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Profile of the German Water Sector

2011

Edited by

Association of Drinking Water from Reservoirs (ATT)
German Association of Energy and Water Industries (BDEW)
German Alliance of Water Management Associations (DBVW)
German Technical and Scientific Association for Gas and Water (DVGW)
German Association for Water, Wastewater and Waste (DWA)
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Publisher

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Photos

azv Südholstein (p. 33), DWA (title), Erich Jütten (p. 6), Fotolia (pp. 18, 38, 72), istockphoto (p. 14), Jürgen Lowis (title, p. 12/13), concept and image/C. Bach (title, pp. 46/47, 48, 60, 66, 78/79), wvgw (title, pp. 30, 51).

Production

Warlich Druck Meckenheim GmbH

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Contents

Foreword

The "Profile of the German Water Sector 2011" provides a comprehensive and up to date picture of water supply and wastewater disposal services in Germany. It is published by ATT, BDEW, DVGW, DBVW, DWA and VKU in consultation with the German Association of Cities (Deutscher Städtetag – DST) and the German Association of Towns and Municipalities (Deutscher Städte- und Gemeindebund – DStGB). The interested public, politicians and decision-makers are thereby provided with extensive and detailed information about the water sector's performance, the great variety of its tasks and the current challenges to be tackled. In conjunction with the 2005 and 2008 editions, the 2011 Profile demonstrates that the modernisation strategy equally pursued by the Federal Government and by the water sector itself is also taking effect in an increasingly difficult environment.

The Profile focuses on the documentation of the performance of the German water sector. The most important performance criteria are the safety, quality and sustainability of supply and disposal services, economic efficiency and customer satisfaction. It is essential to maintain the high levels of performance achieved to date and to improve them wherever possible and required.

"Learning from the best" – the utilities follow that principle by carrying out, inter alia, benchmarking projects. Comparison groups enable utilities to identify, become acquainted with and adopt successful methods and processes for their own purposes. The Associations recommend to their members to participate in these projects, and promote their implementation (Associations' Declarations 2003 and 2005). Concrete figures and practical examples show that the utilities and thus finally the customers benefit from this approach.

Benchmarking, the transparent documentation of performance through the water sector's Profile, and continuous development are the pillars of the sector's permanent improvement which it realizes on its own responsibility. This concept was acknowledged and supported by the German Federal Government in its 2006 report on the modernisation strategy for the German water sector.

The present results show that the utilities of the German water supply and wastewater disposal sector have reached a high level of performance in terms of efficiency, safety and quality of supply and disposal, customer service and sustainability on a European and international level. Moreover, as publishers of the 2011 Profile of the German Water Sector, the associations make an important contribution to the debate about the future framework of the water sector on a national and European level.

Core statements

1. Germany is a water-rich country. The long-term nationwide protection of all water bodies is a national duty to which the water supply and wastewater disposal utilities make a substantial contribution.

2. In Germany, water supply and wastewater disposal are core duties of public services in the general interest within the competence of municipalities or other public corporations. Their democratically legitimised bodies take the strategic decisions with regard to the forms of organisation, participations and cooperation.

3. Fees, quality, environmental requirements as well as water extraction and discharge rights are subject to strict control by public authorities; cost recovery of water services is a legal obligation.

4. The specific regional and local framework conditions determine the local conditions of supply and disposal. Water supply and wastewater disposal therefore need solutions adjusted to local conditions. In conjunction with differing legal provisions, this leads to different efforts for and costs of the services provided.

5. Germany has a varied supply and disposal structure comprising public and private sector companies.

6. Consumers in Germany are careful with drinking water. Since 1990, water consumption has decreased considerably and continues to decline. However, utilities must ensure the availability of adequate supply and disposal capacities to cover peak demand. Political demands for further reductions in water consumption are not reasonable.

7. Demographic and climate change together with continuously decreasing water consumption pose great challenges to the German water sector. Uniform solutions cannot be adopted due to the regional differences in impact.

8. Where micro pollutants are concerned, priority has to be given to avoidance at the immediate source (emission control). Where this is not feasible, account has to be taken of the “polluter-pays-principle”.

9. Performance characteristics of the German water sector are long-term safety of supply and disposal, high drinking water quality, high wastewater disposal standards, high customer satisfaction and sustainable utilisation of water resources while paying attention to economic efficiency (5-pillar benchmarking model).

10. Long and frequent service interruptions in the water supply are unknown in Germany. This is attributable to the high technical standards and the very good condition of plants and networks as compared to other European countries. German water supply utilities have by far the lowest water losses. Usually wastewater treatment plants are well utilised and sufficient reserves are available.

11. The statutory requirements for drinking water quality are observed throughout the country. Drinking water of excellent quality is available to the population in sufficient quantities at all times.

12. In Germany, wastewater is treated almost nationwide with the highest EU purification standards in contrast to many other EU Member States.

13. Safety and quality of supply are of utmost importance to the customers. The vast majority of customers consider their water and wastewater bill as adequate.

14. With total investments of more than €110 billion since 1990, the German water sector is one of the biggest customers for private industry, with the activities involved in planning, construction and operation being outsourced to external contractors to a great extent.

15. Increases in the drinking water prices and wastewater charges have mostly remained below the inflation index for many years. Taking account of the respective water consumption and performance standards, customers in Germany pay less for their drinking water than customers in other comparable EU countries.

16. The German water sector undergoes a constant modernisation process. It is essential to maintain and refine the high standards and to ensure adequate pricing for customers.

17. Voluntary benchmarking is applied to a large extent throughout the country. As a result, utilities have improved their performance with respect to safety, quality, customer service, sustainability and economic efficiency.

Presentation of the Associations

This Profile of the German Water Sector was drawn up by the following Associations:

Association of Drinking Water from Reservoirs
(Arbeitsgemeinschaft Trinkwassertalsperren – ATT)
The ATT is a non-profit association consisting of about 40 water supply utilities, water associations, reservoir undertakings and administrative bodies, as well as university, testing and research institutes in the Federal Republic of Germany and the Grand Duchy of Luxembourg concerned with the production, treatment and distribution of drinking water from reservoirs.

Association of Energy and Water Industries
(Bundesverband der Energie- und Wasserwirtschaft – BDEW)
The German Association of Energy and Water Industries (Bundesverband der Energie- und Wasserwirtschaft – BDEW), Berlin, represents the interests of approximately 1,800 companies. The spectrum of its members ranges from local and municipal to regional and interregional companies. They represent about 90 percent of electricity sales, more than 60 percent of local and district heat supply, 90 percent of natural gas sales as well as 80 percent of drinking water abstraction and about one third of wastewater disposal in Germany.

German Alliance of Water Management Associations
(Deutscher Bund verbandlicher Wasserwirtschaft – DBVW)
The DBVW is a union of eight regional associations. It represents the interests of water sector associations responsible for the maintenance of water bodies, coastal protection and flood control, drinking water supply, wastewater disposal, etc. Approximately 2,000 associations of the water sector (public-law corporations with self-administration) are represented within the DBVW. The DBVW unites all areas of the water sector and has gained comprehensive experience in terms of integrative water management.

German Technical and Scientific Association for Gas and Water
(Deutscher Verein des Gas- und Wasserfaches –
Technisch-wissenschaftlicher Verein – DVGW)

The DVGW promotes the gas and water supply sector, taking particular account of technical and hygienic safety and environmental protection. With its approximately 12,000 members, the DVGW elaborates generally acknowledged technical rules for gas and water. Furthermore, its tasks include the control and certification of products, persons and companies, the initiation and promotion of research projects and training for the whole spectrum of issues relating to the gas and water sector. The non-profit organisation is independent and neutral in economic and political terms.

German Association for Water, Wastewater and Waste
(Deutsche Vereinigung für Wasserwirtschaft, Abwasser und Abfall – DWA)

The DWA has devoted its efforts to developing safe and sustainable water management. Politically and economically independent, the DWA is working in the fields of water management, sewage, waste and soil conservation. Its 14,000 members make the DWA one of the largest organisations in this field in Europe, and its special expertise and competence give it a prominent place in standardisation, professional training and public information.

German Association of Local Utilities
(Verband kommunaler Unternehmen – VKU)

The VKU represents the interests of 1,400 municipal utilities in the sectors of energy, water/wastewater and waste management. Within the VKU, the municipal water industry has its own independent representation of interests which stands for the priority given to the responsibility of municipalities for water supply and wastewater disposal. The VKU represents the interests of its members in terms of regulatory, environmental and economic issues within the different Laender and at national and European level.

PART A –
Framework Conditions

1 The water sector's framework conditions

Germany is a water-rich country. The long-term nationwide protection of all water bodies is a national duty to which the water supply and wastewater disposal utilities make a substantial contribution.

Water management is the determined order of all human action on surface and subsurface water (DIN 4049-1). Water management has a balancing effect between the natural water regime (water availability) and the population's water requirements (water demand). Sustainable water management not only takes account of aspects in terms of quantity but also covers water quality and ecological issues.

In particular, the tasks of water management include for instance

- improvement of the landscape water regime, surface water retention,
- protection of groundwater and surface water bodies,
- maintenance and development, renaturation of water bodies,
- preventive and technical coastal protection and flood control,
- (water saving) irrigation,
- water abstraction, treatment and distribution,
- disposal (i.e. discharge and treatment) of wastewater.

