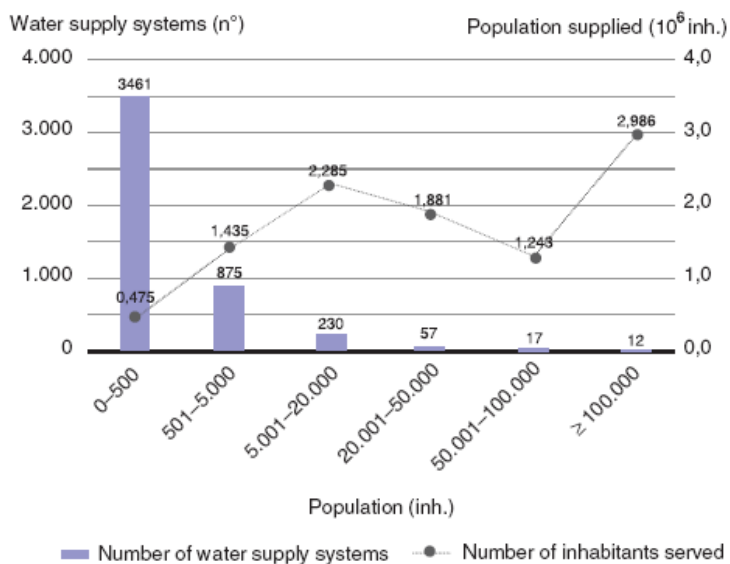


Figure 14: Dimension of public drinking water supplies in Portugal¹¹⁶

Whilst the level of connection in the drinking water sector is already experienced positive, the wastewater sector is recently struggling with stagnation. The following figure shows the development of population served with drainage systems respectively wastewater treatment systems. Both numbers do not yet meet the requirements of PEAASAR II. With 71 % and 81 % of the population served in 2009, the target of 90 % until 2013 is still far from being achieved. Proper treatment is not yet ensured all over the country, so that further action is needed.¹¹⁷

¹¹³ See ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, pp. 116-117.

¹¹⁴ See Instituto Nacional de Estatística (Statistics Portugal) (2008): Water consumption per inhabitant; with 61,000 l / 365 days = 167 l per day.

¹¹⁵ See Vieira, Jose M. P. (2011): Water Safety Plans Implementation in Portugal, p. 110.

¹¹⁶ Vieira, Jose M. P. (2011): Water Safety Plans Implementation in Portugal, p. 110.

¹¹⁷ See ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, pp. 87-88.

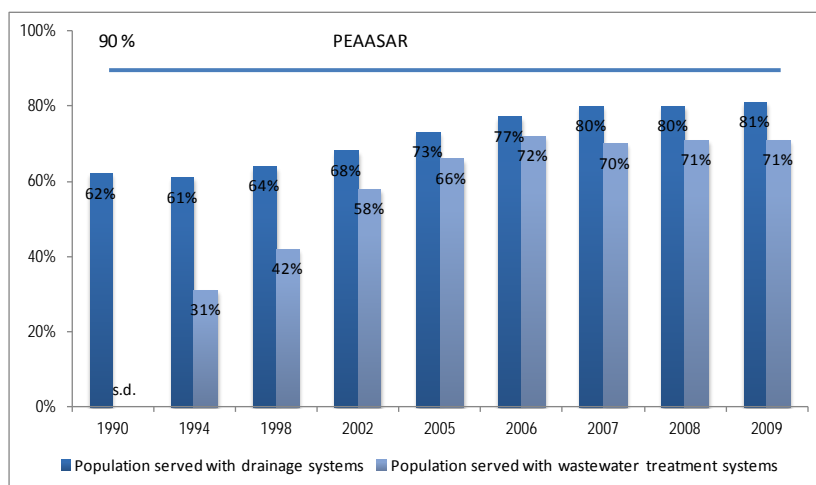


Figure 15: Evolution of the population served with drainage and wastewater treatment services¹¹⁸

All in all the water and wastewater operators billed around 1,136 million cubic meters of drinking water and approximately 1,022 million cubic meters of wastewater in 2010. 47 % of the wastewater was billed for whole sale services and 53 % for retail services (drinking water: 41 % whole sale, 59 % retail).¹¹⁹ As mentioned in part B (Regulatory Framework) the municipalities have different opportunities to fulfill the services of general interest. The next section will present the different types of engagement and thereby the current structure of the Portuguese water market.

C2) Structure

In line with the Annual Report on Water and Waste Services in Portugal 2010 published by ERSAR in 2011, the working steps *abstraction*, *treatment* and *transport* of the drinking water supply process are named in the following **bulk** (whole sale), whereas the *direct distribution* of the drinking water to the population will be denominated as **retail**. “The State is responsible for the multimunicipal systems (bulk services) and the municipalities for municipal systems (retail services). The operators responsible for the provision of these services may decide between three different management models: direct management, delegation and concession, and are able to promote public-public partnerships, or public-private partnerships.”¹²⁰

In 2008 300 water companies provided the end users with water services, regardless of their organizational arrangements.¹²¹ The following figure presents the market share between the different management models in the drinking water supply sector divided in bulk and retail services as well as the number of operators and the population served. It is striking that in the bulk sector more than two third of the population is served by concessionary models, whereas

¹¹⁸ ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010p. 87, source INAG – Inventários Nacionais de Saneamento Básico, PNA e INSAAR 2010 – campanha 2009.

¹¹⁹ See ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010p. 96.

¹²⁰ ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p. 75, for an detailed presentation of the different management models in water services see Annex II.

¹²¹ See Marques, Rui Cunha (2010): Regulation of Water and Wastewater Services, p. 122.

only 29 % of all operators practice this management model. Having a look at the retail sector it is worth mentioning that more than half of the population is served by direct management.¹²²

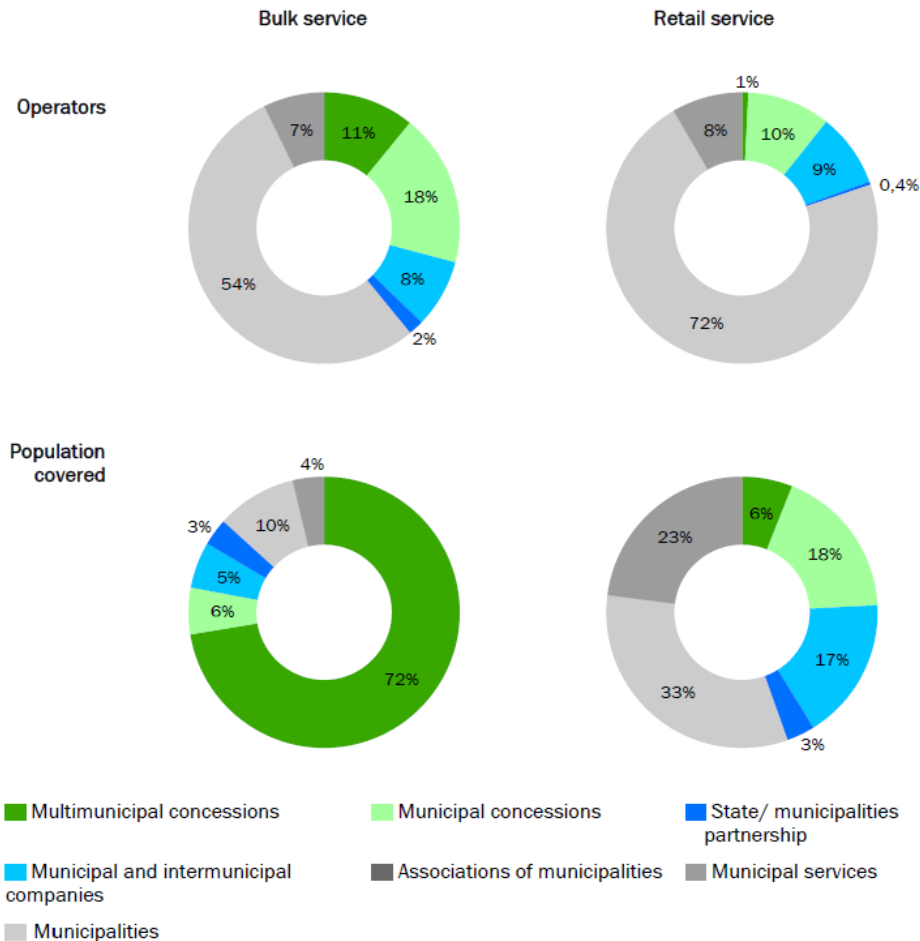


Figure 16: General figures for drinking water supply services grouped by management model¹²³

Analogous the following figure shows the market share between the different management models in the wastewater sector. The differentiation between bulk and retail services as well as the number of operators and the population served gives a good overview of the current structure. The results are similar to the drinking water sector. “Regarding wastewater services at the bulk level, concessionary models cover more than two-thirds of the population, although the number of entities operating according to this model is only 35 % of all operators. [Furthermore,] about 64 % of the population is covered by retail services under direct management models.”¹²⁴ In 2008 305 wastewater companies provided the end users with wastewater services, regardless of their organizational arrangements.¹²⁵

¹²² See ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p. 81.

¹²³ ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p. 81.

¹²⁴ ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p. 83.

¹²⁵ See Marques, Rui Cunha (2010): Regulation of Water and Wastewater Services, p. 122.

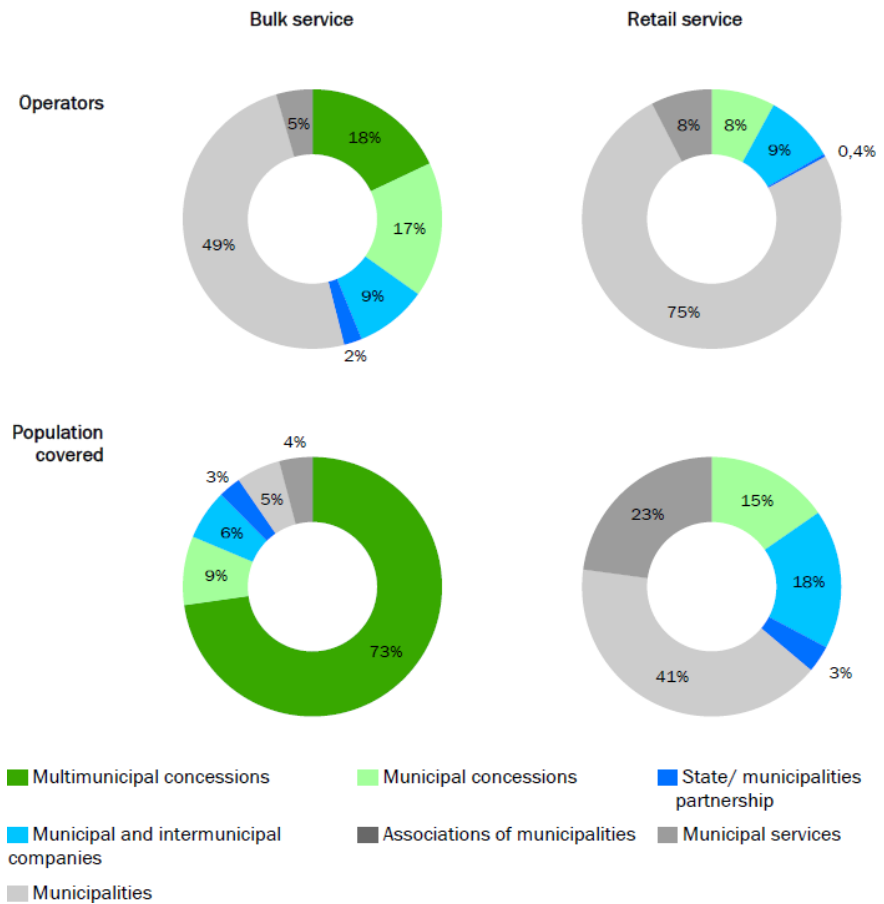


Figure 17: General figures for wastewater management services grouped by management model¹²⁶

As mentioned in part B the company AdP is the main player in Portugal.”In 2006, the AdP supplied ‘wholesale’ water services to 200 municipalities, albeit only partially in many of these, through 14 companies (including EPAL). [...] Apart from its dominant presence in the ‘wholesale’ segment, it is also a significant player in ‘end-user’ systems, through Aquapor and Lusàgua, competing with other private players. The remaining private players include Compagnie Générale des Eaux (CGE/Veolia), which is responsible for 4 companies, potentially serving 270,000 inhabitants, AGS (Somague/Sacyr Group) with 8 participants and 670,000 inhabitants and Indaqua (Mota-Engil, Soares da Costa and Hidrante), with 5 companies and 540,000 inhabitants. Aqualia (FCC Group) also has 3 small systems.”¹²⁷

As aforementioned the entire water and wastewater sector is regulated since the establishment of the ERSAR in 2009 and not only the concessions as before. This regulation standardization shall force more efficiency in each sector. Additional efficiency pressure via competition is an often discussed issue. The corresponding situation in Portugal will be topic of the next report section.

¹²⁶ ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p. 83.

¹²⁷ Marques, Rui Cunha (2010): Regulation of Water and Wastewater Services, p.121.

C3) Intensity of Competition

Competition is an often discussed topic in the water sector. Competition *in* the sector is in Portugal, like in most other countries, absence. In each region only one provider can exist, because of different technical and economical reasons. This provider acts as natural monopoly. This lack of competition can be weakened by a competition *for* the water market. This type of competition is forced by a private involvement, because several operators bid for the transfer of activities or concessions. Costs, competence and efficiency play a more significant role than without competition. The companies are “[...] trying to present the most competitive and advantageous bid to the municipalities, and better tariffs to the end-users.”¹²⁸ With an average of 3.8 bids per tender, the competitive capacity in Portugal can be seen reasonable.

Beside of the competition *for* the market, there are also discussions about competition *by comparison*. Comparing the performances within the country as well as on international level via benchmarking approaches increases the pressure and can force a faster development. For both possibilities there can be found current publications. They show Portugal's interest in competition by comparison.¹²⁹

C4) Finance

Portugal was affected significantly by the impacts of the global economic and financial crisis. The budget deficit will be a serious problem over the next periods. Therefore cost effectiveness is more important than ever and the guiding principle should be ‘to do more with less’.¹³⁰ The future investment needs for the water and wastewater sector in Portugal are estimated (as part of the strategic plan PEAASAR II) to amount up to 3,804 million Euros, of which around 1,604 million Euros will be needed on bulk level and 2,200 million Euros on the end-user level.¹³¹ In the following an overview of the current investment and financing strategies will be given.

“The current investment framework will imply a substantial effort in compliance with the planned investments in order to ensure the accomplishment of the national strategic goals and will have a special focus on the development of network infrastructures for retail services which allow for the return on investments subsidized by the cohesion funds and other financial instruments (bulk level)”.¹³² The National Strategic Reference Framework (Quadro de Referência Estratégico Nacional), which is covering the period from 2007 to 2013, foresees an investment support of around 1,000 million Euros for the drinking water supply and the wastewater management services: 300 million Euros at bulk level (Cohesion Fund), 220 million Euros at retail level (ERDF) and 480 million Euros through bulk and retail service verticalization (Cohesion Fund).¹³³

¹²⁸ ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p.100.

¹²⁹ See De Witte, Kristof; Marques, Rui C. (2009): Designing performance incentives, an international benchmark study in the water sector; ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010.

¹³⁰ See OECD (2011): Environmental Performance Reviews – Portugal 2011, p.1.

¹³¹ See ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p.92.

¹³² ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p.91.

¹³³ See ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p.91.

As aforementioned the sector is very capital intensive, which implicates the importance of investment decisions. The current capital share between the different ownerships is shown in the following figure. Thereby the main players can be identified and it can be given a feeling for the magnitude of the sectors capital. The capital in the sector of multimunicipal concessions was around 486 million Euros in 2010. 71 % of this capital was held by Águas de Portugal and only 29 % by the municipalities. The main shareholders in the field of municipal concessions are Aquapor with 38,3 % of the capital, Indaqua with 26,4 % and AGS with 24,9 %.

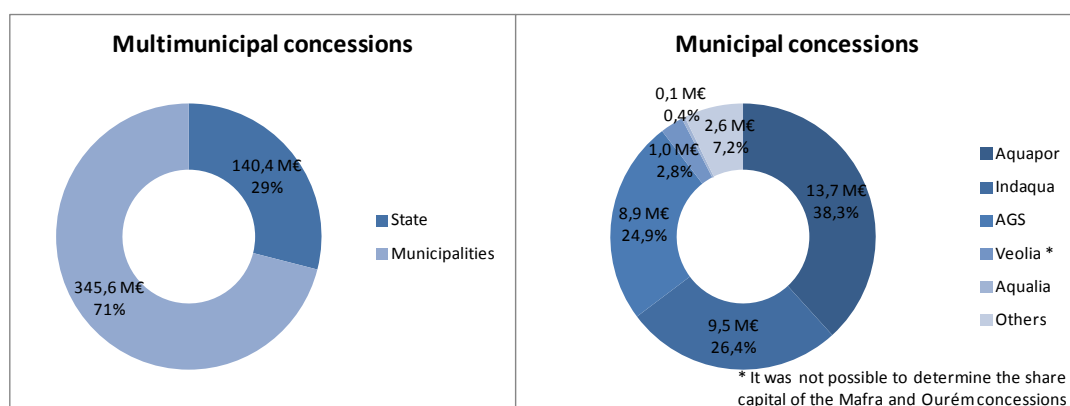


Figure 18: Ownership of share capital of multimunicipal and municipal concessions in 2010¹³⁴

In 2005 the total costs in the Portuguese water and wastewater sector amounted to 1,566 million Euros. They mainly consist of operating costs, investment costs and general administrative costs, but also financial costs and bulk water purchase respectively wastewater drainage costs are included.¹³⁵ The average costs per utility in 2005 can be seen in the following figure.

¹³⁴ ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p.95.

¹³⁵ See Monteiro, Henrique (2008): Evolution of cost recovery levels in the Portuguese water supply and wastewater industry 1998 – 2005, p.14.

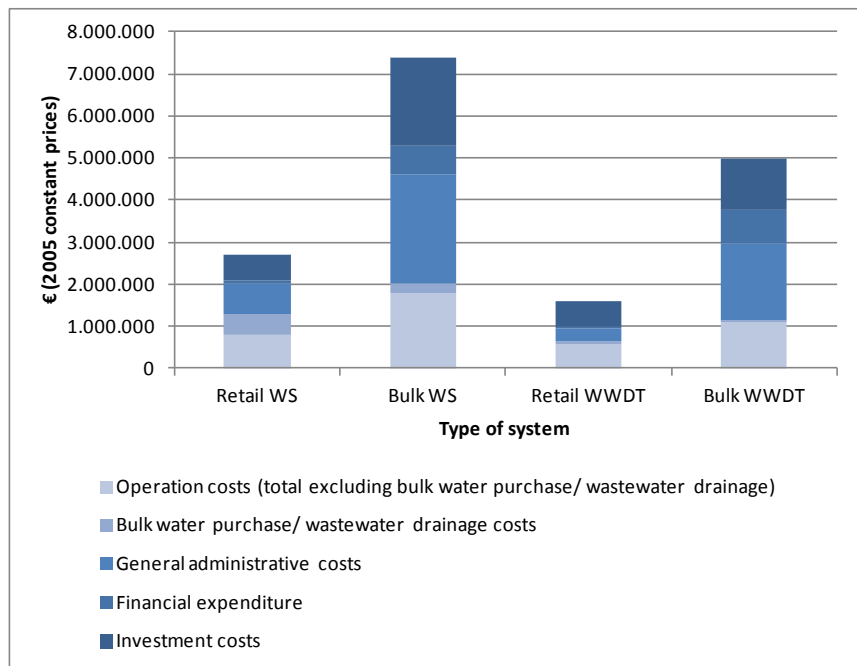


Figure 19: Average cost per utility in water supply (WS) and wastewater drainage and treatment (WWDT) systems (2005)¹³⁶

Beside of the investment needs, the capital share and the costs, the turnover in the sector is of high relevance. “The water services operators in mainland Portugal with a business management model, namely concessions and municipal and intermunicipal operators, presented in 2010 a turnover of 986 million Euros. Water services are the most important in the sector in terms of turnover, representing about 66 % of the total, while wastewater services represent only 34 % of the total turnover of these companies [...]. [Furthermore] it should be noted that 54 % of the turnover was achieved by multimunicipal concessions, 22 % of it by municipal concessions, and 24 % by municipal and intermunicipal companies.”¹³⁷

One decisive factor for the cost recovery level is the tariff to the end-user. The procedure of tariff setting verifies depending on the underlying management model of the operator and can be described as following:¹³⁸

- “Concessionaires of municipal utilities, regulated according to a concession contract, have to comply with the tariffs update and review formulas set on their contracts. In this case, ERSAR is entitled to opinion on the concession contract template and to supervise what was previously agreed;

¹³⁶ Slightly modified *Monteiro, Henrique* (2008): Evolution of cost recovery levels in the Portuguese water supply and wastewater industry 1998 – 2005, p.20.

¹³⁷ *ERSAR* (2011): Annual Report on Water and Waste Services in Portugal 2010, pp. 97-98, in addition a detailed economic analysis of the concessioned sector is presented on pp. 101-114.

¹³⁸ ERSAR (n.d.): Tariffs to the end-user. http://www.ersar.pt/website_en/ViewContent.aspx?SubFolderPath=\Root\Contents\SiteEN\Menu_Main\Sector\TariffsEndUser&FolderPath=\Root\Contents\SiteEN\Menu_Main\Sector&GenericContentId=0&Section=Menu_Main

- All other municipal owned systems (not concessioned) follow a different management model. These systems are subject of a different tariff selection criteria as well as a distinguished process of tariff approval.”

The wide range of management models implies different tariff approval processes. Depending on the type of management model (municipal or inter-municipal services) it is task of the local administration (the Municipal Assembly) or the intermunicipal assembly to approve the tariffs. Municipal or intermunicipal companies often have different organizational structures. In the case of an institutionalized PPP, the General Assembly is responsible for the tariff approval, whereas the Town Hall or the Board of Directors approves the tariffs in case of other municipal companies.¹³⁹ “The tariffs set should ensure an adequate return of investment and services operational costs, as well as of environment and scarcity costs. Tariffs should also ensure an acceptable contribution by users from different sectors in cost coverage.”¹⁴⁰

Water metering exists all over Portugal. The water charges vary between the operators, but the drinking water price, the customer has to pay, always rises with the water consumption. The tariffs consist of a fixed charge depending on the water meter size and a volumetric charge depending on the effective water consumption respectively blocks of water consumption. Analogues the wastewater tariffs consist normally of a fixed and a volumetric component. It is also possible to include a component for the wastewater treatment. Since Law No. 2 of 2007 has become affective, the tariffs as well as a complete breakdown of the costs have to be published on the municipalities’ respectively operators’ website to inform the customers and to ensure thereby more transparency.¹⁴¹

In the following figure the domestic water respectively wastewater charges of 4 different types of water service operators are presented for the year 2008 to get a sense of the magnitude. It is striking that the variable component is charged via increasing block tariffs. Furthermore wastewater charges are significant lower than drinking water charges.

	EPAL
	2008
Water	
Fixed component (€/month)	3.90 - 2,129.85
Variable component (€/m ³)	
0-5 m ³	0.1530
6-20 m ³	0.5754
> 20 m ³	1.3460

Figure 20: Tariff system of the state company EPAL for domestic customers in 2008¹⁴²

¹³⁹ See Marques, Rui Cunha (2010): Regulation of Water and Wastewater Services, p. 124.

¹⁴⁰ ERSAR (n.d.): Tariffs to the end-user.

http://www.ersar.pt/website_en/ViewContent.aspx?SubFolderPath=\\Root\\Contents\\SiteEN\\Menu_Main\\Sector\\TariffsEndUser&FolderPath=\\Root\\Contents\\SiteEN\\Menu_Main\\Sector&GenericContentId=0&Section=Menu_Main

¹⁴¹ See Marques, Rui Cunha (2010): Regulation of Water and Wastewater Services, pp.124, 128.

¹⁴² Marques, Rui Cunha (2010): Regulation of Water and Wastewater Services, p. 125.

Services	Semi-autonomous services (Oeiras and Amadora)	Private company (Águas de Cascais)	Municipal service (Porto de Mós)
	2008	2008	2008
Water			
Fixed component (€/month)	2.95 - 216.11	3.42 - 133.59	2.05 - 8.10
Variable component (€/m ³)			
0-5 m ³	0.492	0.400	0.510
6-10 m ³			0.860
11-15 m ³	1.037	0.729	1.020
16-25 m ³	1.989	1.211	1.530
> 25 m ³	2.076	1.951	2.650
Wastewater			
Fixed component (€/month)	-	3.12	1.160
Variable component (€/m ³)			
0-5 m ³			-
> 5 m ³	0.268	30 % of the water bill	20 % of the water bill

Figure 21: Selection of tariff systems for domestic customers in 2008¹⁴³

The figure below shows the development of the average water price per m³ for tariffs, which are approved by ERSAR. This affects the management models in form of multimunicipal and municipal concessions. ERSAR names the improvement of cost recovery as well as the target of service quality and system sustainability as main reasons for the increasing prices. Nevertheless, it remains to note that a price growth alone does not allow a conclusion about the effectiveness of the use of revenues.

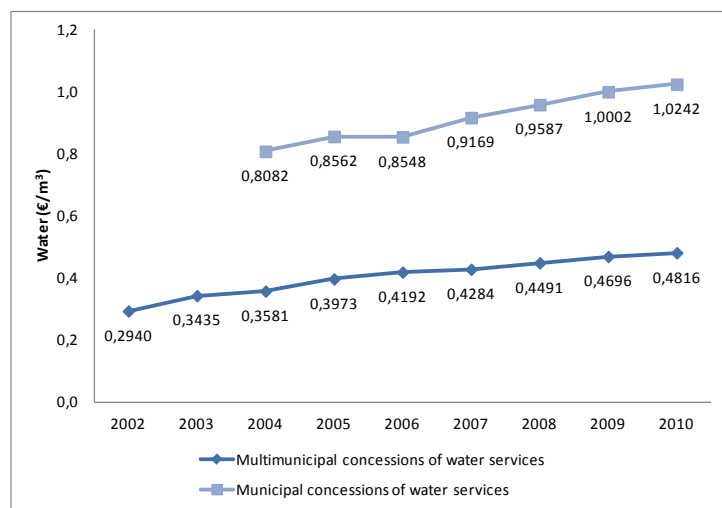


Figure 22: Approved tariffs evolution in water services concessions¹⁴⁴

Having adequate water pricing systems according to the individual water consumption is not trivial. The distribution of the service related costs is not yet reasonable in Portugal. “The drinking water supply almost always subsidizes the wastewater services and, within the water

¹⁴³ Marques, Rui Cunha (2010): Regulation of Water and Wastewater Services, p. 125.

¹⁴⁴ See ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p.103.

service, industrial and commercial customers and customers with high levels of consumption subsidize other (domestic) customers. It must also be noted that there are never any charges for the stormwater service and it is common to find social tariffs and special tariff systems for large families.”¹⁴⁵ It is alarming that investigations of the cost recovery level in the period from 2002 to 2006 show a decreasing trend.¹⁴⁶ The improvement of the operational cost recovery ratio is an important issue in both sectors. Furthermore, the OECD gives some hints for an economic improvement:¹⁴⁷

- Economic evaluation of major water supply projects
- Self-financing of water distribution and pollution abatement activities
- Implementation of the Polluter-Pays Principle and the User-Pays Principle
- Use of economic instruments
- Evaluation of the use of subsidies
- Increasing the financial resources of the Ministry of Environment

C5) Reputation of the Water Utility

One indicator for customer satisfaction is the quality of supplied water. In Portugal the drinking water quality can be assessed as good and satisfying.¹⁴⁸ The following figure shows the enormous development over the last decades. While in 1993 only 50 % of the tested water was rated good quality, in 2009 the number of positive water quality tests was around 98 %. Unfortunately, it remains unclear how many tests built the basis for the evaluations. The detailed parameter analysis can be found in the Annual Report of ERSAR. ERSAR considers the water ingredients separately and evaluates them.

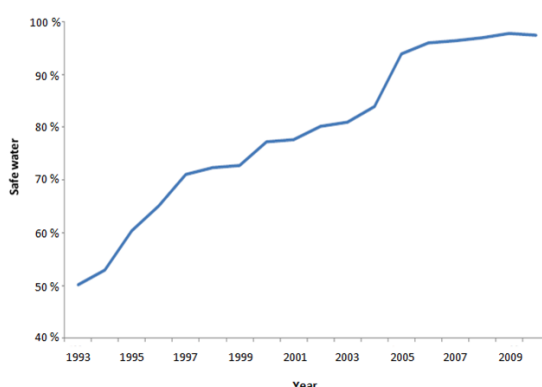


Figure 23: Percentage of water controlled achieving good quality¹⁴⁹

¹⁴⁵ Marques, Rui Cunha (2010): Regulation of Water and Wastewater Services, p. 125.

¹⁴⁶ See Monteiro, Henrique (2008): Evolution of cost recovery levels in the Portuguese water supply and wastewater industry 1998 – 2005, p. 52.

¹⁴⁷ OECD (1993): Conclusions and Recommendations, p.4.

¹⁴⁸ See ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p.117.

¹⁴⁹ ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p.123.

The good drinking water quality is also reflected in the fact, that of all customer complaints, which were received by ERSAR in 2010, just 1 % dealt with drinking water quality. As presented in figure 24 most complaints were related to the meter reading and billing (48%), the helpdesk (22 %) and the quality of service (11 %). This information is interesting to uncover opportunities for further improvement.

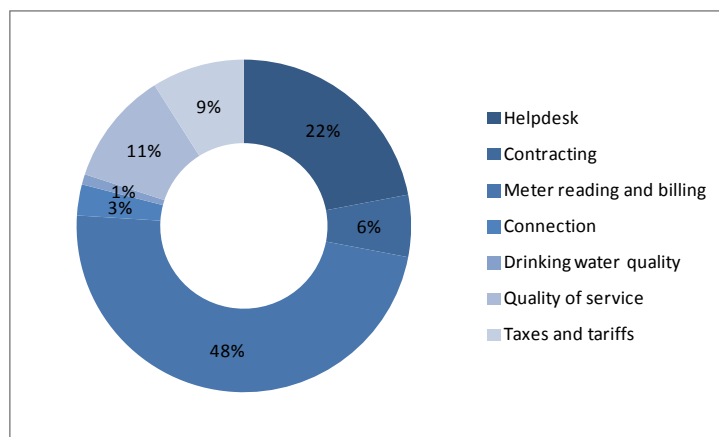


Figure 24: Total complaints received by ERSAR in 2010¹⁵⁰

Since the Decree-Law No. 156 of 15th September 2005 has come into force, the suppliers and municipalities have the obligation to run a complaint book related to the water supply services. The original complaint books have to be sent to ERSAR. Therefore the number of reported complaints has risen significantly since 2005. In 2010 89% of the 3,323 complaints were official ones, which were reported in the operators' complaint books.

In addition the ERSAR evaluates the performance of the water and wastewater sector via different indicators divided in the areas *Protection of User Interests*, *Operator Sustainability* and *Environmental Sustainability*. Although a positive development of the sectors' performances can be recognized, further action is necessary. Further improvements in the retail water supply sector are desirable, especially in the fields of¹⁵¹

- Operating cost coverage ratio
- Non-revenue water (water which is lost without billing)
- Mains rehabilitation
- Mains failures
- Water use efficiency

¹⁵⁰ ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p.94.

¹⁵¹ See ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p.117-120.

The retail wastewater management services sector has to face significantly more difficulties. Most indicators do not meet the performance targets. Some selected, not yet satisfying performance indicators are listed below to show opportunities for further improvement in the wastewater sector:

- Operating cost coverage ratio
- Sewer rehabilitation
- Sewer blockages
- Sewer collapses
- Sludge disposal

3.2.2 Norway

On the one side Norway has an extensive freshwater occurrence on the other side the water sector has to face significant height differentials and challenges caused by pollution. The Norwegian water market is characterised by a fragmented structure and its organisation is dominated by the municipalities' operation.