Germany has a temperate humid climate with precipitation during all seasons. With annually renewed available freshwater resources of 188 billion m^3 (source: Federal Environment Agency), Germany is rich in water bodies. Approximately 2,278 m^3 (= 2,278,000 litres) of usable freshwater are available per capita and year to the population of around 82 million inhabitants.

The average annual level of precipitation amounts to 785 mm, with amounts differing very widely on a regional level and tending to decrease from West to East. The average volume of precipitation varies for instance between 590 mm/a in Berlin/Brandenburg and 938 mm/a in Baden-Württemberg. Regions of high and low precipitation are frequently close to one another in geographical terms. For instance, the city of Düren with a precipitation level of about 620 mm/a and the city of Wuppertal with about 1,200 mm/a are only around 100 km apart (source: German weather service, 2009).

The information provided in this Profile of the water sector relates to water supply and wastewater disposal tasks.

Public water supply utilises only about 2.7 % (corresponding to 5.1 billion m^3) of the available water resources. From 1991 to 2007, the volume of water delivered to end users decreased by approximately 21 % (source: German Federal Statistical Office; for more details see Chapters A.5.1 and B.4.1).

Overall, Germany is rich in groundwater resources from which most of the water required is abstracted. But the geological, hydrological and hydrochemical conditions within the different regions lead to large differences in availability and quality. The utilities thus have to use different technologies for drinking water treatment. In a highly industrialised and densely populated country like Germany with areas of intensive agricultural use, water resources are subject to a wide variety of utilisation requirements and major pollution. Altogether, plant planning, construction and operation is based on the specific local requirements.

The largest coherent area with abundant groundwater resources is the North German Plain. Large groundwater resources can also be found in the Alpine foothills and in the Upper Rhine rift. However, many regions, such as the Ruhr area, the Leipzig or Stuttgart area depend on supply from reservoirs (up to 50 % in Saxony), the abstraction of bank filtrate or district water supply (in some cases over distances of more than 200 km).

Nationwide protection of water bodies is a matter for the Federal Government. To this end, targets have been defined on a European level to ensure a "good status" of water bodies (EC Water Framework Directive; see Chapter A.2.2). In 2009, only 10 % of the surface water bodies and 62 % of the groundwater bodies achieved this target. The main reasons for the non-fulfilment of targets in the case of surface waters are structural changes (e.g. weirs, straightening of water courses) and diffuse nutrient pollution mainly from agricultural sources. In the case of groundwater, the main reasons for not achieving the set targets consist almost always in diffuse nitrogen pollution (nitrate) from agricultural sources (source: Federal Environment Agency 2010).

Due to the long-term memory of groundwater, in many areas it will not be possible to reach the EU targets even with the second and third generation of management plans and action programmes implemented by 2021 and 2027 respectively.

Here the Federal Government is required to implement the EC Nitrates Directive more consistently, also with a view to improving protection of water bodies with the fertilisation ordinance, for example. It is essential to take account of the fact that increased nitrate leaching may occur even where good professional practice is applied.

About 1,200 different pesticides are currently approved in Germany for use in the agricultural, forestry, viticultural and horticultural sectors and other fields of application. Every pesticide contains one or a combination of several active substances out of the 350 substances approved in the European market. Certain pesticides or their break-down or reaction products (metabolites) verifiably accumulate in the environment and are difficult to degrade (persistent). The diffuse pollution of water bodies through pesticide residues is still a serious problem. It can only be solved if sufficient consideration is already given to the protection of raw water resources during the pesticides approval procedure.

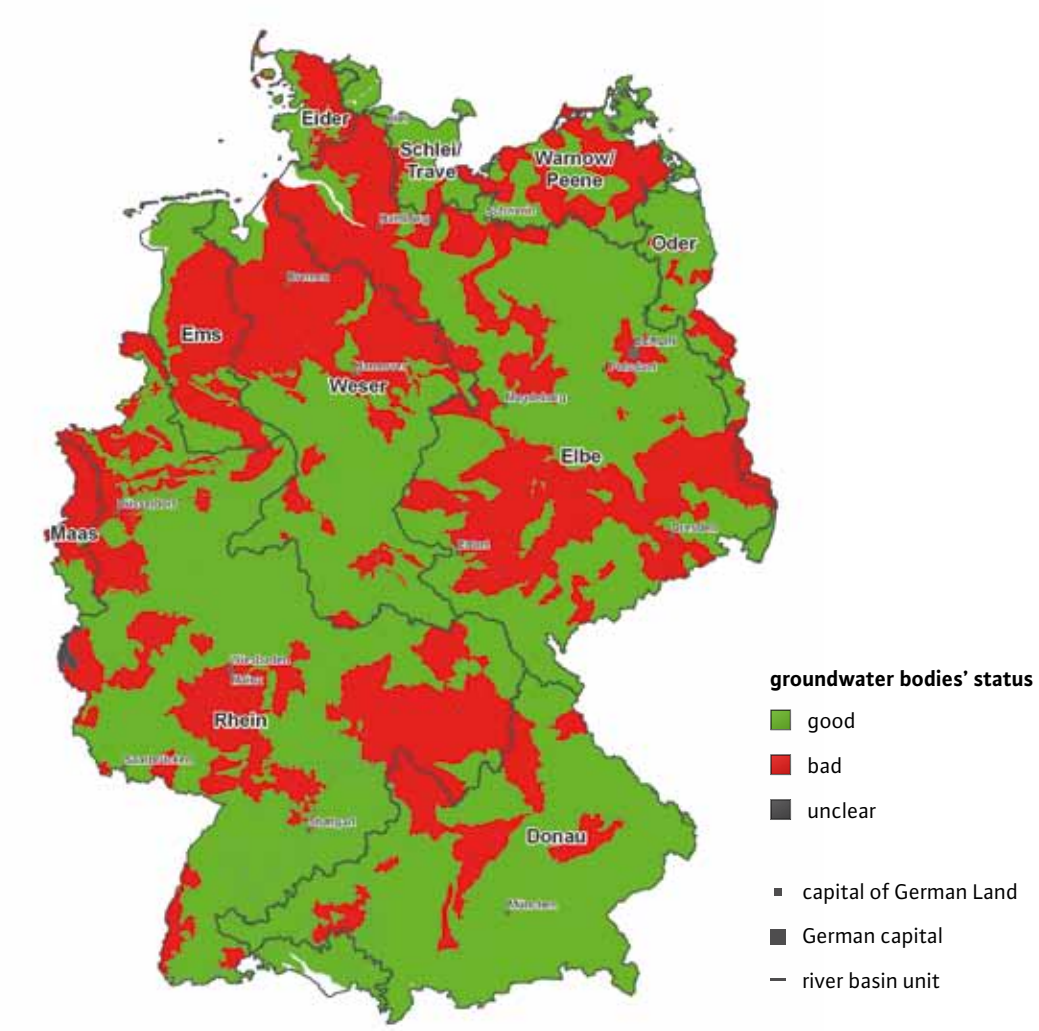
As far as the protection of water bodies is concerned, trend towards increased cultivation of energy crops must be viewed in a critical light. The targets set for bioenergy production can only be achieved through intensified land use, increased utilisation of idle land or by ploughing up grassland. The increased fertilisation of cultivated areas and the use of pesticides can lead to higher nitrate and pesticide input into the raw water resources, thus exacerbating the situation.

Whether and to what extent water needs to be processed depends on the quality of the abstracted raw water. This quality is ensured by about 13,232 water protection areas covering 13.9 % of Germany's national territory (source: WasserBLICK/BFG, 24/10/2010). The requirements to be met in water protection areas go beyond the normal nationwide water protection levels.

As agricultural inputs are still a serious problem, water supply utilities have voluntarily agreed to cooperate directly with farmers over and beyond the statutory compensation paid in some German Laender to the agricultural sector. The costs for the management of water protection and abstraction areas and for cooperation with the agricultural sector are included in the water price.

Chemical status of groundwater bodies in Germany

1



Source: BMU/UBA – "Water Framework Directive – The way towards healthy waters". based on the data of the portal WasserBLICK/BfG, status 03/2010

2 Legal, economic, political framework

In Germany, water supply and wastewater disposal are core duties of public services in the general interest within the competence of municipalities or other public corporations. Their democratically legitimised bodies take the strategic decisions with regard to the forms of organisation, participations and cooperation. Fees, quality, environmental requirements as well as water extraction and discharge rights are subject to strict control by public authorities; cost recovery of water services is a legal obligation.

2.1 Role of municipalities

The German Basic Law (Article 28 (2)) and most constitutions of the German Laender ensure the local self-government of municipalities. Self-government comprises all matters concerning the local community. Local self-government means autonomy in terms of bylaws, supreme power in terms of organisational, personnel, financing, regional and planning issues of cities, municipalities, associations of municipalities and administrative districts in accomplishing their tasks. Municipal regulations and the water laws of the different German Laender stipulate that drinking water supply is usually and wastewater disposal is always an obligation of the municipalities. On that basis, municipalities decide on the local implementation and organisation of water supply and wastewater disposal for the citizens' benefit. In principle, different forms of business organisation are possible, based on the different constitutional provisions of the German Laender for the municipalities with regard to implementing water supply and wastewater disposal on the municipalities' own responsibility as part of their organisational sovereignty. The forms of organisation are usually as follows:

- **Ancillary municipal enterprise:** Operation by municipality within the framework of the general municipal administration.
- **Owner-operated municipal enterprise:** Operation by municipality as special asset with independent accounting (economic autonomy).
- **Institution under public law:** Economically and legally autonomous public utility.
- **Autonomous company:** Private company with the municipality as shareholder (legal and economic autonomy).
- **Operations management model/operator model/cooperation model/PPP model:** Transfer of plant operation to a private operator while the performance of public tasks and sovereign obligations rests with the municipality.