A) Country specific Characteristics and Challenges

Norway is one of the Scandinavian countries and lies in the very North of Europe. Beside of the mainland with several islands, the Kingdom of Norway consists of the archipelago of Svalbard and the island Jan Mayen. The size of the entire Kingdom amounts to 385,186 km², of which 323,787 km² belong to the mainland, 61,022 km² to Svalbard and only 377 km² to the island Jan Mayen. The coastline of the mainland¹⁵² including its islands, bays and fjords is 83,231 km long. Furthermore, it has land frontiers with Sweden, Finland and Russia.¹⁵³

In contrast to the size of the country, the current population density is extremely low. On 1st January 2010 the mainland population was calculated to be 4,858,199, which is equivalent to a population density of 16 people per km².¹⁵⁴ The outliers lay between a population density of 1,375 in Norway's capital district Oslo in the South of Norway and a population density of 2 people per km² in the area Finnmark in the very North of the country. The population of Norway has increased every year since at least 1900 and current population forecasts estimate a development towards around 7,033,000 people by the year 2060.¹⁵⁵

Norway has got a rough and much diversified landscape. Mountains, glaciers, fjords, waterfalls, lakes and rivers characterise the country.¹⁵⁶ Even 9 of the 20 highest waterfalls in the world lay in the Kingdom of Norway.¹⁵⁷ The mainland is distributed in 94.3 % land area and 5.7 % freshwater respectively lakes.¹⁵⁸ More concretely, the total annual available freshwater resources in Norway are about 377 billion m³.¹⁵⁹ The detailed differentiation is shown in the graphic below.

¹⁵² In the following chapters Norway and mainland will be used synonymously.

¹⁵³ See *Statistics Norway* (2010): Statistical Yearbook of Norway 2010, p.15.

¹⁵⁴ This number is based on a mainland size of 305,470 km², which was re-calculated per 1st January 2008.

¹⁵⁵ See *Statistics Norway* (2010): Statistical Yearbook of Norway 2010, pp. 65-67, 121.

¹⁵⁶ See *Statistics Norway* (2010): Statistical Yearbook of Norway 2010, p.16.

¹⁵⁷ See OECD (2011): OECD Environmental Performance Reviews: Norway 2011, p.88.

¹⁵⁸ See *Statistics Norway* (2010): Statistical Yearbook of Norway 2010, p.44.

¹⁵⁹ See *Statistics Norway* (2009): Natural Resources and the Environment 2008.Norway, p.114.

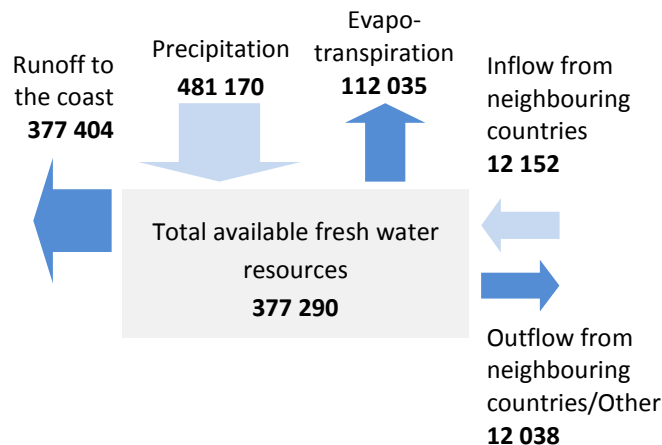


Figure 25: Annual available freshwater resources in Norway. Average for 1971-2000. Whole country in million m³.¹⁶⁰

Nevertheless, the quantity of freshwater should not obscure the fact that Norway has to face pollution problems. “Norwegian lakes and rivers are vulnerable to acid rain, which for a long time has been regarded as one of the major environmental problems in Norway.”¹⁶¹ At least the water sector has focused more and more on the reduction of nitrogen and phosphorus discharges, so that now only 25 % of the Norwegian water sources are considered as critical respectively at risk. This is an important process to protect the natural ecosystem, but it still has to be improved.¹⁶² In Norway several monitoring stations exist, which observe and measure the river discharge (700), reservoir water level (600) and the ground water level. This country-wide measurements are mostly made continuously and shall be still upgraded.¹⁶³

In general the country has more than sufficient precipitation whether in the form of rainfall, snow or hail over the whole year without being confronted with any significant draught periods.¹⁶⁴ But the infrastructure sectors of Norway have to face tough winter and mild summer. Observing the linear trend of the average temperatures from the period between 1871 and 2009 it is obvious that the average temperature rose by 1 °C - 1.5 °C.¹⁶⁵ Therefore climate change adaptations are also an important issue in Norway.

¹⁶⁰ See *Statistics Norway* (2009): *Natural Resources and the Environment 2008*. Norway p.114, further source: Norwegian Water Resources and Energy Directorate 2004 (methodology) and 2007 (data). Records of precipitation do not make it possible to calculate inputs with the same accuracy as runoff. As a result, there is a discrepancy between total inputs and total runoff in the figure.

¹⁶¹ *Statistics Norway* (2009): *Natural Resources and the Environment 2008*. Norway, p.113.

¹⁶² See *OECD* (2011): *OECD Environmental Performance Reviews: Norway 2011*, p.71; *Statistics Norway* (2009): *Natural Resources and the Environment 2008*. Norway, p.113.

¹⁶³ See *United Nations (UN) Department for Economic and Social Affairs* (2004): *Freshwater Country Profile*, p. 3.

¹⁶⁴ See *Statistics Norway* (2010): *Statistical Yearbook of Norway 2010*, p.50.

¹⁶⁵ See *Statistics Norway* (2010): *Statistical Yearbook of Norway 2010*, pp.48, 49.

B) Regulatory Framework

At first it has to be identified that even though Norway is not part of the EU, the EU Water Framework Directive, which was mentioned at the beginning of this report, plays a significant role. The bill to incorporate the EU Water Framework Directive into the European Economic Area Agreement has been submitted to the Norwegian Parliament (Storting).¹⁶⁶ The Directive has already been implemented in the Norwegian law by the regulations of 15 December 2006 concerning the framework for water management (Water Regulations), which entered into force on 1 January 2007.”¹⁶⁷

Several agencies are responsible for the water resources management in Norway. The management and development of water resources is in the remit of the Ministry of Petroleum and Energy (Olje- og energidepartementet). More precisely it is the remit of its subordinate agency the Norwegian Water Resources and Energy Directorate (Norges vassdrags- og energidirektorat). The Ministry of Environment (Miljøverndepartementet) deals with water pollution and nature conservation issues. The most relevant legislation concerning those topics are the Water Resources Act from 2000 and the Pollution Control Act from 1981.¹⁶⁸ From the legal point of view some more acts and regulations must be considered. However, this report is limited to selected laws, which have direct impact on the physical or economic performance of the water supply and the sewage removal.

The purpose of the Water Resources Act “[...] is to ensure socially proper use and management of river systems and groundwater.”¹⁶⁹ It is significant that the Act makes the first provisions concerning the abstraction of groundwater.¹⁷⁰ Furthermore, the Act includes obligations for a licensing process for extensive water projects, which might cause significant damages or contradict the public interest. “Previously licenses were generally only needed for hydropower development. This requirement has been interpreted more widely in recent years, so that other activities which could involve damage or nuisance – such as water supply or drainage projects [...] - have also become subject of the licensing process.”¹⁷¹ The responsible authorities in the context of the Water Resources Act are, on the national level, the King in Council and the aforementioned Ministry of Petroleum and Energy as well as its subordinate authority the Norwegian Water Resources and Energy Directorate.¹⁷²

The Planning and Building Act of 1985 lays down regulations for the land use in general.¹⁷³ In particular it “[...] includes provisions on the coordination of national, county, and municipal activities and provides a basis for decisions on the use and protection of the environment. Under

¹⁶⁶ See *Ministry of Petroleum and Energy* (2008): Facts 2008: Energy and Water Resources in Norway, p. 129.

¹⁶⁷ *Ministry of Petroleum and Energy* (2008): Facts 2008: Energy and Water Resources in Norway, p. 130.

¹⁶⁸ See *United Nations (UN) Department for Economic and Social Affairs* (2004): Freshwater Country Profile – Norway, p.2; an English translation of ‘Acts relating to energy and water resources in Norway’ can be found at <http://www.ub.uio.no/ujur/ulovdata/lov-19900629-050-eng.pdf>.

¹⁶⁹ *Ministry of Petroleum and Energy* (n.d.): Acts relating to energy and water resources in Norway (unofficial translation), p.58.

¹⁷⁰ See *Ministry of Petroleum and Energy* (2008): Facts 2008: Energy and Water Resources in Norway, p. 128.

¹⁷¹ *Ministry of Petroleum and Energy* (2008): Facts 2008: Energy and Water Resources in Norway, p. 125.

¹⁷² See *Ministry of Petroleum and Energy* (2008): Facts 2008: Energy and Water Resources in Norway, p. 126.

¹⁷³ See *Ministry of Petroleum and Energy* (2007): Norwegian water resource management.

the Act, municipalities may establish environmental goals for their water resources and the environment in the vicinity of these resources.”¹⁷⁴

The municipalities are responsible for many welfare services and services of public interest, so that they cover inter alia the water supply and the sewage removal. While in the Norwegian water market the involvement of the private sector plays no role, intermunicipal cooperations are not unusual.¹⁷⁵ The legislation from 1974 concerning municipal water and wastewater fees “[...] enables the municipalities to recover the totality of costs involved in supplying water to households and industry and in operating municipal sewage systems.”¹⁷⁶

The drinking water regulations (Drikkevannsforskriften) entered into force on 1st January 2002. Main target of these regulations is to ensure a supply of drinking water in sufficient quantity and quality. They contain information on quality requirements and allowable, permitted drinking water ingredients and their limits. Ensuring these quality standards as well as the supply security is the responsibility of the water utilities. Furthermore, the water supplier is always committed to provide relevant data and information about the water quality to the customer. The approval for water supply is the responsibility of the Local Authorities for Food Safety (Lokale Mattilsynet). Beyond, the local authorities make decisions according to the Food Act to implement the provisions of these regulations. The violation of the drinking water regulations is punishable.¹⁷⁷

Norway has got a waterworks register (Vannverksregisteret) where the data from the operating waterworks is collected. This register is run by the Norwegian Institute for Public Health (Folkehelseinstituttet).

C) The Water Market

The water market of Norway is characterised by its small structure. The water and sanitation services are in the hand of many municipalities of various sizes, whereas the private sector plays no role. The main challenges in the Norwegian water sector are the aging infrastructure as well as the associated high leakage rate and high interruption frequency.

C1) Dimension

The structure of the water market is small, which means that the responsibility for the water supply and the wastewater removal is on the municipal level. 1,058 municipal water works were in operation in 2010, whereas a total of 2,735 wastewater facilities having a capacity of minimum 50 persons served were estimated to operate in 2010.¹⁷⁸ In the following section the

¹⁷⁴ United Nations (UN) Department for Economic and Social Affairs (2004): Freshwater Country Profile – Norway, p.2.

¹⁷⁵ See Ministry of Local Government and Regional Development (2000): The main functions of county municipalities and municipalities in Norway; Ministry of Local Government and Regional Development (2011): Municipal Structure.

¹⁷⁶ Samdal, J. E. (1975): Water Management in Norway, The Ministry of Environment, Norwegian Institute for Water Research (NIVA), Oslo, p. 16.

¹⁷⁷ See Helse- og omsorgsdepartementet (2001): Forskrift om vannforsyning og drikkevann (Drikkevannsforskriften, FOR-2001-12-04-1372), especially §5, §6, §9, §16, §20, §21.

¹⁷⁸ See Statistics Norway (2011): 212 litres a day per person, Statistics Norway (2011): 107 kg cadmium from municipal wastewater.

focus lies on the dimension of the water supply sector first, before the wastewater sector of Norway will be presented.

The connection rate in the municipal water supply sector is with 83.5 % of the population (~4,1 million inhabitants) acceptable. The rest of the population is served by smaller waterworks or self supply. The 1,058 municipal waterworks produce around 722 million m³ of drinking water, which is pumped through a tap water net work of nearly 42,700 km. The leakage rate of around 31 %, which implicates an annual water loss of about 223 million m³ of drinking water, is alarming and represents an often discussed issue in Norway. The aging infrastructure is one possible reason for the extreme high leakage and at the same time poses the risk of contaminants from the outside, if the pressure is too low. Around half of the pipe kilometers were laid between 1971 and 2000. Since 2001 some pipes have been laid or renewed, but having a look at figure 26 it gets obvious that a startling number of pipes is extreme old. Especially in Oslo many pipes are even older than 100 years.¹⁷⁹ Nevertheless, it is sobering that the leakage rate was already a well known problem in 1975. A water waste of up to 40 % was seen as a serious problem. Especially, because it also means a waste of money from the economic point of view.¹⁸⁰

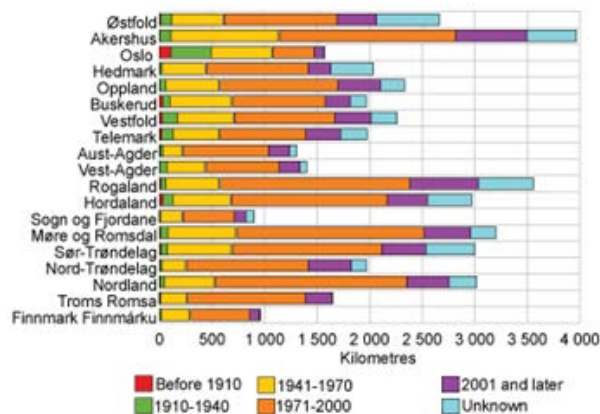


Figure 26: Length of municipal water pipelines by county and time being laid (2010)¹⁸¹

Therefore the renewal of old pipes is an important issue in Norway. “Calculated as a 3-year moving average for the period 2008-2010, the rate of renewal is 0.71 per cent of the total length of water pipelines,”¹⁸² which means a significant increase compared to the period of 2002 - 2004 (0.48 %). The development of this renewal indicator is shown in the following figure.

¹⁷⁹ See *Statistics Norway* (2011): 212 litres a day per person.

¹⁸⁰ See *Samdal, J. E.* (1975): *Water Management in Norway*, The Ministry of Environment, Norwegian Institute for Water Research (NIVA), Oslo, p. 13.

¹⁸¹ *Statistics Norway* (2011): 212 litres a day per person.

¹⁸² *Statistics Norway* (2011): 212 litres a day per person.

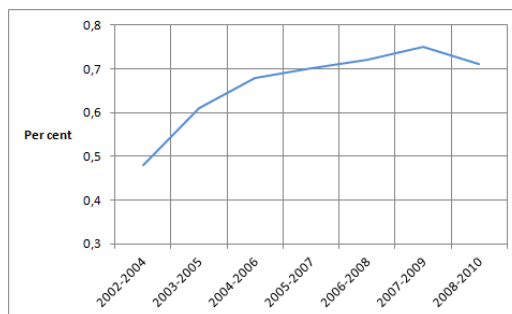


Figure 27: Renewal of municipal water pipelines - 3year moving average (2002 - 2010)¹⁸³

The water consumption in Norway is with around 212 liters per person and day very high.¹⁸⁴ It corresponds to an average annual demand of 77,380 liters per person. The share of water demand by various sectors is shown in figure 28. It is conspicuous that the leakages represent the second highest number, behind the overall household consumption, and are at the same time higher than the demand of the Norwegian industry.

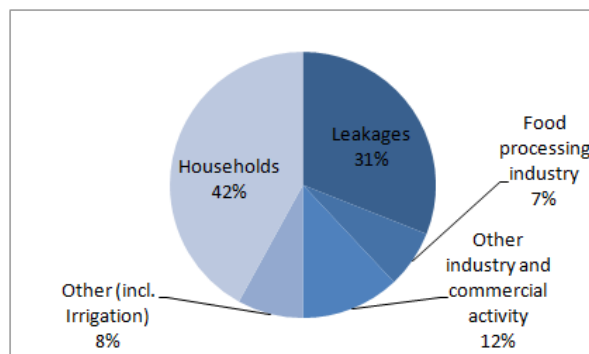


Figure 28: Percentage of public water supplies used by various sectors (2006)¹⁸⁵

As aforementioned 2,735 wastewater facilities (minimum 50 persons served) are operating in the Norwegian water market and serve comparably to the drinking water supply approximately 83 % of the population. Wastewater facilities which are treating the sewage of less than 50 persons are most common private solutions. Furthermore, 59 % of the population is connected to advanced high-grade treatment plants.¹⁸⁶ The detailed breakdown of the population between various types of treatment plants can be seen in figure 29.

¹⁸³ *Statistics Norway* (2011): 212 litres a day per person.

¹⁸⁴ See *Statistics Norway* (2011): 212 litres a day per person.

¹⁸⁵ *Statistics Norway* (2009): Natural Resources and the Environment 2008.Norway, p.117, Source: National Institute of Public Health, water works register. The figure is based on data for 1,570 water works in 2006.

¹⁸⁶ See *Statistics Norway* (2011): 107 kg cadmium from municipal wastewater; *Statistics Norway* (2011): 117 km of sewage system renewed.

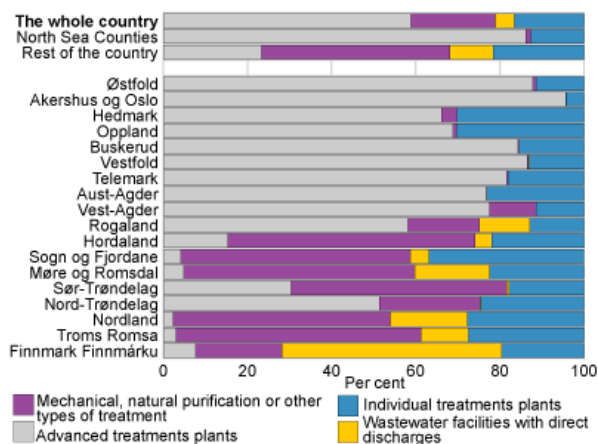


Figure 29: Share of the population connected to various types of treatment plants (2009)¹⁸⁷

Regardless of the type of connected wastewater system, the sewage net work is estimated to consist of 36,100 kilometers of wastewater pipes, of whom 7,700 kilometers are combined wastewater and stormwater pipes and 28,400 kilometers are pure sewerage pipes. Furthermore, Norway has around 15,200 kilometers of separate storm water net work. In analogy to the water supply the aging infrastructure with regard to the wastewater pipelines plays a major role. The renewal rate of the whole net work is with 0.49 % lower than in the water supply sector. Taking into account the current renewal rate it would take more than 200 years to renew the whole pipeline system. This represents a risk for the sustainability of the future net work performance.¹⁸⁸ Moreover, “many Norwegian wastewater treatment plants were built in 1970’s and will need upgrading in the coming years.”¹⁸⁹

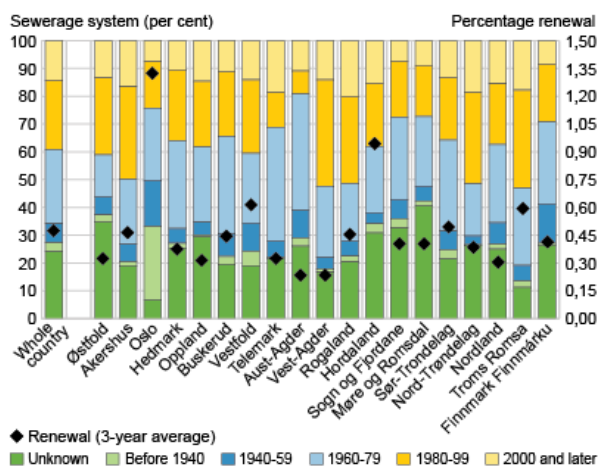


Figure 30: Sewerage system classified by period (2010) and sewerage system renewed 3-year average (2008-2010)¹⁹⁰

¹⁸⁷ Statistics Norway (2010): 59 per cent of the population connected to high-grade treatment.

¹⁸⁸ See Statistics Norway (2011): 117 km of sewage system renewed.

¹⁸⁹ Saegrov, Sveinung et al. (2011): Making urban water networks sustainable – Some examples from Norway, LESAM 2011, p.1.

¹⁹⁰ Statistics Norway (2011): 117 km of sewage system renewed.

C2) Structure

In Norway an increasing municipal responsibility for environmental management, including issues like local air and water quality, can be observed. Furthermore, the municipalities are still responsible for water supply, sanitation and waste management to operate most closely to the residents. As Norway consists of 430 municipalities with 19 parent counties the structure can be described as small.¹⁹¹ “The growing scope of municipal responsibilities has improved response to local needs and simplified procedures, but also made it more difficult, especially for small municipalities, for local authorities to perform all their tasks effectively.”¹⁹² Referring to the numbers of January 2011 Utsira is with 216 residents the smallest municipality, whereas Oslo is the largest one with nearly 600,000 inhabitants. The extreme differences in size represent various challenges for the municipalities. In particular the smaller municipalities have to face a lack of specialist expertise. A possible solution might be to operate in form of an intermunicipal collaboration model and thereby share manpower, expertise and experiences making use of economies of scale.¹⁹³

Since the water supply and wastewater removal is mainly organised on the municipality level the public bodies also have to face the described challenges. Around “63.7 % of the waterworks are municipal, 1.6 % inter-municipal and 34.7 % co-operative units owned by the consumers themselves.”¹⁹⁴ But as aforementioned the first two serve the major part of the population.¹⁹⁵ “There has been little consideration of using the private sector in water, with exception of one suburb of Oslo, in the 1990s.”¹⁹⁶

C3) Intensity of Competition

As the water and wastewater services are in the hand of local municipalities, competition plays only a minor role. There are no current discussions, which indicate significant alteration in this field.

C4) Finance

In 2010 the annual turnover exclusive value added tax amounted 964 million NOK in the water supply sector and 1,558 million NOK in the sewerage sector.¹⁹⁷ Nevertheless the state of the networks and assets makes investments necessary. In 2010 the Norwegian Association of Chartered Engineers published a report, which deals with the situation of the Norwegian infrastructure. The report underlines that the water and wastewater systems are in poor conditions and there is still a large need of investments to avoid water supply interruptions and

¹⁹¹ See *Statistics Norway* (2010): Statistical Yearbook of Norway 2010, p.17; OECD (2011): OECD Environmental Performance Reviews: Norway 2011, p.73; Ministry of Local Government and Regional Development (2011): Municipal structure.

¹⁹² OECD (2011): OECD Environmental Performance Reviews: Norway 2011, p.73.

¹⁹³ See Ministry of Local Government and Regional Development (2011): Municipal structure.

¹⁹⁴ Email request to the *Department of water hygiene, Division of Environmental medicine Norwegian institute of Public Health*, English Summary on Water Report Data sent by Liliane Myrstad on 24 November 2011.

¹⁹⁵ See C1 Dimension

¹⁹⁶ *Public Services International Research Unit* (2004): Privatising other people's water – the contradictory policies of Netherlands, Norway and Sweden, p.4.

¹⁹⁷ See *Statistics Norway* (2002): Continued decrease in investment levels, Table.

leakage more efficiently.¹⁹⁸ To have an idea of the magnitude, the investments in the wastewater sector in 2001 shall be mentioned as an example. The total investments amounted to 1.69 billion NOK, of which 436 million NOK were invested in wastewater treatment plants and 1,250 million NOK in the sewer system.¹⁹⁹ The investment decisions for several projects are made individually by the developer.²⁰⁰

“Investments related to water supply and wastewater treatment are normally funded through ordinary national and international financial markets and are paid back through user charges [...]. Smaller investment use loans, larger projects are often funded through bond issues.”²⁰¹ Furthermore, the Norwegian government provided financial support for new wastewater treatment plants and the maintenance of insufficient drinking water treatment plants until 2001 respectively 2002. The grant system for the waste water sector has been phased out, whereas the grant system for the drinking water sector is now part of the general district development funding.²⁰²

As aforementioned the regulation of water and wastewater fees is recorded in the Act on municipal water and sewer charges (Lov om kommunale vass- og kloakkavgifter) from May 1974. Amendments by the Act of 11 June 1993 and some minor modifications in the following years have completed the current legislation. These regulations shall ensure that the municipalities have an adequate funding mechanism to fulfill their tasks associated with the local water supply and wastewater removal in a sufficient and efficient manner. The Act underlines that the users shall pay the costs which are related to the water and wastewater services they take advantage of. The occurring operating and maintaining costs as well as the considered costs for necessary investments over a 5 year period shall be adequate allocated and recovered by the municipalities with the help of an equitable fee system. Moreover, the costs which form the basis for the fees shall exclude state subsidies. Beyond this, municipalities are not allowed to collect more fees than necessary to fulfill the aim of full cost recovery. Consequentially the revenue from the fees is earmarked and the municipality is not allowed to fund eg. the construction and operation of fountains, swimming pools as well as environmental measures. Beside the upper limitation of the revenues by the total amount of costs, the polluter pays principle implies that the expenses have to be fully, but adequately, allocated to the endusers. Indirectly it follows that the expenses occurring by water and sewerage services shall not be financed by the municipality budget.²⁰³

It is significant that the regulations are aware of the fact that fees can vary around Norway depending on local natural and demographical conditions as well as different investment needs and costs. With respect to the fullcost recovery principle and the polluter pays principle the municipalities have design freedom concerning their fee system. A one-time fee for the connection and an annual water and sewerage charge depending on the consumption of water

¹⁹⁸ See *Sæggrov, Sveinung; et al. (2011): Making urban water networks sustainable – Some examples from Norway, LESAM 2011, p.1.*

¹⁹⁹ See *Statistics Norway (2002): Continued decrease in investment levels.*

²⁰⁰ See *United Nations (UN) Department for Economic and Social Affairs (2004): Freshwater Country Profile – Norway, p.2.*

²⁰¹ *United Nations (UN) Department for Economic and Social Affairs (2004): Freshwater Country Profile – Norway, p.6.*

²⁰² See *United Nations (UN) Department for Economic and Social Affairs (2004): Freshwater Country Profile – Norway, p.6.*

²⁰³ See *Ministry of Environment (1974 last update 2010): LOV 1974-05-31 nr 17, Lov om kommunale vass- og kloakkavgifter ; Ministry of Environment (2000): Reglement T-1157, Lov om kommunale vass- og kloakkavgifter - Forskrift om kommunale vann- og avløpsgebyrer.*

per property (simultaneously, it is assumed that this is also the amount of wastewater) and optionally based on the water meter size, shall ensure that the end user is adequately charged.²⁰⁴ The control and supervision of the municipal administration is the duty of the municipal council, especially the supervisory board is responsible for the supervision. Furthermore, the municipal auditor shall verify that the financial management is done in accordance with current regulations and decisions.²⁰⁵

The Drinking Water Regulations provides that the provider has to pay a fee of 0.05 kroner per cubic meter of produced water, but no more than 2 million kroner per year for the monitoring and control of water supply.²⁰⁶ These costs are included in the water rates. To give an example for the average water and wastewater charges, the following section will present some numbers of the sectors.

region	One-level fee system	Two-level fee system	
	Fixed annual fee	variable portion (per m ³ water used)	fixed portion
Østfold	1,832	8.77	604
Akershus	1,793	8.36	825
Oslo	1,034	6.02	95
Hedmark	2,739	11.02	701
Oppland	2,245	10.81	864
Buskerud	2,283	8.44	468
Vestfold	1,927	6.23	876
Telemark	2,167	6.42	1,301
Aust-Agder	1,894	5.78	1,017
Vest-Agder	1,613	5.98	780
Rogaland	1,764	5.77	845
Hordaland	2,554	8.18	1,633
Sogn og Fjordane	2,549	7.06	1,157
Møre og Romsdal	2,315	6.39	1,460
Sør-Trøndelag	2,671	7.46	1,292
Nord-Trøndelag	2,332	7.69	1,252
Nordland	2,502	7.50	1,524
Troms Romsa	2,241	5.89	1,343
Finnmark Finnmarku	2,338	5.95	1,298

Table 6: Water fees, for private dwellings of 120 m² in NOK (average, by region, time and contents)²⁰⁷

²⁰⁴ See also for further information *Ministry of Environment* (1974 last update 2010): LOV 1974-05-31 nr 17, Lov om kommunale vass- og kloakkavgifter ; *Ministry of Environment* (2000): Reglement T-1157, Lov om kommunale vass- og kloakkavgifter - Forskrift om kommunale vann- og avløpsgebyrer.

²⁰⁵ See *Ministry of Environment* (2000): Reglement T-1157, Lov om kommunale vass- og kloakkavgifter - Forskrift om kommunale vann- og avløpsgebyrer.

²⁰⁶ See *Helse- og omsorgsdepartementet* (2001): Forskrift om vannforsyning og drikkevann (Drikkevannsforskriften, FOR-2001-12-04-1372), §16.

²⁰⁷ Statistics Norway (2007): Water fees for a private dwelling of 120 m² (NOK) average, by region, time and contents.

The average annual water charges for 2007 were published by Statistics Norway. The calculations differ between 3 types of tariffs. The *fixed annual fee*, the *two-level fee system* consisting of an fixed portion and a variable portion per m³ water used and the *payment by water used* consisting of a charged minimum use and a variable portion per m³ water used provide application in Norway. The average data was collected for 20 regions in Norway and assumes a private dwelling of 120 m². The results for the first two tariff types are represented in the table 6.

Furthermore, the following figure presents the variation in annual water supply fees shown as proportion of municipalities and population in different price classes.

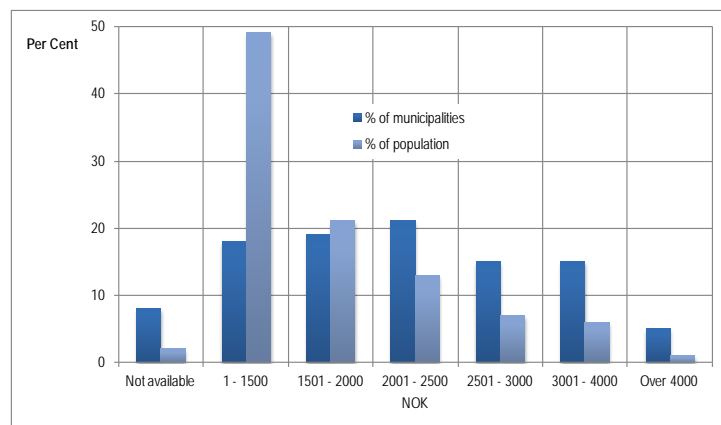


Figure 31: Variation in annual water supply fees shown as proportion of municipalities and population in different price classes (2008)²⁰⁸

It is striking that the average water charges vary significantly over the country. Especially the highly variable portions of fixed and volume fees is worthy of remark. Furthermore, figure 31 shows that 71 % of the country’s population lives in municipalities with average annual water supply fees less than 2000 NOK, “[...] which illustrates the fact that annual fees are lower in the larger municipalities.”²⁰⁹ Nevertheless, comparing water fees is not simple. “Local conditions such as patterns of built-up areas, topography, bedrocks in the ground, the need for pumping stations and treatment requirements are factors behind the variation in fees.”²¹⁰ But waterpricing is worse a discussion, because local conditions shall not overshadow potential ineffectiveness.

²⁰⁸ Statistics Norway (2009): Natural Resources and the Environment 2008.Norway, p.122.

²⁰⁹ Statistics Norway (2009): Natural Resources and the Environment 2008.Norway, p.122.

²¹⁰ Statistics Norway (2010): 59 per cent of the population connected to high-grade treatment.