With a view to effectively realising drinking water supply and wastewater disposal, municipalities may form associations for voluntary cooperation. Usually, this integration takes place on a voluntary basis within the meaning of municipal sovereignty through inter-municipal cooperation in the form of

- **Special-purpose associations** as public corporations,
- **Institution under public law** as joint enterprises of several municipalities or
- **Water and soil associations** within the meaning of the federal law on water and soil associations (Water Association Act).

To some extent, municipalities (such as in North Rhine-Westphalia) are members of **water management associations** subject to **special laws**.

Public-law forms of business are special-purpose associations, institutions under public law, water and soil associations, special-law associations as well as ancillary municipal enterprises and owner-operated municipal enterprises. Private forms of business organisation comprise autonomous companies or cooperation models in the form of GmbH or AG (limited liability company and stock corporations) where the majority of shares is mostly held by municipalities. The municipalities or their representatives in the Association's bodies decide on the form of business organisation for supply and disposal utilities and on pricing (prices or charges, see Chapter A.2.5). In accordance with the responsibilities determined by bylaws, they continue to establish the utilisation prerequisites for all property owners in cities and municipalities.

In addition to these compulsory tasks, municipalities have to fulfil partial tasks regarding the implementation of environmental laws issued by the government and the German Laender. In accordance with the regulation of competencies of the respective German Land, the lower water authorities or the water management offices as lower instance of the water management administration implement the water rights within urban districts and cities not attached to districts.

Among others, the lower water authorities approve wastewater systems, wastewater treatment plants, small sewage works, wastewater and rainwater discharges, use of water bodies, such as abstraction from surface water and exceptional approvals for water and medicinal spring protection areas. Furthermore, as supervisory/executive authorities they are responsible among others for sewage treatment plants, water supply facilities, registration of private wells, flooded areas, water and medicinal spring protection areas as well as for the Wastewater Levy Act and the wastewater register. As owners of small water bodies, responsibility for respective maintenance also lies with the municipalities and special purpose associations, institutions under public law, water and soil associations and water management associations subject to special laws. Municipalities ensure the provision of water for fire-fighting.

District-free cities and urban districts as lower-tier public health authorities are involved in drinking water quality assurance. Within the scope of planning law, cities and municipalities also contribute to the development of their settlement area in terms of water management issues. In this way, they make an essential contribution to the local development and implementation of water management matters, thus paying attention to local and regional requirements. Through the election of municipal councillors and mayors, citizens participate in these processes in a democratic manner.

2.2 Water Framework Directive, Water Resources Management Law, water laws of the German Laender

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

(extract from the recitals of the European Water Framework Directive)

Since 2000, the European Water Framework Directive (WFD) has provided the central regulatory framework for the use of water bodies and water resources in Europe. It defines far-reaching objectives with regard to the chemico-physical, biological-ecological and quantitative status of groundwater, surface water and coastal waters. These objectives are to be achieved by a cross-sector management approach comprising a series of basic management and protection principles:

- The management and protection of water bodies must look at the boundaries of natural river catchment areas to take the interdependencies of the hydrologic cycle into consideration as far as possible.
- Combined approaches consisting of quality standards for water bodies and limit values for emissions into water bodies.
- Cost recovery and polluter-pays-principle: This means foregoing the subsidisation of water prices and charges, taking account of environmental and resource costs for prices and charges, and assigning costs according to the polluter-pays-principle.
- Integrated management of groundwater and surface waters.
- Point and diffuse sources of pollutions of water bodies need to be given equal consideration in management and for the implementation of measures.

Water supply and wastewater disposal are also incorporated in this framework. Water abstraction and wastewater discharges must not affect the condition of the water bodies. For instance, the Water Framework Directive (WFD) requires that the level of purification treatment for the production of drinking water be reduced. The WFD was implemented in German law through the Water Resources Management Act and the water laws of the German Laender and through additional implementing ordinances. This implementation is still in progress concerning the WFD's "daughter directives" on groundwater protection, environmental quality standards and substances relevant to the protection of water bodies.

The German Water Resources Management Act governs the rights and duties of water supply and wastewater disposal with regard to the utilisation and protection of water bodies. The aforementioned Act defines public water supply as a service in the general interest. Wastewater disposal, which has always been recognised as a public service, has been defined as a public-law duty. Both services are therefore of great social importance (and responsibility.) At the same time, the Water Resources Management Act stipulates the principles for careful use of water, priority supply from local water resources and the reduction of water losses from distribution systems. Moreover, it requires that generally acknowledged rules of technology be taken into consideration for water supply and wastewater disposal, and prescribes state-of-the-art purification for direct wastewater discharges.

In their water laws, the German Laender can issue rules which deviate from German federal law in terms of water supply and wastewater disposal, unless these are related to certain substances or plants, in order to respond flexibly to specific supply and disposal situations ("deviation competence")

2.3 Qualitative requirements

2.3.1 German Drinking Water Ordinance

While the Water Framework Directive, the Water Resources Management Act and the water laws of the German Laender regulate the role of water supply and wastewater disposal as part of the hydrologic cycle, the German Drinking Water Ordinance, which transposed the EC Drinking Water Directive into national law, defines the legal requirements on drinking water, e.g. in terms of

- the quality of drinking water (e.g. for chemical or microbiological parameters),
- water treatment (e.g. with regard to admissible processes and treatment substances),
- the obligations of water supply utilities (e.g. obligatory analyses and reporting to the responsible authorities),
- the obligations of the responsible authorities (e.g. concerning the surveillance of drinking water) and
- the mandatory requirement to minimise chemical substances in drinking water (tightening of European standards).

For the fulfilment of these requirements, the German Drinking Water Ordinance recommends complying with the generally acknowledged rules of technology. Legal requirements and technical rules make drinking water one of the best-analysed and best-tested foods.

2.3.2 German Wastewater Ordinance

The European Directive concerning urban wastewater treatment (91/271/EEC) defines uniform minimum standards for the EU Member States concerning wastewater treatment. It defines stricter requirements for so-called "sensitive areas". Almost the whole of Germany is identified as "sensitive area". This Directive has been transposed into German law by the Water Resources

Management Act, supplemented by the water laws of the German Laender.

The German Wastewater Ordinance regulates the implementation of the Water Resources Management Act in Germany. The Wastewater Ordinance defines

- sampling method and site,
- requirements for analysis and measurement procedures.

It determines minimum standards for domestic wastewater and for all industrial and commercial sectors in terms of

- parameters for which samples have to be taken,
- the purification results for given parameters.

This Ordinance requires that state-of-the-art methods be used for direct discharges, and leads to an excellent technical standard of wastewater treatment in Germany.

The determination of analysis methods ensures a uniform level of surveillance. If the treated wastewater is discharged into water bodies with even higher demands on the treated wastewater to be discharged, stricter requirements (based on the Water Resources Management Act and the water laws of the German Laender) may be defined for the treatment results in the public notice issued by the water authority. The compliance with these requirements is monitored by the authorities of the German Laender.

2.4 Technical self-administration

The legislator confines itself to the determination of public protection functions and thus defines the legal framework. The implementation of these functions is specified and controlled by the public authorities. Within the technical and scientific associations DVGW and DWA, more than 2,300 honorary experts from the water sector, industry, administration and science elaborate technical rules and standards. The parties concerned are included through comprehensive and transparent consultation procedures. As a result, the set of rules receive their professional justification and acknowledgement. On a national level, cooperation takes place with other standardisation organisations like DIN and VDI, on a European and international level with CEN, CENELEC and ISO.

In this way, the State is relieved of its tasks which the sector can perform itself within the scope of technical self-administration at a high level of quality and on the basis of a large consensus. This cooperation principle is the cornerstone of the German and European technology and environmental law. The standardisation concept of the German Federal Government of September 2009 explicitly commits to the technical self-administration, with respective strengthening seen as an important instrument for reducing bureaucracy.

2.5 Prices and charges

In the German water sector, public charges and private prices exist in parallel. "Fees" is the umbrella term for charges and prices. Both forms of payment are subject to comprehensive control by public authorities and courts of law.

2.5.1 Legal framework

In Germany, **charges** are subject to concrete legal provisions. The Local Rates Act and municipal regulations of the German Laender determine the framework for the calculation of charges. Accordingly, the following principles are essentially applied:

Principle of equivalence (proportionality): Charges must be in due proportion to the service provided in return (Local Rates Act).

Principle of cost recovery: All costs associated with water supply and wastewater disposal must be covered by the charge. Long-term insufficiency or surplus cover is not admissible (Local Rates Act).

Prohibition of cost overrun: The estimated revenue from charges must not exceed the likely cost of the facility (Local Rates Act).

Principle of equality or equal treatment: Arbitrary discrimination of consumers is to be excluded (Local Rates Act).

Economic principles: Charges must be calculated in accordance with economic principles and methods (Local Rates Act). These may include

- **The principle of preservation of net real-asset values:** The calculation must make sure that there is no technical deterioration of supply and disposal in the long run. Value conservation is ensured by indexing the acquisition costs or the cost of production through the actual replacement value or the current replacement value and by paying adequate interest on the necessary equity capital.

or

- **The principle of real capital preservation:** The calculation must make sure that the supply and disposal duties are upheld. Value conservation is ensured through depreciation of acquisition and production costs and payment of adequate interest (including inflation adjustment) on the necessary equity capital.