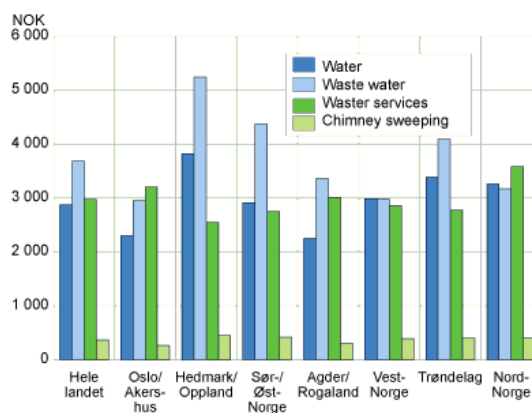


Figure 32: Municipal residential charges in 2011²¹¹

Figure 32 shows the municipal residential charges in 2011. While an average private household with a water consumption of 175 m³ has to pay about 3800 NOK in Hedmark/Oppland, the water charges amount only around 2200 NOK in Oslo/Akershus. Assuming ‘water in’ is ‘water out’, the same household has to pay about 5100 NOK for wastewater services in Hedmark/Oppland, while the waste water charges amount only around 3000 NOK in Oslo/Akershus.²¹²

It is alarming that in the wastewater sector currently 47 % of the *population* is served by municipalities, which cover less than 100 % of the total costs. In fact only 66 % of the *municipalities* cover their costs fully.²¹³ “There is room to better link water and wastewater tariffs to the use of water so as to contribute cost recovery and expand and improve water supply and sanitation infrastructure.”²¹⁴ Increasing fees of around 4.9 % for water services and 4.3 % for wastewater services from 2010 to 2011²¹⁵ might be an indicator for change, but does not automatically mean more effectiveness and cost recovery.

C5) Reputation of the Water Utility

The performance of the water utility is measured first and foremost by the water quality and the supply security, which means especially a lowest possible interruption frequency. In Norway the water “[...] supply is more than adequate for domestic, agricultural and industrial uses in almost all parts of the country and at all times.”²¹⁶ Among the inhabitants, which were connected to municipal water works in 2010, 96 % were provided with drinking water with satisfactory content of thermo tolerant intestinal bacteria (*E. Coli*), 93 % with water with adequate levels of acidity (pH) and 79 % with tap water of acceptable colour.²¹⁷ “A number of water works using surface water as their source are finding it hard to comply with the requirements with respect to

²¹¹ *Statistics Norway* (2011): Municipal fees up 5.9 per cent.

²¹² See *Statistics Norway* (2011): Municipal fees up 5.9 per cent.

²¹³ See *Statistics Norway* (2011): 107 kg cadmium from municipal wastewater.

²¹⁴ *OECD* (2011): *OECD Environmental Performance Reviews: Norway 2011*, p.71.

²¹⁵ See *Statistics Norway* (2011): Municipal fees up 5.9 per cent.

²¹⁶ *United Nations (UN) Department for Economic and Social Affairs* (2004): *Freshwater Country Profile – Norway*, p.4.

²¹⁷ See *Statistics Norway* (2011): 212 litres a day per person.

thermo-tolerant coliform bacteria in water. “²¹⁸ In 2006 over the whole country 576 waterworks supplied 3,466,562 people by lake water, the number of people supplied by the 352 river water works amounted to 349,088 and 560 water works collected groundwater and supplied 412,904 people. The first numbers includes 445 people served by treated seawater. This data implies that desalination plays a minor role in Norway, whereas most people are served by treated surface water. Even though the drinking water regulations require the disinfection and thoroughly treatment of row water, some water works, especially the small ones, are not doing it in an sufficient manner, which can cause at worst illness. But also the capital Oslo, which has to face the difficulties of a very old net work, had incidents in the past. In 2007 the inhabitants had to boil their water before use, which means a significant limitation in everyday life. Nevertheless, most people in Norway are served by drinking water of good quality.”²¹⁹

The number of service interruptions in Norway is not satisfying. For example the “key number for wastewater networks is in average 100 service interruptions pr. 1000 km length.”²²⁰ As mentioned in section C1 the aging infrastructure of both the water and the wastewater network is alarming and is one main reason for supply interruptions, incidents and leakage. Leakage causes costs, which the end user has to pay for. Therefore the reduction of leakage is also in the interest of the Norwegian population. As customer satisfaction is also directly bound to the water quality and the supply security, Norway has considerable additional scope for the further expansion. The sustainability of the water utilities’ services should be in focus making further developments and investment decisions.

²¹⁸ *Statistics Norway* (2009): Natural Resources and the Environment 2008.Norway, p.118.

²¹⁹ See *Statistics Norway* (2009): Natural Resources and the Environment 2008.Norway, p.113, p.120.

²²⁰ *Sægrov, Sveinung: et al.* (2011): Making urban water networks sustainable – Some examples from Norway, LESAM 2011, p.1.

3.2.2 Germany

In Germany the technical development of the water supply and wastewater removal sector is very positive. The status quo of the systems as well as the drinking water quality are at a good level. Therefore discussions of the sectors' actors focus more and more on the economic performance.

A) Country specific Characteristics and Challenges

The Federal Republic of Germany is located in Central Europe. Its area amounts to 357,125 km².²²¹ Germany has land frontiers to 9 countries, more precisely, to Austria (815 km), Czech Republic (811 km), the Netherlands (567 km), France (448 km), Poland (442 km), Switzerland (316 km), Belgium (156 km), Luxembourg (135 km) and the smallest one to Denmark with 67 km. Furthermore, parts of the north of Germany are limited by the Baltic Sea and the North Sea. Accordingly, several islands belong to Germany.

Germany is geographical diversified. While the north can be described as rather flat, there are low mountain ranges in the interior of the country. Moreover, parts of the Alps belong to the south of Germany. The highest German mountain Zugspitze amounts to 2,962 meter. The flow systems of the largest German rivers Rhein (865 km), Elbe (700 km), Donau (647 km), Weser (440) and Ems (371 km) have the major hydrological influence. The biggest natural lake is the *Bodensee* with around 535.9 km². The Bodensee is located at the border triangle with Austria and Switzerland in the south of Germany. Beside of many natural lakes, Germany has numerous artificial lakes of which the biggest one (Bleiloch) has a capacity of 215 million m³ water.²²² The fact that only 2.7 % of the available water resources are used for public water supply indicates extensive water reserves.²²³ Looking at the evolution of the precipitation in Germany (figure 33), one notices a relatively stable average amount of precipitation with around 800 mm per year. The German Weather Service predicts also sufficient future rainfall of around 800 liters per m².

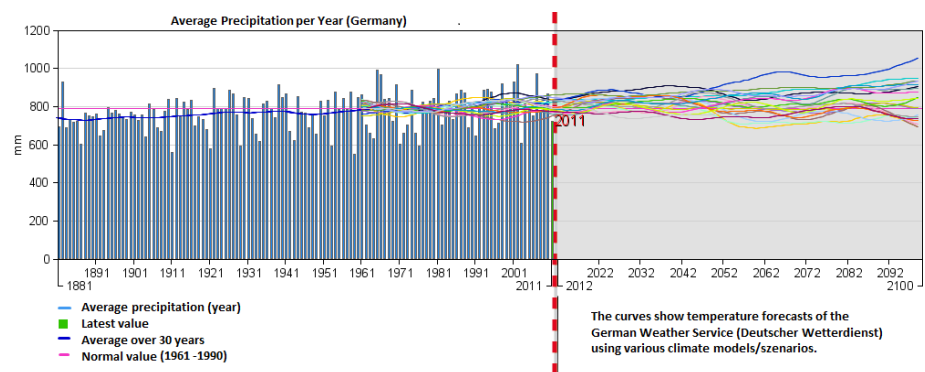


Figure 33: Development of the average precipitation in Germany²²⁴

²²¹ See *Umweltbundesamt* (2011): Struktur der Flächennutzung.

²²² See *Statistisches Bundesamt* (2011): Statistisches Jahrbuch 2011 – Bundesrepublik Deutschland, pp. 20-25.

²²³ See *Bundesverband der Energie- und Wasserwirtschaft (BDEW)* (2011): Wasserfakten im Überblick, p.1.

²²⁴ See *Deutscher Wetterdienst* (2011): KlimaAtlas Deutschland – Lufttemperatur Kalenderjahr.

Beside of precipitation during all seasons, the German climate is characterized by moderate temperatures and frequent weather change.²²⁵ Figure 34 shows the development of the annual average temperature in Germany as well as forecasts of the German Weather Service until 2100 under consideration of different climate models respectively scenarios. It is significant that all scenarios indicate a climate change. Increasing temperatures by the world wide discussed climate change will also affect Germany.

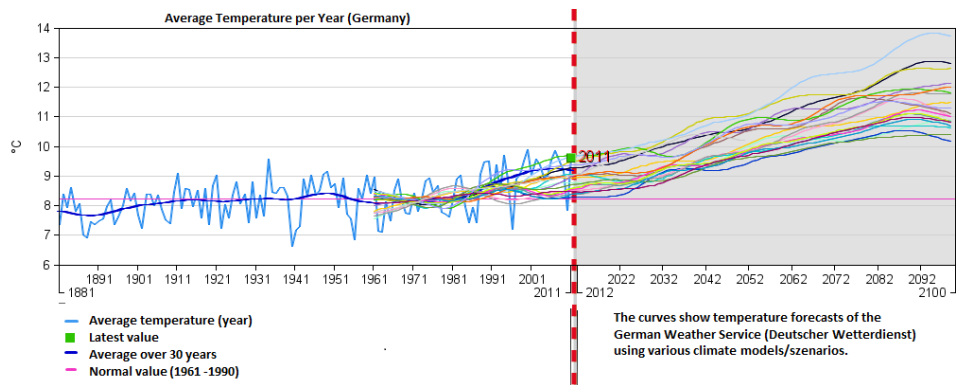


Figure 34: Development of the average temperature in Germany²²⁶

Apart from the climate change, the demographical change will also affect Germany. Whilst the population was around 82 million in 2008, future forecasts show an estimated decrease of around 4.6 million people until 2030.²²⁷ Especially in sectors with scarce assets and capacities, like in the water industry, strongly declining consumer numbers are alarming. Moreover, the aging population becomes more and more a challenge for the wastewater treatment, because of drug residues in the wastewater.²²⁸

B) Regulatory Framework

The current legal basis for the water supply and wastewater removal in Germany is first and foremost the Water Resources Act (Wasserhaushaltsgesetz - WHG) of 2009. The law makes requirements concerning water management for all resources: surface water, ground water and marine water. Furthermore, the WHG includes regulations concerning flood protection, water body development, water supervision and fines. In addition to these themes, the law also deals with specific regulations concerning the water supply and wastewater removal. The most important issues are listed below.²²⁹

Sewage shall be removed reasonable, so that public welfare is not compromised. Furthermore, the legal entities of public law, which are required under state law, are responsible for the wastewater removal. However, the liable entities are allowed to transfer the wastewater obligations to third parties. Anyone who operates a wastewater system is required to prepare its

²²⁵ See *Statistisches Bundesamt* (2011) *Statistisches Jahrbuch 2011 – Bundesrepublik Deutschland*, p.20.

²²⁶ See *Deutscher Wetterdienst* (2011): *KlimaAtlas Deutschland – Niederschlag Kalenderjahr*.

²²⁷ See *Statistische Ämter des Bundes und der Länder* (2011): *Demografischer Wandel in Deutschland*, p.21.

²²⁸ See *Bundesverband der Energie- und Wasserwirtschaft (BDEW)* (2011): *Profile of the German Water Sector – 2011*, p. 41.

²²⁹ See *Wasserhaushaltsgesetz (WHG)* (2009): *Gesetz zur Ordnung des Wasserhaushalts vom 31. Juli 2009 (BGBl. I S.2585)*.

state, its ability to function and its conversation. Furthermore, the service provider has to monitor its operation and the type and quantity of sewage content himself. The entity has the obligation to record and store the relevant information and upon request to provide them to the competent authority.²³⁰

Since 2009 the water supply is *officially* a service of general interest (Daseinsvorsorge), which emphasizes its great importance and essentiality. The whole population depends on an adequate water supply. For this reason the water suppliers are forced by the requirements of the WHG to manage the resource water and to inform the end-consumer on water saving opportunities carefully. Furthermore, the water demand shall be covered primarily by local, close water resources, if the effort is reasonable and acceptable.²³¹ Thereby no region shall be disproportionately affected to serve an area-wide water conservation.²³²

The hygienic requirements for the provided drinking water are regulated by the drinking water regulations (Trinkwasserverordnung). Those, in Germany very high requirements, are checked by the health department. In case of inadequate drinking water quality, the health department initiates further action. Optionally, fines will be imposed or even the interruption of supply will be arranged.²³³ Analogously, all requirements concerning wastewater are embedded in the wastewater regulations (Abwasserverordnung).

Beside of environmental and health regulations the water services also underlay structural requirements. In § 28 of the Basic Law (Grundgesetz) is defined that the municipalities have the right to regulate all affairs of the local community on their own responsibility. Of course they have to take account of the current legislation.²³⁴ But the right of self-governing the water supply as part of the municipal public duty does not mean that it has to be fulfilled directly by the municipalities. Unless state law provisions do not prevent this possibility, the municipalities are allowed to transfer tasks to third, private entities or make use of cross-municipality solutions.²³⁵ Further regulations concerning organizational questions are made on state level by the State Water Laws (Landeswassergesetze). The structure of the German water market will be part of the next section.

The leading organizations in the field of water and wastewater are the Federal Association of Energy and Water (Bundesverband der Energie- und Wasserwirtschaft - BDEW) and the German Association for Gas and Water (Deutscher Verein des Gas- und Wasserfaches - DVGW). Both are very active in the sectors and publish relevant, recognized contributions. In tendency the BDEW focuses more on economic issues, whereas the DVGW sets its priorities more on the technical challenges of the sectors.

²³⁰ See *Wasserhaushaltsgesetz (WHG) (2009)*: § 54 – 61.

²³¹ See *Wasserhaushaltsgesetz (WHG) (2009)*: § 50.

²³² See *Lotze, Andreas; Reinhardt, Michael (2009)*: Die kartellrechtliche Missbrauchskontrolle bei Wasserpreisen, p.3277.

²³³ *Trinkwasserverordnung (2001)*: Abs.1, § 9, Abs.5, § 18 und Abs.7, § 24.

²³⁴ See *Grundgesetz für die Bundesrepublik Deutschland (GG) (1949)*: §28.

²³⁵ See *Ewers, Hans-Jürgen; et al. (2001)*: Optionen, Chancen und Rahmenbedingungen einer Marköffnung für eine nachhaltige Wasserversorgung, p.17.

A general regulatory authority does not exist in the German water industry. Nevertheless, economic issues like water pricing are regulated ex post in case of the suspicion that the monopoly has been exploited. Depending on the organizational form, various regulatory authorities can take action, which is considered more detailed in the report section Finance.

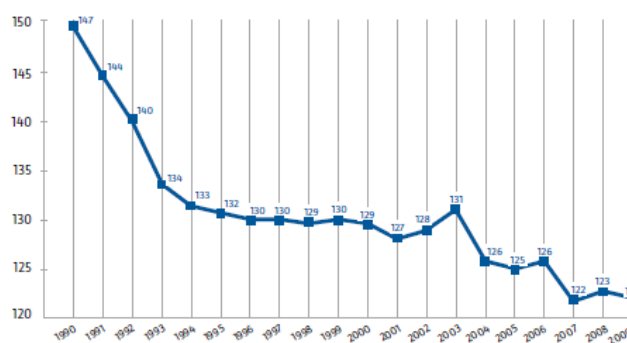
C) The Water Market

The German water market is characterized by a divided, small structure. Many water supplier and wastewater service provider are responsible in the sectors. Since the technical level of the sectors can be described as good, the discussions focus more and more on economic questions. High price differences over the country raise questions about injustice and the sectors' cost efficiency.

C1) Dimension

As aforementioned, Germany has got extensive water resources, but only 2.7 % of them are used. In 2009 around 5,016 million m³ water was produced. 61.5 % of the used water was ground water, 30.3 % surface water and only 8.2 % swelling water. Therefore, the groundwater recharge is a relevant issue in Germany. In comparison to 1990 the amount of the total treated water indicates a decrease of around 1,750 million m³ respectively 26 %.²³⁶

In total the drinking water supply in Germany is organized by 6,211 companies. These companies provide 99 % of the German population via an approximately 530,000 km long net work.²³⁷ Similar to the overall German trend, the water consumption per capita is also declining, although previous forecasts were assuming rising water consumptions. The development is presented in figure 35. With a current water use of 122 liters per person and day, it indicates a significant reduction.



Source: BDEW Water Statistics, related to households and small trades, p – provisional

Figure 35: Development of the per-capita water consumption in Germany (in litres per person and day)²³⁸

²³⁶ See BDEW (2011): Wasserfakten im Überblick, p.2.

²³⁷ See BDEW (2011): Profile of the German Water Sector – 2011, pp.34, 52.

²³⁸ BDEW (2011): Profile of the German Water Sector – 2011, p.39.

The security of supply can be described as good. “Long, frequent service interruptions of water supply are unknown in Germany. This is due to the high technical standards and the excellent condition of plants and networks in comparison with other European countries. German water supply utilities have by far the lowest water losses.”²³⁹ More precisely, in Germany there are water losses of around 6,5 %. Accordingly, the rate of main failures has decreased during the last decade. Whilst in the period of 1997 – 2004 11,7 damages occurred per 100 km net work length, the number of main failures only amounted to 9,9 per 100 km between 2005 and 2009. Nevertheless, Benchmarking projects in different German states identify verifying renewal rates from 0.4 to 1.2 %.²⁴⁰ The renewal rates are very important in terms of sustainability. It is great to achieve good technical and qualitative standards, but the sector has also to ensure the future viability of the net work. This fact similarly applies to the sewage network.

The current sewage connection rate amounts to 96.1 % in Germany. 95 % of the population is connected to wastewater treatment plants using highest technical EU standards. The wastewater piping system is estimated to amount to 187,264 km, the storm water piping system 114,373 km and the combined water system is around 239,086 km long. The detailed connection situation can be seen in figure 36.²⁴¹

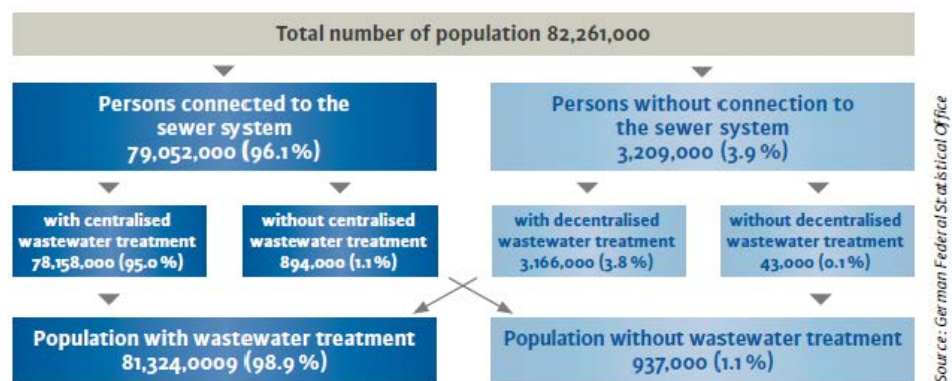


Figure 36: Wastewater connection in Germany in 2007²⁴²

Considering the age structure of the German sewer net work in figure 37, it is striking that around 70 % of the pipes are younger than 50 years. Nevertheless, parts of the main system are much older. Thus ensuring a sustainable maintenance, investments are necessary.

²³⁹ BDEW (2011): Profile of the German Water Sector – 2011, p.48.

²⁴⁰ See BDEW (2011): Profile of the German Water Sector – 2011, pp.56-57.

²⁴¹ See BDEW (2011): Profile of the German Water Sector – 2011, pp.52-54.

²⁴² BDEW (2011): Profile of the German Water Sector – 2011, p.54.

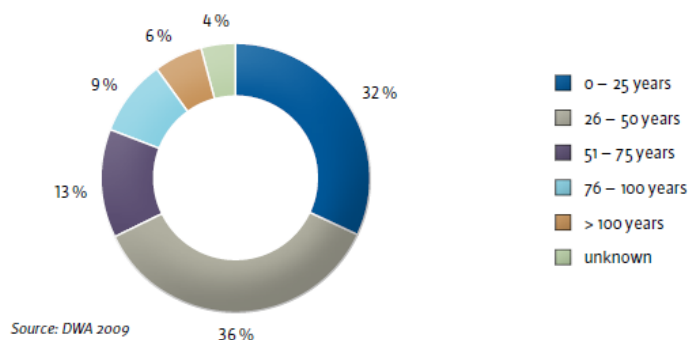


Figure 37: Age pattern in the sewer network²⁴³

C2) Structure

On account of the legal framework in Germany, the municipalities have the option to fulfil the tasks of general interest themselves or in collaboration with third parties. This collaboration has got different possible configurations. The common management models can grossly be divided in models under private and public law.

The public forms of organisation are mainly:

- Ancillary municipal utilities (Regiebetrieb)
- Owner-operated municipal utilities (Eigenbetrieb)
- Institution under public law (Anstalt des öffentlichen Rechts)
- Special purpose association (Zweckverband)
- Water and soil association (Boden- und Wasserverband)

The Regiebetrieb is fully embedded in the municipality. It is legally and organisationally dependent and does not have a separated accounting, so that surpluses are allocated to the General Fund. The Eigenbetrieb is also legally dependent, but organisationally and financially independent of the municipality. Therefore losses and profits are earmarked. The organisation of water supply as an institution under public law offers the strongest independence of the community. It is organizationally, financially and legally independent. Intermunicipal cooperation is possible via different association forms (Zweckverband/Boden- und Wasserverband).²⁴⁴

Moreover, different private models exist in the German water market, from mixed public-private companies to autonomous private companies. Especially concessions play a major role in public-private-partnerships. In the following the ownership structure of the drinking water and the wastewater sector as well as its development shall be presented.

²⁴³ BDEW (2011): Profile of the German Water Sector – 2011, p.68.

²⁴⁴ See Cronaue, Ulrich (2003): Kommunale Unternehmen: Eigenbetrieb – Kapitalgesellschaften – Zweckverbände, margin numbers: 30, 33, 114-119, 225 -236; Dierkes, Mathias; Hamann, Rolf (2009): Öffentliches Preisrecht in der Wasserwirtschaft, pp.169.

As mentioned before, the total drinking water supply in Germany is organised by 6,211 companies. The BDEW has evaluated detailed characteristics of around 1,218 companies, which present 75 % of the total produced water, ensuring the representativeness of the results concerning the structure of the German water market. This analysis shows that in 1993 the water output of public and private suppliers was nearly the same, whereas the number of public water supply utilities was significant higher. This confirms the assumption that private players act primarily in densely populated areas. Comparing the numbers of 1993 to the results of 2008, privatization is a discernible trend in the German drinking water sector.

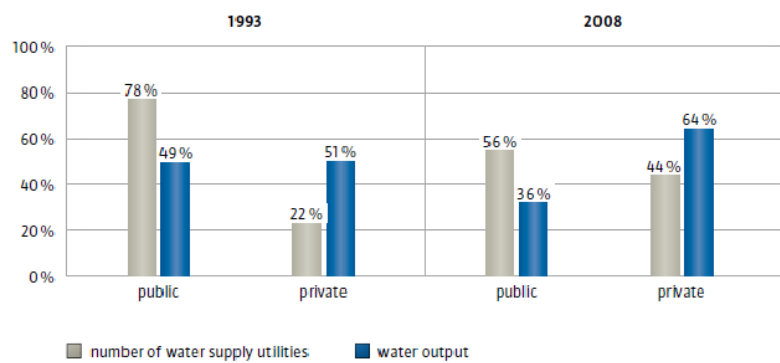


Figure 38: Development of the types of enterprise in the public water supply (under public/private law)²⁴⁵

The detailed ownership structure in the German water market is represented in figure 39. Under consideration of the water output, mixed public-private companies dominate the market with 26 %, followed by special purpose associations (17 %) and other private-law utilities (16 %). Ancillary municipal utilities play with 1 % of the total water output almost no role in the drinking water sector.

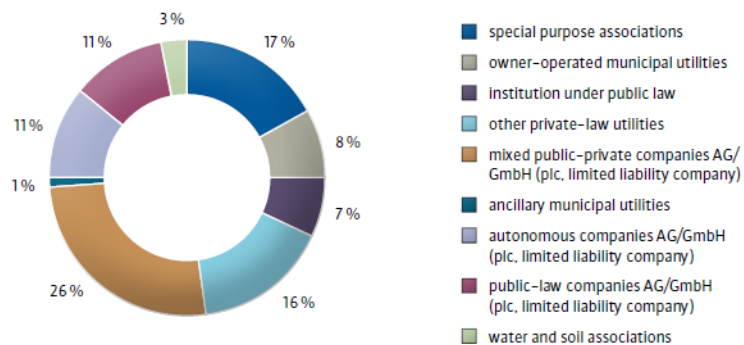
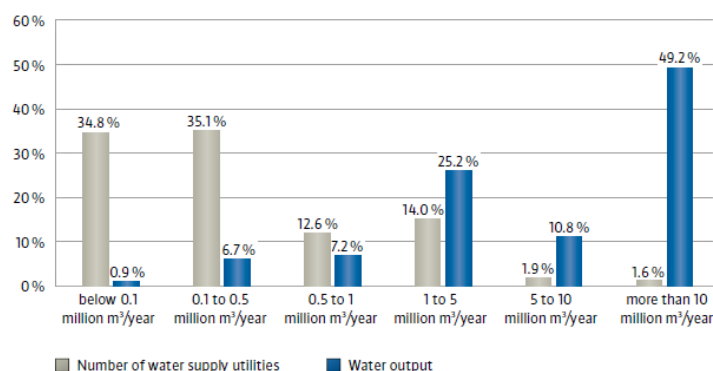


Figure 39: Types of enterprise in the public water supply 2008 (Shares related to water output)²⁴⁶

²⁴⁵ BDEW (2011): Profile of the German Water Sector – 2011, p.34.

²⁴⁶ BDEW (2011): Profile of the German Water Sector – 2011, p.35.

Beside of the ownership structure also the size structure in the German water market is of great interest. Figure 40 shows that less than 4 % of the total number of water utilities provide 60 % of the total water output in Germany. Furthermore, it indicates that around 70 % of the water utilities can be described as small. Each one has a water output of less than 0.5 million m³ per year. The total number of 6,211 water utilities combined with the results of figure 40 underline the small structure of the drinking water market as well as its diversity. The largest German (end-user) water supply companies are Gelsenwasser, Berliner Wasserbetriebe, Stadtwerke München and Hamburg Wasser.



Source: German Federal Statistical Office, Fachserie 19, Reihe 2.1, Heft 2007 (published in 09/2009)

Figure 40: Size structure of water supply utilities in Germany 2007 (Shares as percent)²⁴⁷

In contrary to the drinking water sector almost every wastewater utility acts under public law. Private participation plays only a subordinate role in the wastewater sector. As presented in figure 41, the most common organisational form is the owner-operated municipal utility (37 %), followed by different intermunicipal associations (28 %).

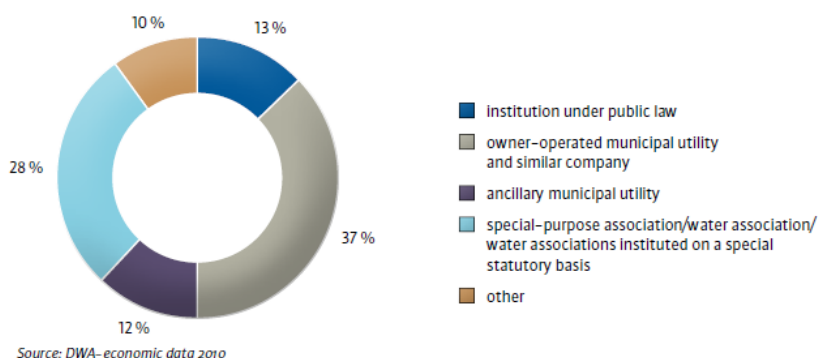
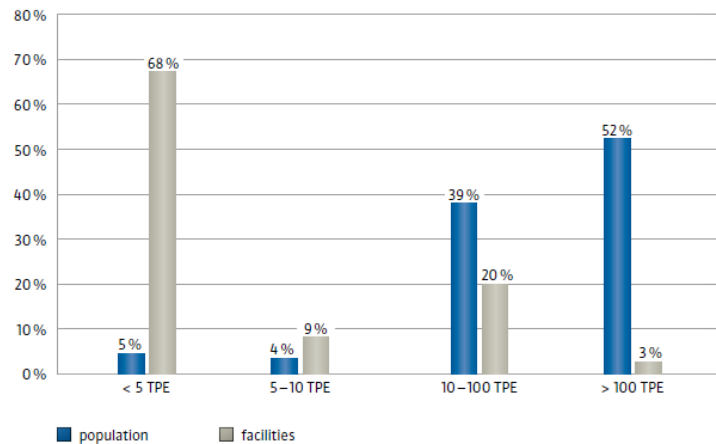


Figure 41: Organisational form of wastewater disposal (weighted according to the population connected to the sewerage system)²⁴⁸

²⁴⁷ BDEW (2011): Profile of the German Water Sector – 2011, p.36.

²⁴⁸ BDEW (2011): Profile of the German Water Sector – 2011, p.35.

The size structure of the German wastewater market is illustrated in figure 42. The effects are similar to the ones in the drinking water sector. A few large providers take care of the wastewater services in metropolitan areas.



Source: German Federal Statistical Office, Fachserie 19, Reihe 2.1, Heft 2007 (published in 09/2009)

Figure 42: Size structure of wastewater treatment facility operators 2007²⁴⁹

C3) Intensity of Competition

The legal requirements concerning a local, close removal of water favors a fragmented water supply in Germany. Moreover, due to the natural monopoly there is a lack of competition *in* the German water market. For physical and economic reasons, only one local water utility can prevail. The municipalities' opportunity to tender the water supply or parts of it, can help to force more competition *for* the market. Private companies can make offers e.g. for management services. The municipality can choose the company with the best offer, which increases the pressure on the companies to compete in questions of expertise, efficiency and prices. This process creates a kind of limited competition *for* the market. Nonetheless, the contracts are typically long-term, so that this form of competition is restricted to the time of the tender.

The aforementioned competition *via comparison* is also of interest for the German water market. Different benchmarking projects, efficiency analysis as well as price comparisons are omnipresent in the German water industry. The publication of current data and evaluation results informs the end-user about opportunities, simultaneously increasing the pressure on the providers to operate more efficiently. Customers' education and sensibility for water and wastewater related questions is necessary to foster the end-users influence on the performances. Competition *via comparison* should be further intensified, because it is a kind of competition, which is not hindered by the regulatory, legal framework.

²⁴⁹ TPE = thousand total number of inhabitants and population equivalents, BDEW (2011): Profile of the German Water Sector – 2011, p.37.

C4) Finance

To ensure the sustainability of the water supply and the wastewater removal for the future, further investments are indispensable. This also applies to Germany, if the service level should be kept. Main target is to make continuous investments and thereby to avoid unplanned high expenditures and related price increases. The investments of the water supply and wastewater removal industry amounted around 110 billion Euros since the German reunification.²⁵⁰ The development of the capital expenditures in both sectors is shown in the following figures.

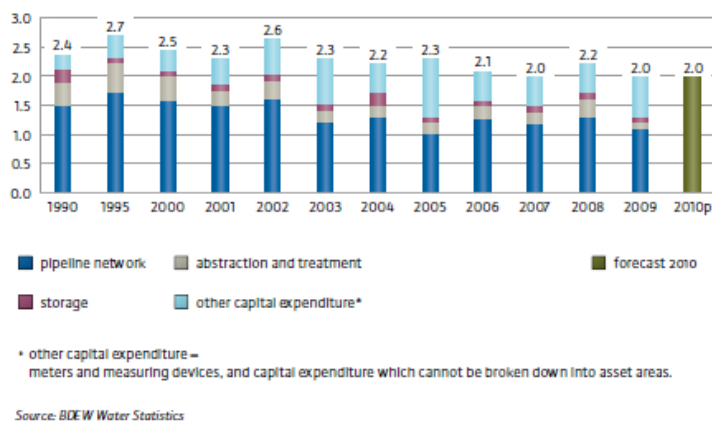


Figure 43: Development of capital expenditure in public water supply from 1990 to 2010 (according to asset areas, in billion Euros)²⁵¹

During the last years the capital expenditure level has been relative constantly with around 2 billion Euros. It is striking that the bulk of investments flows in the pipeline network, whereas the investments in abstraction and treatment are decreasing.