Adequate rate of interest on equity capital: Most Local Rates Acts of the German Laender stipulate a market interest rate on the deployed capital to avoid an inflation-triggered decrease in value, thus ensuring economic freedom of action and maintaining the real-asset values of municipal utilities. Interest is paid on the basis of either real capital preservation or the preservation of net real-asset values.

As a rule, there are generally no specific legal requirements for **calculating the water prices**. The Local Rates Act for Rhineland Palatinate for example explicitly stipulates in Section 7, para. 9, clause 2 that the rate of charges is to be equally applied to fees under private law. 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.

2.5.2 Control and transparency

Prices and charges are subject to comprehensive control by public authorities and courts of law. The type of control mechanisms taking effect depends on the pattern of the respective fees.

Public utilities can choose whether to impose charges (under public law) or prices (under private law). Private companies may only charge prices to their customers.

On the municipal level, charges are controlled by the municipal or local council, or by the respective bodies within the associations. The lawfulness and proportionality of charges is also examined by the municipal audit association so that external control is also ensured. Owner-operated municipal utilities are additionally subject to control by an external auditor. Furthermore, the local supervisory authorities examine whether the Articles of Associa-

tion forming the basis of charging are in accordance with law. Consumers may have their notification of charges checked by an administrative court. Consumers have made use of this possibility of controlling the charges for many years.

Price supervision is the duty of the cartel authorities of the German Laender, or of the German Federal Cartel Office where cross-border activities are concerned. The control of abusive practices checks whether deviations in prices from those of other suppliers are attributable to objective circumstances (so-called comparative market principle). The water supplier must prove that deviations are objectively justified, whereas the cartel authority must only prove that the utilities used for the comparison are comparable. Instead of the comparative market principle that is currently applied in Hesse (German Land), the cartel authority may carry out control checks according to the cost verification scheme as applied in Baden-Württemberg. The water sector is thus subject to more stringent supervision by cartel authorities than other sectors. Moreover, consumers may individually initiate a civil court review of the adequacy (equity) of the prices charged to them. The equity control is carried out according to Section 315 of the German Civil Code. The Court examines whether the service provided (water delivery) is proportionate to the contractually agreed water price. Irrespective of this control through civil or administrative courts, municipalities as co-partners or principal shareholders of private companies carry out their control functions under company law.

Control of prices and charges

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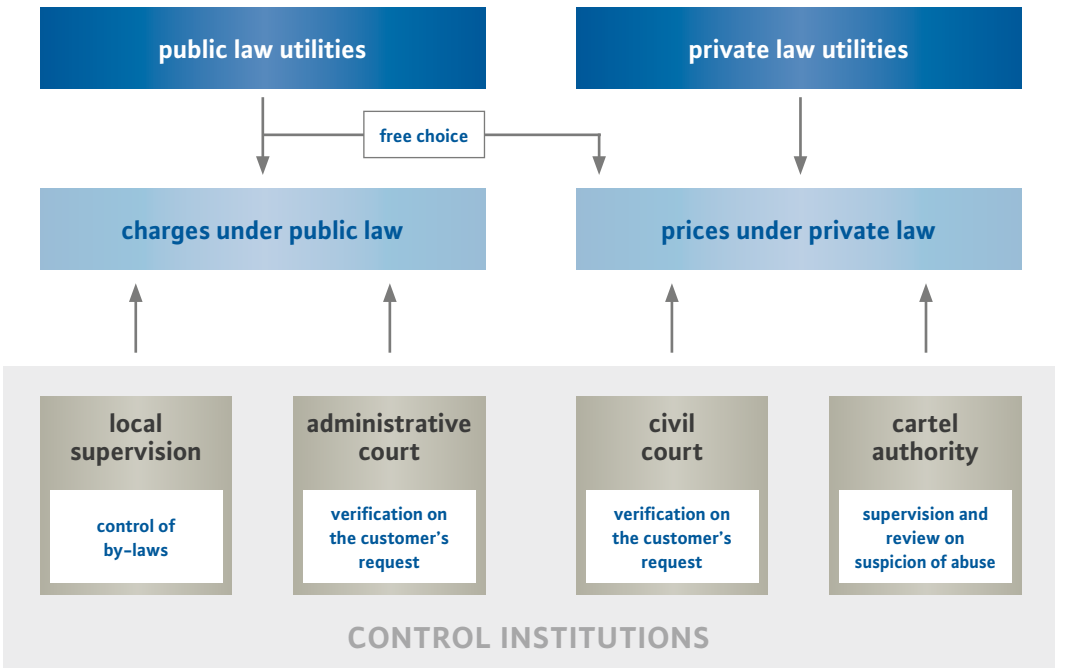


Source: VKU

Hence, the level of prices and charges is democratically legitimised through the participation of the municipal bodies with elected local representatives, thus ensuring the social control of fees on several levels.

2.5.3 Cost recovery and price reduction decree under cartel law

Cost recovery for the water sector is stipulated in Germany by the Local Rates Acts of the German Laender and by the Water Framework Directive at EU level. In contrast to other EU Member States, cost recovery has been implemented in Germany.

Cost recovery has to take place according to the principle of real capital preservation or the principle of preservation of net real-asset values (see Chapter A.2.5.1). These calculation principles apply to prices and charges. Accordingly, all connected users have to bear all incurred costs.

This also applies to implicit costs. Furthermore, costs include the provision of equity capital and the replacement of plant and equipment.

The price reductions decreed by the cartel authorities may be inconsistent with the cost recovery principle. Due to the comparative market principle which means that the cubic metre price of a water supplier is compared to those of another or several other water suppliers, cartel supervision may lead to a price reduction decree issued by the cartel authority. The cartel authority does not examine whether complete cost recovery still exists after the reduction in price.

A permanent cost-coverage shortfall can only be taken into consideration where it is proven by the supplier. According to the German Federal Supreme Court, the respective utility must provide full evidence of efficiency for all decisions taken by that utility, some of them long ago in the past.

As it is scarcely possible to provide such evidence, water suppliers may experience a cost-coverage shortfall due to a price-reduction decree and thus infringe the provisions of the German Legal Rates Act and the Water Framework Directive.

2.5.4 Cost structure

One main feature of water supply and wastewater disposal is the large-scale infrastructure with a long service life of up to 100 years. Other facilities, such as reservoirs, have an even longer service life. Consequently, this high technical expenditure is reflected in the cost structure.

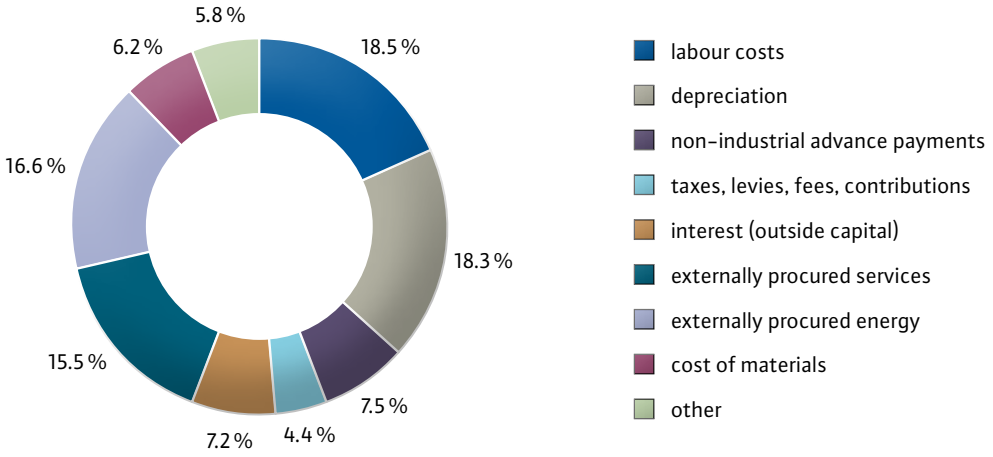
On the one hand, the new construction, extension and renewal of this technical infrastructure cause high capital costs (such as depreciation and interest on investment). On the other hand, operation and maintenance of the facilities generate labour costs and cost of materials which also have a considerable share in overall costs.

A further cost position is the concession fee which may be levied by the municipalities. The concession fee is paid for the use of public transport routes and land. Here, "use" means the installation and operation of pipes. On average, the concession fee accounts for about 10 % of the water suppliers' costs and is determined by the Ordinance on Concession Fees.

Cost structure in water supply in 2008

3

Shares as percent

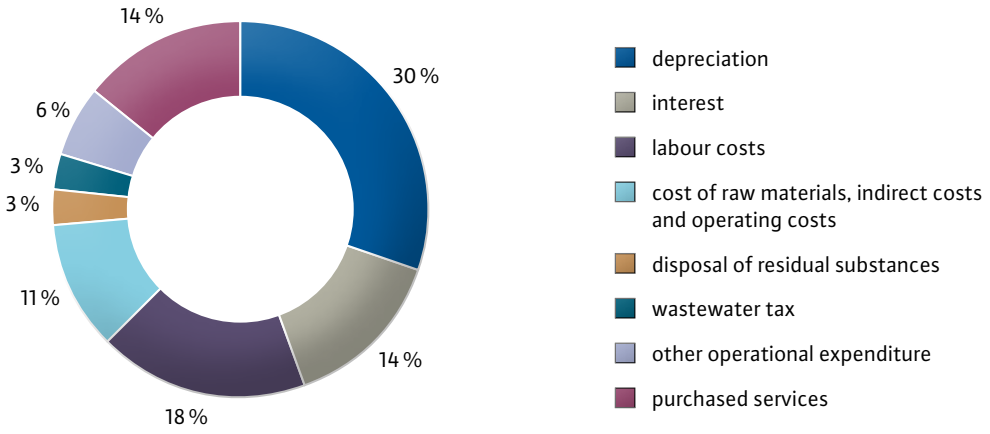


Source: German Federal Statistical Office, Fachserie 4, Reihe 6.1, 2008, published in 08/2010

Cost structure in wastewater disposal in 2008

4

Shares as percent, weighted according to the population registered



Source: DWA-Wirtschaftsdaten der Abwasserbeseitigung 2009, published in 07/2010

The operation and maintenance of plants are cost variables which are largely independent of real water and wastewater quantities. The average share of fixed costs for supply and disposal is between 70 and 85 %.