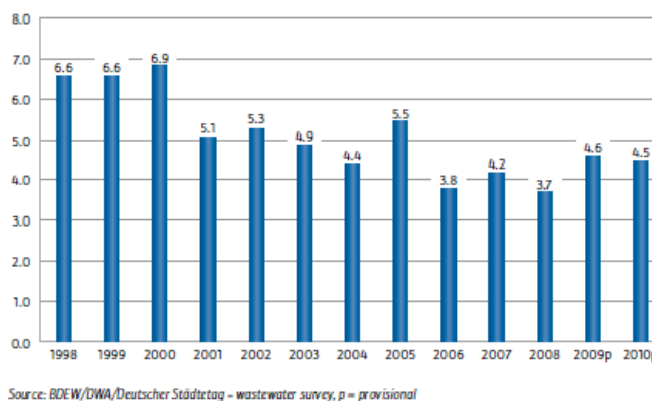


Figure 44: Development of capital expenditure in public wastewater supply from 1998 to 2010 (in billion Euros)²⁵²

²⁵⁰ See BDEW (2011): Profile of the German Water Sector – 2011, p.75.

²⁵¹ BDEW (2011): Profile of the German Water Sector – 2011, p.76.

²⁵² BDEW (2011): Profile of the German Water Sector – 2011, p.77.

The development in the wastewater sector is characterized by a less homogeneous trend. As illustrated in figure 44, the capital expenditures have decreased significantly after 2000. This is due to the fact that capital investments related to the implementation of the EC Directive on Urban Wastewater Treatment were phased-out. Comparing figures 43 and 44 it is conspicuous that the capital expenditures in the wastewater sector are more than twice as large. Of this high investment volume around 56 % flows in planning and construction services and 44 % in plant operation.²⁵³

Subsidies play a minor respectively no role in the German water supply. The more important issue is a cost-covering price structure. Depending on the company's legal form, the water pricing is influenced by different frameworks. Whilst requirements for charges of companies under public law are made in the Municipal Charges Acts (Kommunalabgabengesetze - KAG) of the states, water prices of companies under private law are not subject to specific regulations.²⁵⁴ “However, according to the rulings of the German Federal Supreme Court, the principles applied to the calculation of charges are to be applied in the same way to the calculation of prices.”²⁵⁵ The main obligations and principles are:²⁵⁶

- Principle of equivalence (proportionality)
- Principle of cost recovery
- Prohibition of cost overrun
- Principle of equality or equal treatment
- Economic principles

Whilst the first obligations are self-explanatory, the economic principles may include the principle of preservation of net real-asset values or the principle of real capital preservation.

In the following figure the supervisory and control of prices and charges is illustrated. It remains to emphasize, that the participation of private companies does not automatically leads to the collection of prices.²⁵⁷ The decisive factor is the legal form of the charging company. As presented in figure 45, companies under public law can choose between charges and prices, whereas companies under private law are bound to prices.

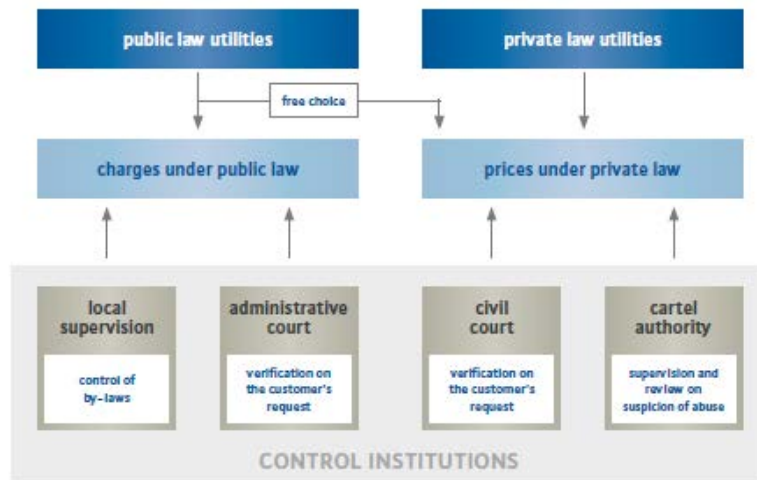
²⁵³ See *BDEW* (2011): Profile of the German Water Sector – 2011, p.76.

²⁵⁴ See *Reif, Thomas* (2002): Preiskalkulation privater Wasserversorgungsunternehmen, p.52.

²⁵⁵ *BDEW* (2011): Profile of the German Water Sector – 2011, p.23.

²⁵⁶ See *BDEW* (2011): Profile of the German Water Sector – 2011, p.23.

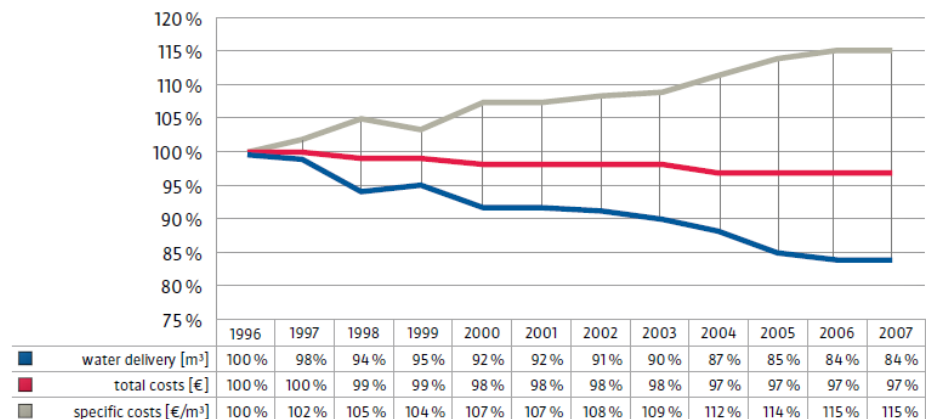
²⁵⁷ See *Reif, Thomas* (2002): Preiskalkulation privater Wasserversorgungsunternehmen, p.53.



Source: VKU

Figure 45: Control of prices and charges²⁵⁸

In the German drinking water supply sector dominates the two-part tariff model. Whilst the companies have to face extremely high fixed costs with around 80 %, the fixed proportion of the tariffs is with around 10 – 20 % very small.²⁵⁹ In times of declining water consumption, this difference between the companies' cost and revenue structure forces a cost coverage gap. The following figure illustrates the problem of decreasing water deliveries on total and specific costs.



Source: VKU-expert's report Holländer et al., 2009

Figure 46: Effects of decreasing water deliveries on total and specific costs (Relative evolution over time)²⁶⁰

²⁵⁸ BDEW (2011): Profile of the German Water Sector – 2011, p.24.

²⁵⁹ See *Verband kommunaler Unternehmen* (2010): Wasserpreise – Hintergrundinformationen zur Wasserpreisbildung, p.2; *Merkel, Wolfgang* (2009): Wasser- und Abwasserwirtschaft: Sicherheit und Qualität bestimmen den Preis, nicht umgekehrt, p.78; *Umweltbundesamt* (1998): Vergleich der Trinkwasserpreise im europäischen Rahmen, p.51.

²⁶⁰ BDEW (2011): Profile of the German Water Sector – 2011, p.43.

Therefore discussions concerning tariff adjustments are increasing in Germany. These adjustments are necessary on the one hand to ensure a sustainable cost recovery and on the other hand to meet the principle of equality or equal treatment. Otherwise, high usage consumers would pay the fixed costs for low usage consumers.

Currently the water prices strongly differ over the country. In part, differences up to 586 % were observed.²⁶¹ This situation raises questions about price fairness among the population. Although price comparisons are not easy, because different local circumstances occur various costs, the cartel authority of the state Hessen has recently imposed requirements to lower the water prices. To avoid the decision, the affected company under private law has decided afterwards to act under public law in the future. This also offers a basis for discussion in the population as well as in the water sector.

The prices for drinking water include a reduced value added tax of 7 % (normal 19 %) and depending on state law a water abstraction levy. These water abstraction levies verify between 0 and 31 Cent per m³ abstracted water. Furthermore, the revenues from the water abstraction levies do not have a tied purpose in every state.²⁶²

In 2010 the average water price for households amounted to 1.91 Euro per m³, which already includes the share of the fixed price component.²⁶³ Considering the current daily water consumption of around 122 liter, this implies average annual water costs of around 85 Euros per person.²⁶⁴ The Development of per capita expenditure on drinking water compared to the inflation is illustrated in figure 47. The expenditures are relatively homogenous over the last decade and constantly lie under the inflation rate.

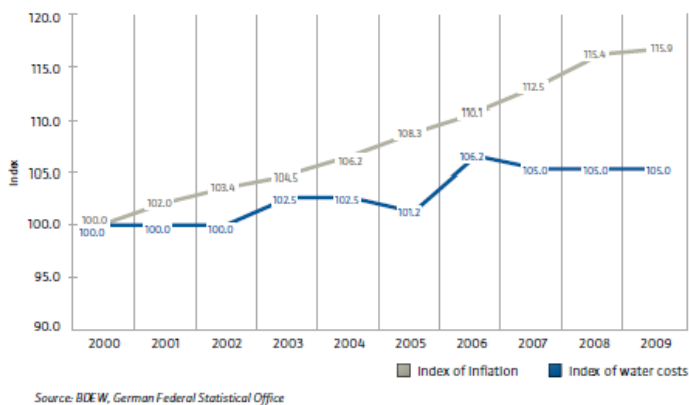


Figure 47: Development of per capita expenditure on drinking water compared to the inflation (Index year 2000 = 100)²⁶⁵

²⁶¹ See Hirschhausen, Christian von; et al. (2010): Wasser: Ökonomie und Management einer Schlüsselressource, p.76.

²⁶² See for detailed information BDEW (2011): Profile of the German Water Sector – 2011, pp.27-28.

²⁶³ See BDEW (2011): Wasserfakten im Überblick, p.5.

²⁶⁴ Own estimation based on the calculation $((122 \cdot 365) / 1000) \cdot 1,91 = 85,0523$.

²⁶⁵ BDEW (2011): Profile of the German Water Sector – 2011, p.74.

The taxation of wastewater services is more differentiated. “Public wastewater disposal utilities as sovereign undertakings are exempt from corporate income and turnover tax. If a utility responsible for wastewater disposal uses a private third party to discharge this obligation, the latter is subject to the full turnover tax rate with the possibility of input tax deduction”.²⁶⁶ Similar to the water abstraction levy, the utilities have to pay a wastewater tax to the respective state and pass these additional costs directly to the end-consumer. In 2008 the revenues of the wastewater tax amounted to 254.05 million Euros.²⁶⁷

The average price per m³ wastewater (according to the freshwater scale) was around 2.28 Euros in 2005. Furthermore, many utilities divide the according scale into stormwater and sewage. In this cases, the average prices evaluated in 2005 amounted to 2.05 (sewage) and 0.88 Euros (stormwater).²⁶⁸ Thus in Germany the average wastewater charges are higher than the charges in the drinking water sector. The development of per capita expenditure on wastewater compared to the inflation is illustrated in figure 48. In contrary to the drinking water expenditures, the wastewater expenditures have increased significantly, but despite the increase, they still lie under the inflation rate.

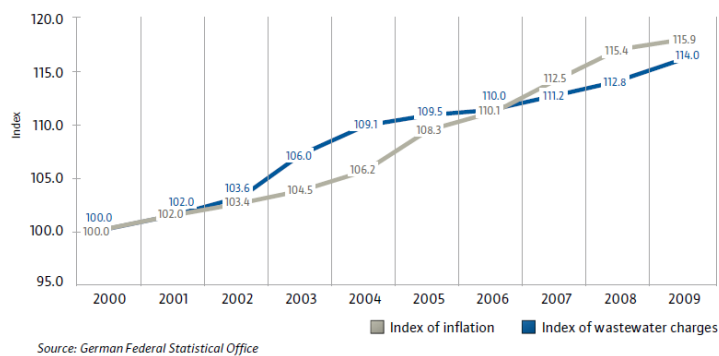


Figure 48: Development of per capita expenditure on wastewater compared to the inflation (Index year 2000 = 100)²⁶⁹

C5) Reputation of the Water Utility

Beside of the aforementioned good supply security characterised by marginally service interruptions, the drinking water quality is a main indicator for customer satisfaction. The recently published report by the Federal Ministry of Health (Bundesministerium für Gesundheit) certifies Germany very good drinking water quality. The evaluation was focused on the drinking water of water plants, which were obliged to report. In particular, those facilities that emit (including the associated piping network and installation of drinking water) on average more than 1,000 cubic meters of water per day respectively were serving more than 5,000 people. The drinking water from those facilities had a good to very good quality in 2010. Under the

²⁶⁶ BDEW (2011): Profile of the German Water Sector – 2011, p.29.

²⁶⁷ See N.N. (2011): Umfassende Wassernutzungsabgabe statt Abwasserabgabe und Entnahmeentgelt?, p.32.

²⁶⁸ See Bundesverband der deutschen Gas- und Wasserwirtschaft (BGW): Deutschen Vereinigung für Wasserwirtschaft, Abwasser und Abfall (DWA) (2008): Wirtschaftsdaten der Abwasserentsorgung, pp. 2-3.

²⁶⁹ BDEW (2011): Profile of the German Water Sector – 2011, p.74

supervision conducted measurements show, that most microbiological and chemical quality requirements are met. In particular, over 99% of the requirements and limits are not exceeded.²⁷⁰ The results of the report were also considered and appreciated in the daily press in January 2012. This emphasizes the importance in society. Nevertheless, studies show that although all residents are drinking water consumers, not all end-consumers are adequately informed and interested.

Concerning the reputation of the water utility, the main initiatives are the customer barometer (Kundenbarometer) and the customer balance (Kundenbilanz) of the BDEW. Whilst the first mentioned initiative shows the customer view respectively the customer satisfaction on the drinking water supply via questionnaires, the second initiative addresses the water supplier and wastewater provider to pursue the target of more transparency. The consumers' awareness for costs as well as performances shall be fostered. The success of this project will hopefully be seen in several years. However, in the following the main results of the customer barometer will be presented. Even if results would be desirable, which are based on more than 1000 samples, there still can be derived a tendency.

The fact that around 91 % of the customers are satisfied with the drinking water quality,²⁷¹ is not surprising because of the very high quality level in Germany. Interestingly, however, is the result with respect to the total satisfaction, which is illustrated in figure 49. In 2009 about 80 % of the customers were very satisfied with the service of their water supplier, whereas the number of unsatisfied customers was with fewer than 2 % marginal.

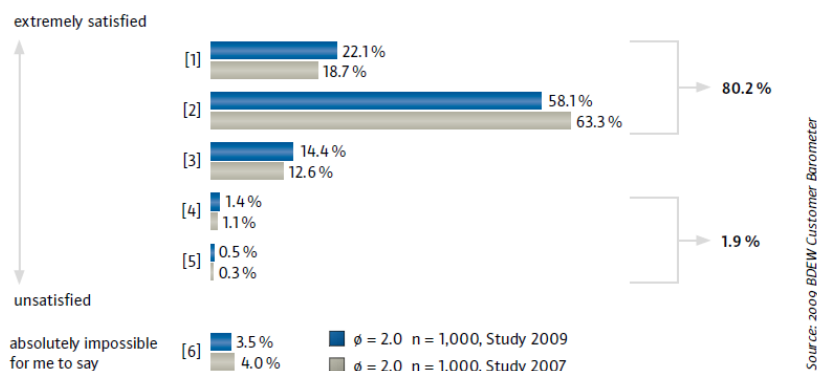


Figure 49: Customers' satisfaction with the service of their water supplier²⁷²

Moreover, the results of the customer barometer indicate the regular control of the water quality, the careful adherence to laws and standards in water abstraction and treatment, the water meters function (exactly and reliably), the careful maintenance and technical control of

²⁷⁰ See Bundesministerium für Gesundheit (2011): Bericht über die Qualität von Wasser für den menschlichen Gebrauch (Trinkwasser) in Deutschland, p.2.