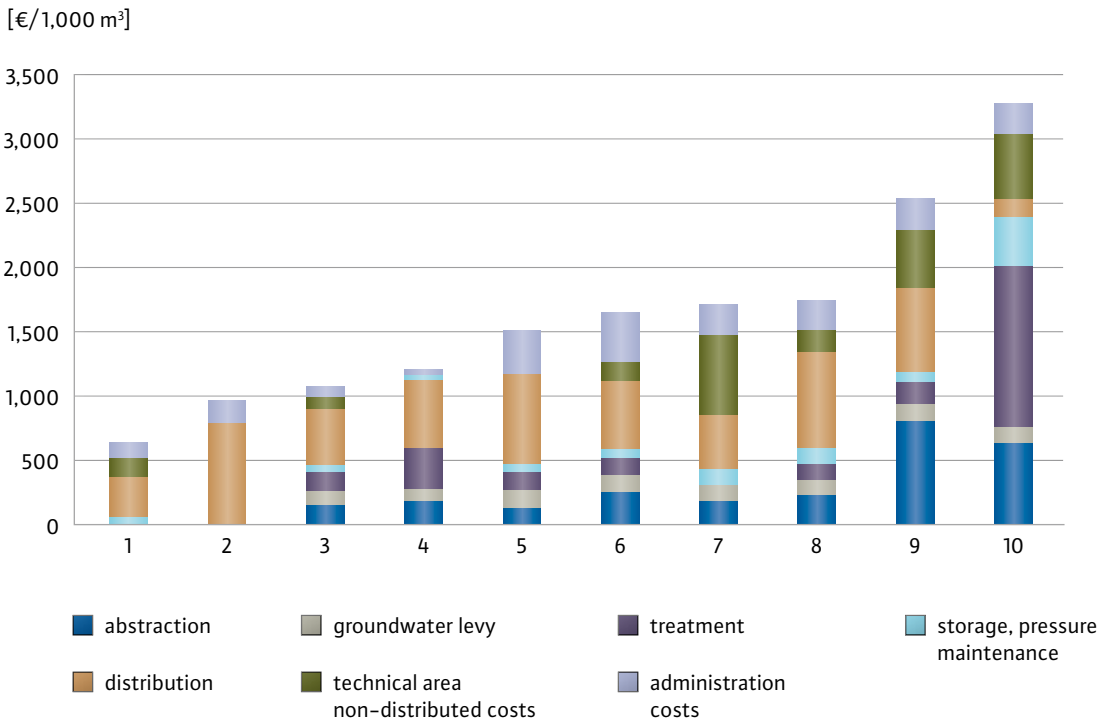
Volume-based costs such as energy costs and costs of operating equipment have only an insignificant share in overall costs. This cost structure, typical of the water sector, favours the introduction or stronger weighting of a volume-independent basic price or basic charge.

The average cost structure is significant only to a limited extent because the real costs may considerably differ from one utility to the next. This is illustrated by the example of water supply in the following diagram.

Distribution of the costs of water supply utilities

5

according to cost centres



Source: Wöbbeking et al., 2004

Water suppliers with comparable overall costs may have very different cost structures and weightings of the various types of cost. The real cost structure of a water supplier depends on the regional conditions of supply (geographical conditions, quality of raw water, population density, demography, geology, climate, legal requirements) – (see also Chapter A.3) which essentially determine the level of the local water price or water charge. Similarly, the same also applies to the cost structure of wastewater disposal. Therefore, prices and charges must always be seen in their regional context. The diagram also shows that a simple comparison of fees is not expedient on account of these differences in structure. Moreover, it reveals that most of the costs cannot be influenced by the supplier.

2.6 Special charges (water abstraction levies, compensation payments, wastewater tax)

In Germany, drinking water fees and wastewater charges are additionally increased by special state charges like the water abstraction levy or the wastewater tax. The utilities pay the water abstraction levy and the wastewater tax to the respective German Land and must bill their customers accordingly through the water fee and wastewater charge.

On a national average, the water abstraction levies collected within 10 German Laender accounted for 4.6 % of the water fees for 2007. The total receipts of the German Laender from the water abstraction levies were between €200 and 390 million p.a. from 2000 to 2007. (Source: VEWA-Studie 2010).

Depending on the German Land, the income generated by the water extraction levies is used to support different areas. In some Laender the income is not tied to a specific statutory purpose. The highest water extraction levies are charged in Berlin with €0.31 for 1,000 litres which every citizen of Berlin pays to the Land of Berlin with his water bill.

In some German Laender, farmers receive additional compensation payments for water-friendly management in water protection and abstraction areas. These costs too are part of the water prices. The state raises an extra statutory levy for discharging wastewater into a water body, which in the end is borne by the charge payer.

Overview of German Laender regulations on water abstraction levies

German Laender	Taxation elements [1]	Level of fees
Baden-Württemberg	GW, SW	**5.1**
Bavaria	There are no legal regulations for a water	
Berlin	GW	**31**
Brandenburg	GW SW	**10** **0.2**
Bremen	GW, SW [3]	**5**
Hamburg	GW	**7 or 8** [4]
Hesse	The regulations for the water abstraction fee	
Mecklenburg-West Pomerania	GW SW	**5** **2**
Lower Saxony	GW, SW	**5.1**
North Rhine-Westphalia [5]	GW, SW	**4.5**
Rhineland-Palatinate	There are no legal regulations for a water	
Saarland	GW	**7 or 8** [6]
Saxony	GW, SW	**1.5**
Saxony-Anhalt	The water law of Saxony-Anhalt (Article 47)	
Schleswig-Holstein	GW, SW	**5 or 11** [7]
Thuringia	The regulations for the water abstraction fee	

The wastewater tax accounts for more than 4% of a citizen's annual wastewater costs (Source: DWA-Wirtschaftsdaten 2010, data for 2008). From 2005 to 2007, the German Laender collected receipts from the wastewater tax to the amount of €300 million p.a. on average (Source: VEWA-Studie 2010). The wastewater tax level is measured by the loads of the admissible wastewater substances being discharged. Further incentive for utilities to optimise their plants consists in the possibility of reducing the wastewater tax by a further bringing the discharged loads down below the admissible loads. But this has lost its steering effect due to the high standard of wastewater treatment in Germany. It is therefore advisable to strive at least for modernisation.

2.7 Fiscal law

There is no uniform taxation for water supply and wastewater disposal in Germany. While water supply is basically subject to a reduced uniform turnover tax rate, taxation of the wastewater disposal sector 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.

6

in Cent	Minimum threshold/p.a.	Tied purpose	Total revenue in €/p.a.[2]
	2,000 m³	no	about 85 million
abstraction fee.			
	6,000 m³	yes	about 52.6 million
	3,000 m³	yes	about 19.0 million
	4,000 m³	yes	about 4.45 million
	10,000 m³	no	about 4.85 million
were repealed in 2003.			
	2,000 m³	yes	about 5 million
	€260	yes	about 60 million
	3,000 m³ or €150	to some extent	about 86 million (2009)
abstraction fee.			
	€200	to some extent	about 2.2 million
	2,000 m³	yes	about 5.6 million (2009)
provides for a water fee. A decree has not been issued to date.			
	€100	50 %	about 58 million
were repealed in 1999.			

1 GW = groundwater, SW = surface water

2 assessment period 2010 unless stated otherwise

3 100% groundwater abstraction for public drinking water supply: fees for surface water abstraction: €0.005 /m³ to 500 million m³ and €0.003 /m³ from 500 million m³ onwards

4 €0.07 /m³ for surface water extraction; €0.08 /m³ for abstraction from deeper groundwater

5 The water abstraction fee will be gradually abolished by 31/12/2018.

6 Reduced rate for EMAS- or ISO 14001 certified utilities

7 Reduced rate for the commercial sector from a quantity purchased of 1,500 m³

Sources: Water laws of the German Laender, budget plans of the Laender

3 Structural and technical framework conditions

The specific regional and local framework conditions determine the local conditions of supply and disposal. Water supply and wastewater disposal therefore need solutions adjusted to local conditions. In conjunction with differing legal provisions, this leads to different efforts for and costs of the services provided.

A main feature of water supply and wastewater disposal is the dependency on external framework conditions which may differ greatly on a regional level. Water abstraction, processing and distribution or wastewater collection and treatment depend immediately on the climatic, geological, hydrological and topographic conditions which vary greatly on a regional and local level.

The expenditure required for the provision of drinking water depends on the local water availability (spring water, groundwater, surface water) and quality. These are determined, among others, by climate, vegetation, land use (agriculture, industry, etc.) and by natural pollution (e.g. frequently iron and manganese and occasionally uranium) attributable to geological influences. The altitude conditions determine the type of plants required (e.g. high-level tanks, pump stations) and their energy demand.

As far as wastewater disposal is concerned, the technical design of the sewer system depends on the local soil and slope conditions. Separate sewage systems prevail in the North German lowlands, whereas mixed sewage systems are mainly used in Central and South Germany (joint discharge of wastewater and rainwater). The 2009 amendment of the Water Regimen Law will lead to a further extension of separate sewage systems. Moreover, the retention surface and the degree of surface sealing play a crucial role.

Demand forecasts are of great importance in planning long-lasting and complex infrastructures. Demand structures, population (see Chapter A.5.2) and requirements from industry and commerce may considerably vary over time. For instance, water demand has decreased since the 1980s due to the change in customer behaviour and the increasing utilisation of water-saving devices and fittings.

Dimensioning of currently existing plants is partly based on scientific forecasts from the 1970s predicting a rise in drinking water demand in (Western) Germany. In actual fact, water demand has decreased by almost 50 percent compared to the value forecast at that time. Likewise, the forecast economic development in the East German Laender has not been fulfilled in many regions so that some plants were oversized. Even though present-day planning processes take account of current demand trends and the demographic factor, decisions taken in the past have a long-term effect in view of the long service life of supply and disposal plants (see Chapter A.5.1).

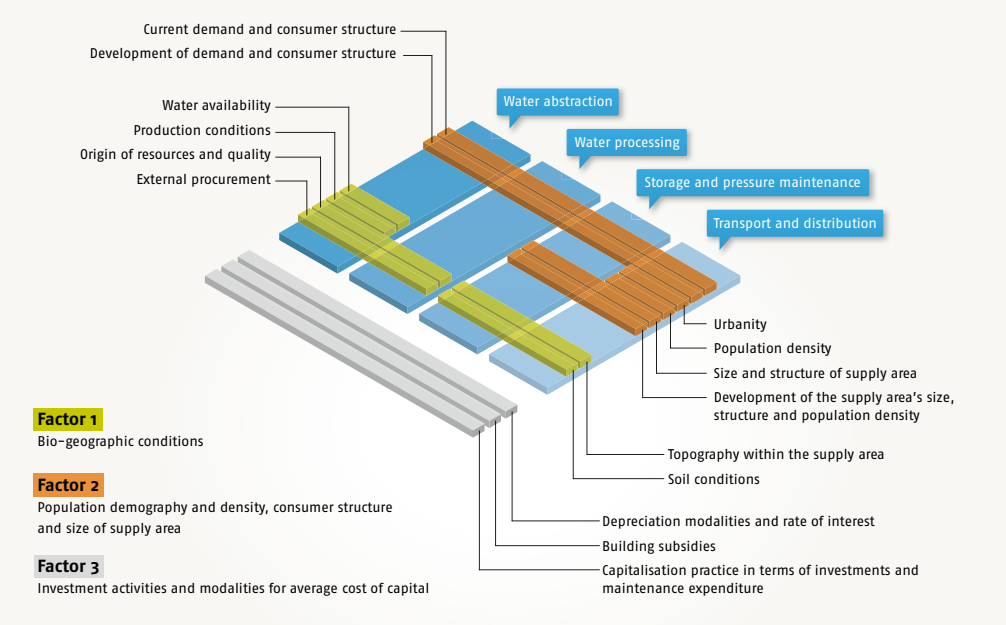
The 2009 VKU expert opinion of Holländer et al. shows how the structural framework conditions are interlinked with the main processes of drinking water supply. The influence factors (1 to 3) combine various external framework conditions. Those resulting from factors 1 and 2 have an immediate effect on the four main processes of drinking water provision (blue).

Diagram 7 illustrates which conditions have an impact on which main processes. Factor 3 has an influence on the costs of water supply utilities as a whole, without any difference in the effectiveness on the main processes.

The benchmarking projects illustrate the wide range of costs resulting from the structural differences (see diagram 8).

Link between structural framework conditions and the main processes of drinking water supply

7

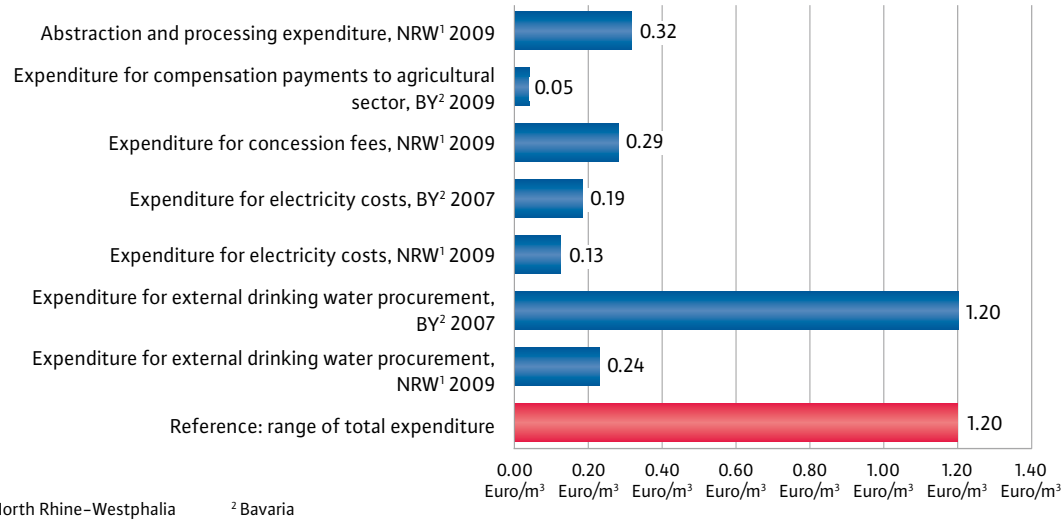


Source: VKU-expert´s report Holländer et al., 2009

Comparison of the range of overall expenditure and different expenditure variables (in Euro/m³)

8

Results from public benchmarking reports (drinking water)



[1] North Rhine-Westphalia [2] Bavaria

Source: IGES/TU Berlin Study on behalf of BDEW, 2010

4 Forms of business organisation and size structure

Germany has a varied supply and disposal structure comprising public and private sector companies.

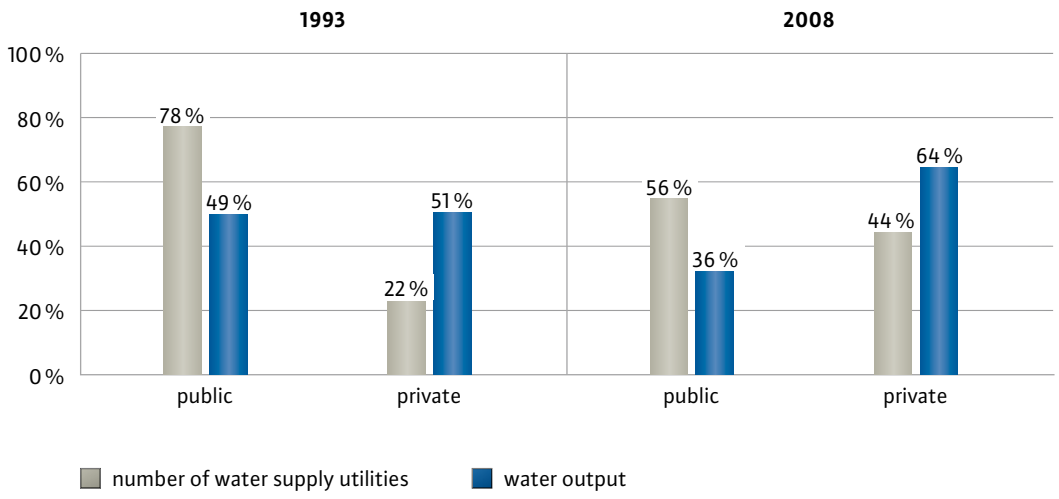
In total, there are approximately 6,211 water supply enterprises and utilities. For about 5,000 utilities not covered by the BDEW Statistics, data are only available about the size structure. However, it is to be assumed that these enterprises are predominantly small ancillary municipal utilities and owner-operated municipal utilities. The following statements refer to the 1,218 utilities covered by the BDEW Water Statistics 2008 representing 75 % of the water output in Germany.

In total, there are more than 6,900 wastewater disposal utilities in Germany. The data on wastewater disposal were collected by the DWA economic data survey; 552 wastewater disposal utilities representing 49.5 % of the German inhabitants participated in that survey. The undertakings not covered are predominantly operated by municipalities in the legal form of ancillary municipal utilities and owner-operated municipal utilities.

In the water supply sector, public and private forms of organisation have co-existed for decades.