²⁷¹ See BDEW (2011): Profile of the German Water Sector – 2011, p.62.

²⁷² BDEW (2011): Profile of the German Water Sector – 2011, p.62.

waterworks as well as the specific environmental protection in water abstraction as most important services.²⁷³

Nonetheless, the customer barometer also uncovers a lack of information among the consumers. Also the numbers were slightly decreasing from 2007 to 2009, more than 65 % of the people still do not know in detail about their water consumption or water costs (figure 50).

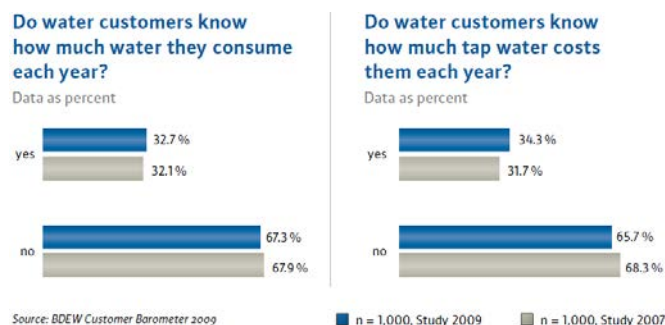


Figure 50: Customers' awareness on water consumption and water costs²⁷⁴

“In Germany, 97 % of the wastewater volume is treated with the highest EU standard, (which) is biological treatment with nutrient elimination.”²⁷⁵ Similar to the drinking water sector, the overall customer satisfaction on wastewater services is with more than 77 % very high (see figure 51). “The contribution of wastewater disposal to environmental protection is still assessed as very important or important by approximately 96 % of the persons interviewed.”²⁷⁶ But beyond this positive feedback, the results of the customer barometer also indicate a lack of consumer information. Therefore a further aim of both sectors should be to increase transparency.

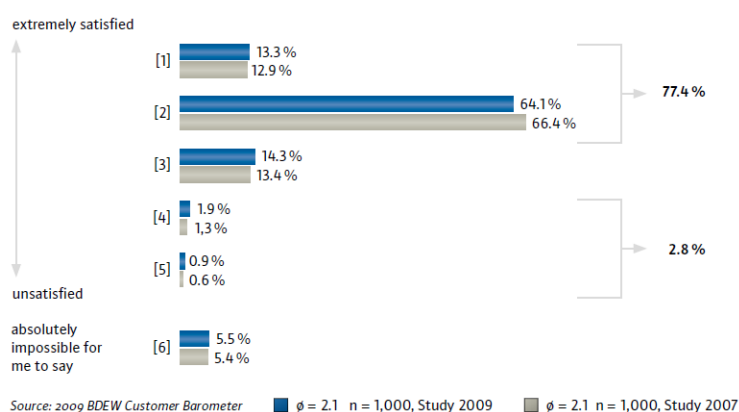


Figure 51: Overall satisfaction of customers with the services of their wastewater disposal utility²⁷⁷

²⁷³ See BDEW (2011): Profile of the German Water Sector – 2011, p.62.

²⁷⁴ BDEW (2011): Profile of the German Water Sector – 2011, p.62.

²⁷⁵ BDEW (2011): Profile of the German Water Sector – 2011, p.58.

²⁷⁶ See BDEW (2011): Profile of the German Water Sector – 2011, p.65.

²⁷⁷ BDEW (2011): Profile of the German Water Sector – 2011, p.65.

4 Classification within Categories

Although the sample of four countries is not very large, the results of the individual country reports give a good overview on the wide range of existing market structures and regulatory models in Europe. The detailed information on the water and wastewater sectors in Scotland, Portugal, Norway and Germany show, that the countries face basically similar challenges. However, caused by the individual technical development status, the regulatory framework and country specific challenges, the focus and handling differs partially strongly. Comparisons are difficult, since they rely on the type and nature of the provided data. Nonetheless, this chapter summarises the results and tries to classify the countries within selected subjects respectively categories to identify potential for further development.

Population

As mentioned in the introduction, the population's connection rates in the drinking water sector are satisfying, but the detailed country reports show need for improvement in the wastewater sector. Sustainable water management also means the safe handling of wastewater and discharges. Whilst population forecasts for Scotland and Portugal predict quite moderate increases, Norway's population is estimated to grow significantly. In contrary, in Germany a decrease of inhabitants is predicted. Demographical changes are especially challenging industries with relatively stare capacities like the water and wastewater sectors. Decreasing numbers of inhabitants and directly related lower water consumption make additional flushing necessary to avoid loss of quality. In the worst case a deconstruction needs to take place, which requires further investments. Additionally water pricing models have to be adjusted continuously to avoid a cost coverage gap. But also rapidly rising population numbers make an adjustment of the capacity needed. In this case adequate water resources must also be considered.

Water Consumption and Technical Status Quo

The water consumption per capita and day verifies strongly among the four countries. Whilst the individual water consumption is relatively low in Germany (122 l), it is significantly higher in Scotland (150 l), Portugal (167 l) and Norway (212 l).²⁷⁸ One reason might be the comparatively high leakage rate in the latter countries.²⁷⁹ Especially in Norway, the leakage rate has long played a subordinate role, since water resources are sufficiently available. Nonetheless, water losses do not only mean resource wastage, but also economic losses. Additionally, the drinking water quality can suffer, because contaminated water can enter the network. Particularly, in Scotland, Norway and Portugal technical adjustments are necessary to reach an adequate supply level. Maintenance, repair and renewal of old and critical assets are indispensable. Another reason for high water consumptions might be insufficient measures to save water, e.g. lack of information or incentives.

²⁷⁸ Most recently available numbers.

²⁷⁹ See for this reasoning also p. 15.

Regulatory Framework

The requirements of the EU Water Framework Directive have been implemented in all investigated countries. In particular, even the economic principles are taken into account in the countries' legislation. Crucial differences occur in the regulation and monitoring of the water market. Whilst Portugal and Scotland have established national regulation authorities, Germany and Norway do not have national institutions, which intervene ex ante. The regulation authorities have different supervisory and consulting duties, but have also direct influence on the companies' economic decisions, e.g. water pricing. Main target is to beware the end-consumers of monopoly misuse. In the case of the drinking water market in Scotland the economic regulator has to monitor only one monopoly supplier as well as a few licensed providers, which makes it much easier than it would be to measure and evaluate the costs and prices of 6,211 water utilities in Germany. The legal framework of Germany lays down that the authorities intervene when there is suspected misuse of the companies' natural monopoly. This ex post supervision takes time as recent judgments in Hessen show. This implicates that the intervention of a special regulation authority like in Scotland is more directly and protects the end-consumer a priori. Regulation is subject of many debates across Europe and the map of regulated countries (see figure 7) shows that several countries have already introduced a regulatory authority.

Structure

The ownership structures vary significantly among the investigated countries. Whilst private companies play nearly no role in the water and wastewater market of Norway and are just involved in the retail market for business customers in Scotland, the engagement of private companies is very present in Germany and Portugal. Main reasons for private participations are the additional use of expertise and capital. An assessment of the models will not be made at this point. Advantages and disadvantages were already adequately discussed in the literature. Nevertheless, it is interesting to note that all models apply in practice.

Furthermore, it is striking that the fragmentation of the sectors differs strongly among the investigated countries. In Scotland only one public provider is operating physical water and wastewater services over the whole country. In contrary, the structure in Norway and Portugal is much smaller and in Germany with more than 6,000 companies, extremely fragmented. This raises the question, if economies of scale and scope are used sufficiently.

Competition

Competition in the water respectively wastewater market is very difficult due to the already mentioned reasons.²⁸⁰ The unique model of the competitive retail market in Scotland allows a limited market opening and thereby a kind of competition in the market. The model requires long-term preparation and the real success can probably be assessed only in a few years. Nonetheless, the recent model implementation as well as ongoing benchmarking projects in

²⁸⁰ See p. 12.

Portugal and Germany show the willingness to improve the level of competition. Benchmarking projects and the publication of the performance indicators in both sectors force a competition *via comparison*. Each company desires a positive external representation, so that the data publication and comparison increase the pressure for a more efficient performance.

To foster cost and performance efficiency is also aim of competition *for* the market. This type of competition is enhanced in Portugal and Germany via the possibility of private participation. The companies bid for tenders related to the water supply respectively wastewater removal services and have to make the best offer to get to the supplement. It is striking that in contrary to Scotland, Portugal and Germany, competition plays only a minor role in Norway. Basically, it would be desirable if the level of competition could be improved across Europe.

Finance

Geographical variations (e.g. differences in height, raw water quality) are a problem in most European countries. Different treatment methods occur various costs, which might be an explanation for price differences. With exception of Scotland, where the same prices for water and wastewater services are charged over the whole country, in all investigated countries significant price differences can be observed. On the one hand differences are explainable, but on the other hand waterpricing is worse a discussion, because local conditions shall not overshadow potential ineffectiveness. Foundation for the tariff structures are the occurring costs. The costs shall be covered adequately, which means first and foremost that the polluter has to pay the actual costs. Especially in Portugal and Norway the cost recovery level is not yet satisfying. But whilst in Norway the revenues are earmarked, in Portugal the water services subsidy in large parts the wastewater services. This is also evident if one considers the water prices. While the wastewater charges are usually higher than the water charges in Norway, Scotland and Germany, it is the opposite in Portugal.

The dominating tariff model among the four investigated countries is a two-part tariff model consisting of a fixed annual charge and a volumetric charge based on the actual water consumption in m³. Similar to the described case of Germany, the water and wastewater industries across Europe have to face extremely high fixed costs. One main subject of discussion is to bring the revenue structure more in line with the cost structure. In particular this means a higher fixed portion of charges. Whilst this would meet the objectives of the polluter pays principle and help to avoid cost coverage gaps, it would not give incentives to save water. Especially in Germany, this conflict of interests is a highly topical issue. As mentioned in the beginning, the net work industries are very capital intensive. Investment needs are obvious in all investigated countries. Consequently, the importance of a sustainable long-term funding is high in both sectors.

Customer satisfaction

The customer satisfaction depends first and foremost on the water quality and the supply security. But also administrative issues and water prices affect the end-consumers' satisfaction. In general it can be said that the water and wastewater customers of the investigated countries are not unsatisfied. Nonetheless, there is scope of improvement. Beside of technical improvement which affects the drinking water quality and the contamination of treated wastewater, the provision of more information and thereby gained transparency can help to improve the reputation of the water utility.

5 Perspective and Starting Points

The detailed country reports identify a wide spectrum of characteristics and challenges related to the water supply and wastewater removal among Europe. Whilst Norway has to deal with problems around the physical supply, e.g. leakage and drinking water quality, discussions in Germany focus mainly on economic challenges. Nevertheless, in the following a number of starting points for further development in both sectors are derived from the previous outcomes.

Population

- Szenario analysis
- Cost-benefit analysis (reconstruction vs. additional flushigs)

Water Consumption and Technical Status Quo

- Leakage repair
- Consumption analysis - What affects the differences?

Regulatory Framework

- Influence of the degree of regulation on efficiency, costs and prices

Structure

- Efficiency analysis regarding the companies' ownership structure
- Sufficient use of economies of Scope and Scale?

Competition

- National benchmarks
- Transnational benchmarks
- Publication requirement
- Rating systems for water supplier respectively wastewater provider

Finance

- Adequate tariff structures
- Earmarked revenues
- Improvement of the cost recovery ratio
- Long-term funding strategies

Customer satisfaction

- Improvement of the drinking water quality
- Lower interruption frequency
- Transparency initiatives

To reach the overall aim of sustainable urban water and wastewater sectors, there is still a lot of need for improvement. Considering the outstanding tasks of workarea 2 of the project TRUST, especially the enhancement of competition as well as the establishment of an adequate rating tool are in focus to foster the efficiency in both sectors.

Annex I Excerpts from the Water Framework Directive

Article 5 Characteristics of the river basin district, review of the environmental impact of human activity and economic analysis of water use

1. Each Member State shall ensure that for each river basin district or for the portion of an international river basin district falling within its territory:

- an analysis of its characteristics,
- a review of the impact of human activity on the status of surface waters and on groundwater, and
- an economic analysis of water use

is undertaken according to the technical specifications set out in Annexes II and III and that it is completed at the latest four years after the date of entry into force of this Directive.

2. The analyses and reviews mentioned under paragraph 1 shall be reviewed, and if necessary updated at the latest 13 years after the date of entry into force of this Directive and every six years thereafter.

Article 9 Recovery of costs for water services

1. Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs, having regard to the economic analysis conducted according to Annex III, and in accordance in particular with the polluter pays principle.

Member States shall ensure by 2010

- that water-pricing policies provide adequate incentives for users to use water resources efficiently, and thereby contribute to the environmental objectives of this Directive,
- an adequate contribution of the different water uses, disaggregated into at least industry, households and agriculture, to the recovery of the costs of water services, based on the economic analysis conducted according to Annex III and taking account of the polluter pays principle.

Member States may in so doing have regard to the social, environmental and economic effects of the recovery as well as the geographic and climatic conditions of the region or regions affected.

2. Member States shall report in the river basin management plans on the planned steps towards implementing paragraph 1 which will contribute to achieving the environmental objectives of this Directive and on the contribution made by the various water uses to the recovery of the costs of water services.

3. Nothing in this Article shall prevent the funding of particular preventive or remedial measures in order to achieve the objectives of this Directive.

4. Member States shall not be in breach of this Directive if they decide in accordance with established practices not to apply the provisions of paragraph 1, second sentence, and for that purpose the relevant provisions of paragraph 2, for a given water-use activity, where this does not compromise the purposes and the achievement of the objectives of this Directive. Member States shall report the reasons for not fully applying paragraph 1, second sentence, in the river basin management plans.

ANNEX III ECONOMIC ANALYSIS

The economic analysis shall contain enough information in sufficient detail (taking account of the costs associated with collection of the relevant data) in order to:

(a) make the relevant calculations necessary for taking into account under Article 9 the principle of recovery of the costs of water services, taking account of long term forecasts of supply and demand for water in the river basin district and, where necessary:

- estimates of the volume, prices and costs associated with water services, and
- estimates of relevant investment including forecasts of such investments;

(b) make judgements about the most cost-effective combination of measures in respect of water uses to be included in the programme of measures under Article 11 based on estimates of the potential costs of such measures.

Annex II Management models in the Portuguese water and waste services

Management models in State owned systems		
Model	Operator	Collaboration type
Direct management	State (There is currently no case)	Not applicable
Delegation	State-owned company (EPAL is the only example)	Not applicable
Concession	Multimunicipal concessionaire	Participation of State and municipalities in the share capital of the concession. However, there may be a minority share of private companies
Management models in municipal or intermunicipal owned systems		
Model	Operator	Collaboration type
Direct management	Municipality	Not applicable
	Municipalized services	Not applicable
	Association of municipalities (intermunicipal services)	Constitution of a collaborative public management body in which several municipalities take part
Delegation	Company established in partnership with the State (municipal or State owned company)	Participation of State and municipalities in the share capital of the concession
	Municipal owned company (the State is absent). (established under commercial law or as municipal owned company*)	Participation of several municipalities in the share capital of the concession. However, there may be a minority share of private companies
	Parish or users association	Agreements or contract-programs between the municipality and parish or users association
Concession	Municipal concessionaire	Public-Private Partnership (municipality or municipalities and other private operators)

* The distinction between municipal, intermunicipal or metropolitan companies established under commercial law and municipal owned companies was introduced by Law no. 53-F/2006, 29th December. Existing companies established under previous legislation have two years to adapt their statutes and structure. Failing to do so, the legal regime for municipal owned companies will be automatically applied.

Management models in the Portuguese water and waste services²⁸¹

²⁸¹ ERSAR (2011): Annual Report on Water and Waste Services in Portugal 2010, p. 75.

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