Development of the types of enterprise in the public water supply 9

under public/private law



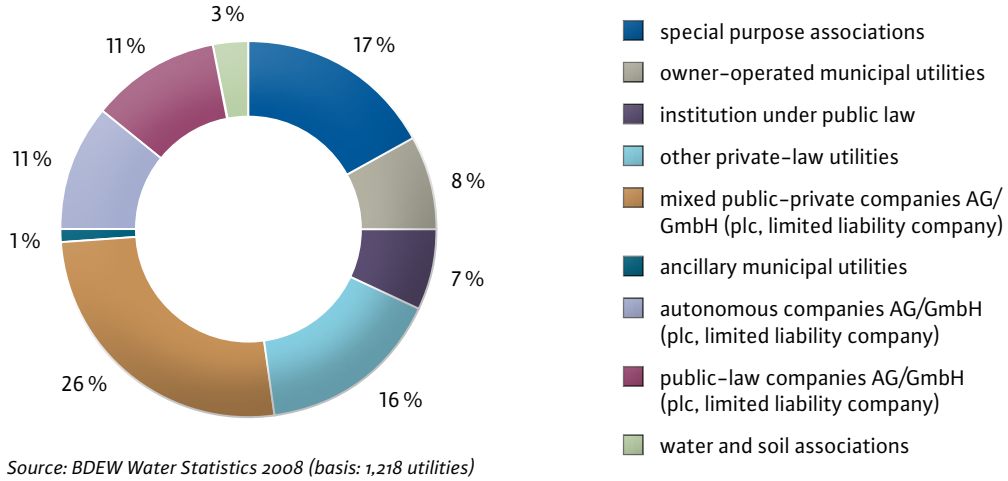
Source: BDEW Water Statistics 2008 (basis: 1,218 utilities)

Related to the number of utilities, public sector companies account for 56 %, while the share of private sector companies amounts to 44 %. Related to water output, public sector companies account for 36 % whereas the share of private sector companies amounts to 64 % (2008; types of enterprise see Chapter A.2.1).

Types of enterprise in the public water supply 2008

10

Shares related to water output



Source: BDEW Water Statistics 2008 (basis: 1,218 utilities)

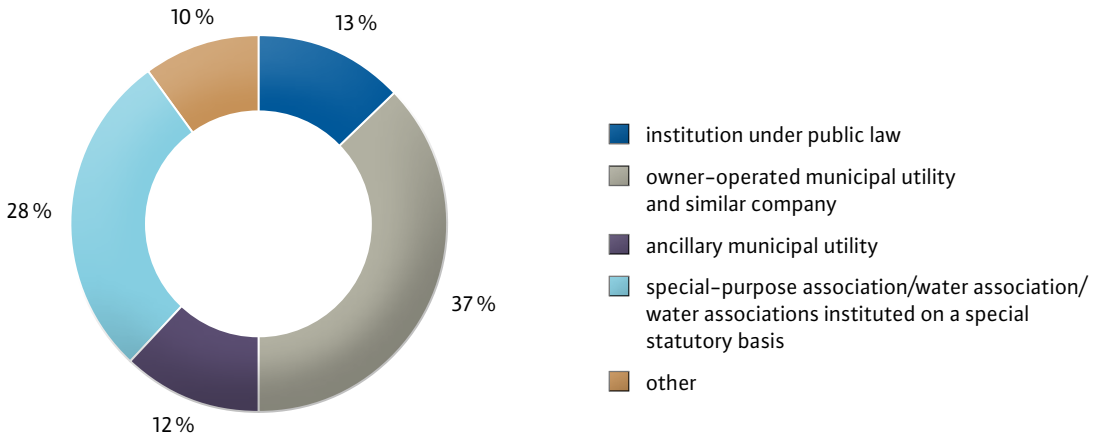
In the public sector companies, the special-purpose associations prevail, whereas ancillary municipal utilities account for 1 %. In 1993, the share of owner-operated municipal utilities totalled 29 %; in 2008, it amounted to 8 %.

In the private sector companies, mixed public-private companies in the form of AG/GmbH (plc, limited liability company) prevail (26 %), i.e. companies with private participation. In contrast to drinking water supply, wastewater disposal in Germany is predominantly carried out by utilities under public law. The largest share is held by owner-operated municipal utilities as well as special-purpose and water associations.

Organisational form of wastewater disposal

11

weighted according to the population connected to the sewerage system



Source: DWA-economic data 2010

Private wastewater disposal utilities are mainly active in the operative business by means of management or operator contracts.

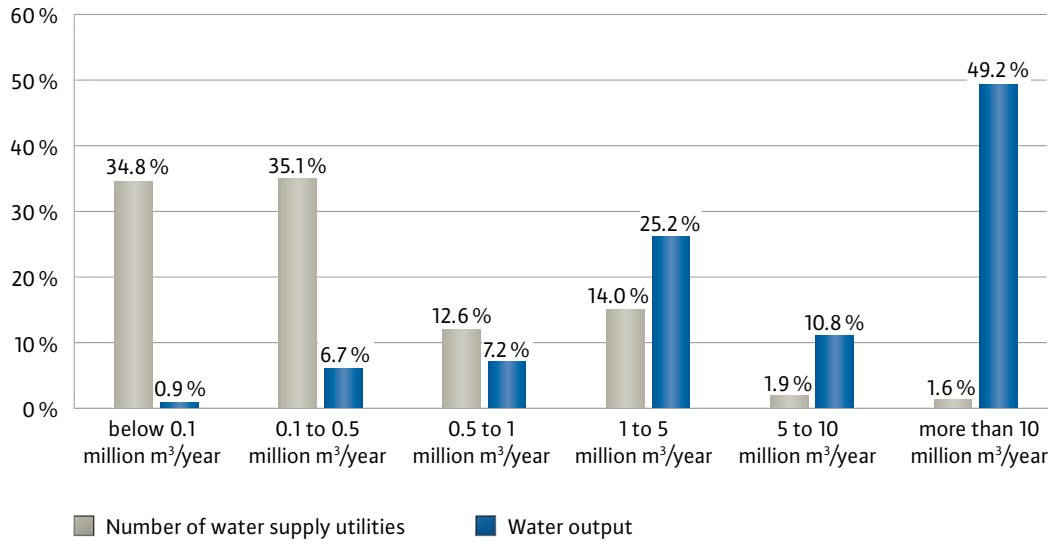
Related to the number of utilities, the share of private companies in wastewater discharge is about 4 %, and in wastewater treatment about 6 %. Related to the registered population, private companies account for 14 % in wastewater discharge and for 15 % in wastewater disposal.

In the drinking water sector, mostly small utilities supply a relatively small number of inhabitants in rural areas. In contrast, a small number of utilities usually supply a large number of inhabitants in urban conurbations. Half of the water output is therefore supplied by approximately 100 utilities (less than 2 % of the utilities). In this way, the corporate structure reflects the settlement structure in Germany.

Size structure of water supply utilities in Germany 2007

12

Shares as percent



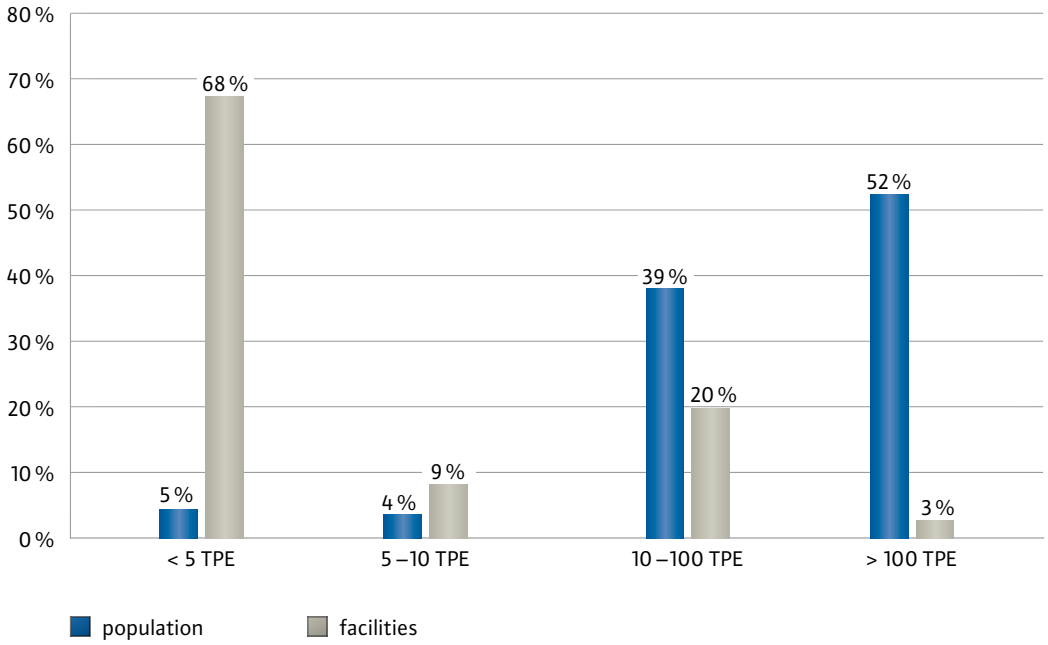
Source: German Federal Statistical Office, Fachserie 19, Reihe 2.1, Heft 2007 (published in 09/2009)

The structure is similar for the operators of wastewater facilities. In conurbations, a small number of large facilities dispose of the wastewater of a large number of inhabitants.

Size structure of wastewater treatment facility operators 2007

13

TPE = thousand total number of inhabitants and population equivalents



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

5 Current developments and challenges

Consumers in Germany are careful with drinking water. Since 1990, water consumption has decreased considerably and continues to decline. However, utilities must ensure the availability of adequate supply and disposal capacities to cover peak demand. Political demands for further reductions in water consumption are not reasonable.

Demographic and climate change together with continuously decreasing water consumption pose great challenges to the German water sector. Uniform solutions cannot be adopted due to the regional differences in impact.

Where micro pollutants are concerned, priority has to be given to avoidance at the *immediate source* (emission control). Where this is not feasible, account has to be taken of the "polluter-pays-principle".

5.1 Decline in drinking water consumption

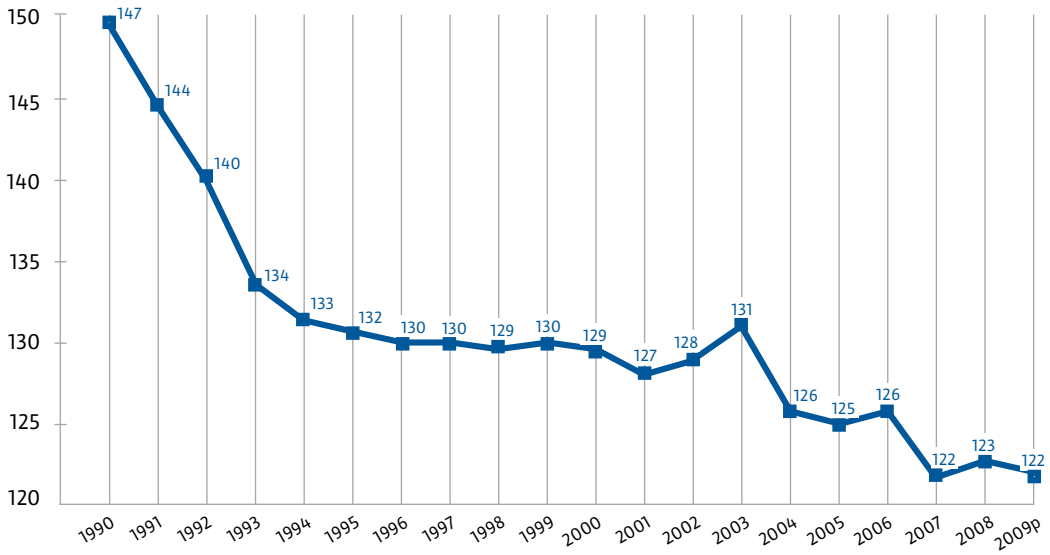
In Germany, drinking water is used economically, carefully and environmentally friendly. The careful use of drinking water is embodied in law and has been heeded for decades. Problems in terms of drinking water wastage or, as in many other European states, water shortage do not exist in Germany.

The average per-capita consumption in Germany has decreased by 17 percent since 1990. It is currently 122 litres per person and day.

This figure is related to households and small trades which are jointly registered by statistics.

Development of the per-capita water consumption 14

Data in litres per person and day, Germany

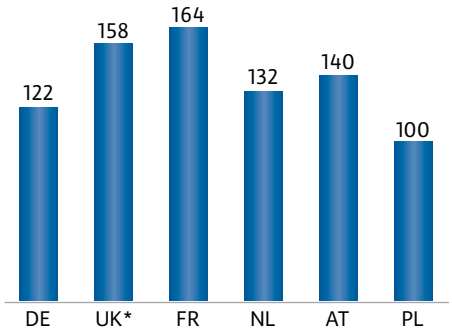


Source: BDEW Water Statistics, related to households and small trades, p = provisional

Comparison of per-capita water consumption on a European level

15

Data in litres per person and day (status: 2007)



* England & Wales only

Source: VEWA Study 2010 on behalf of BDEW

A comparison between six European countries (Source: VEWA Study 2010) shows that the German per-capita consumption is lower than in other long-standing EU Member States. No up-to-date and reliable figures are available for an international comparison of per-capita consumption.

As the EU increasingly focuses on water consumption, reliable and up-to-date figures from all 27 Member States are urgently required with a view to making the discussion more objective.

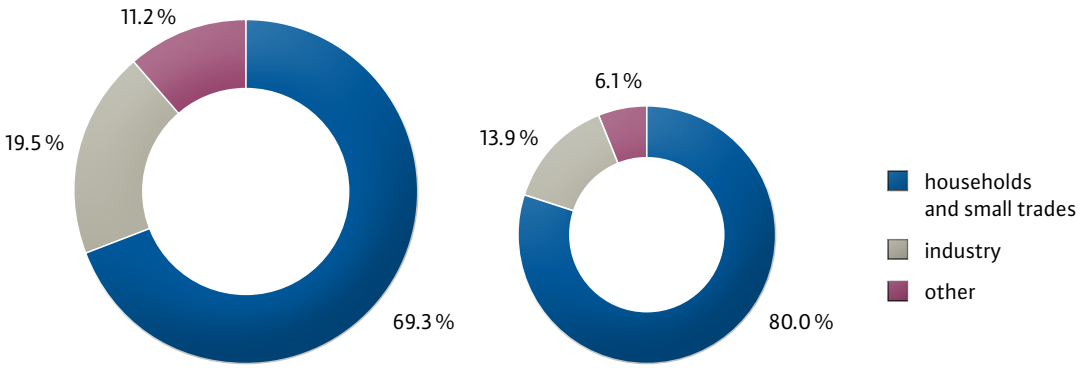
From 1990 to 2008, the volume of water supplied by public utilities to the customers decreased from 5.99 billion to 4.49 billion m³, i.e. by 25 % (Source: BDEW Statistics). Though the total water consumption of households and small trades has significantly decreased since 1990, this customer group has gained in importance; today, it purchases 80 percent of the deliveries of public water supply.

The comparatively low water consumption of German households is attributable to the following reason, among others: since the 1980s, campaigns co-initiated by water suppliers have led to a basic change in public awareness and to the development of water-saving fittings and equipment. Other countries, particularly those with scarce or diminishing water resources, still have to undergo this development.

Change in water delivery volumes

16

Breakdown according to customer groups in 1990 and 2008, data as percent



1990 = total water delivery: 5.99 billion m³

2008 = total water delivery: 4.49 billion m³

Source: BDEW Water Statistics

The volume of water delivered by public water supply utilities to industry has decreased continuously since 1990. This decrease is attributable to the introduction of resource-friendly production processes and an increasing degree of self-production, as well as the decrease in water purchases of industry. In Germany, industry covers 94 percent (Source: German Federal Statistical Office, 2007) of its water demand through its own production. This leads to an increasing need for utility companies to act as corporate managers in the industrial water supply. The share of industry supplied by public water supply utilities in England and Wales, the Netherlands, Austria and Poland, is substantially higher than in Germany and is well over 20 percent (Source: VEWA Study 2010).

Meanwhile, the considerable decrease in per-capita consumption and water deliveries to industry partly leads to under-usage of the facilities and leaves little room for any further downward margins from an operational perspective. For instance, intensive flushing of affected water mains is necessary to avoid deposits and corrosion as well as hygienic problems attributable to longer hydraulic residence times and lower flow velocities. Regionally varying operational changes are also necessary in terms of wastewater collection and draining, such as sewer flushing and adjustments of wastewater treatment in sewage plants.

Nevertheless, utilities need to maintain the capacities required to cover peak demand, particularly during longer droughts. In the light of a forecasted increase in drought periods due to climate change, peak demand is likely to continue to grow in terms of volume and duration. This means that utility companies have to keep the necessary infrastructure available without being able to downsize the mains, in spite of a decline in water consumption.

Political demands for further reductions in water consumption or funding of adequate measures are therefore not reasonable. They may lead to technical and hygienic problems necessitating cost-intensive solutions.

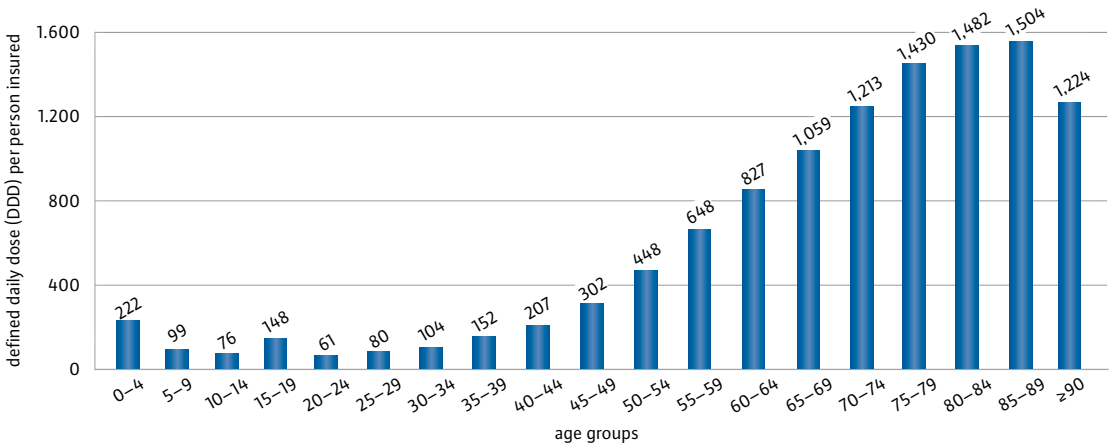
5.2 Demographic Change

Aging, decline in population and migration movements are a challenge to the water sector. According to forecasts, the population in Germany will decrease from approx. 82 million today to about 65 to 70 million in 2060 (Source: German Federal Statistical Office). At the same time, the age structure will shift to elder people. In 2060, one in three German citizens will be 65 and older while young people under 20 years of age will only account for about 16 % of the population. Without any social countermeasures, qualitative changes in terms of the wastewater composition may occur. Already today, a growing share of drug residues can be identified in wastewater.

Pharmaceutical consumption per person insured

17

in the statutory health insurance system



Source: Arzneiverordnungs-Report 2010, Springer-Verlag Berlin Heidelberg 2010
DDD = defined daily dose of pharmaceutical prescriptions

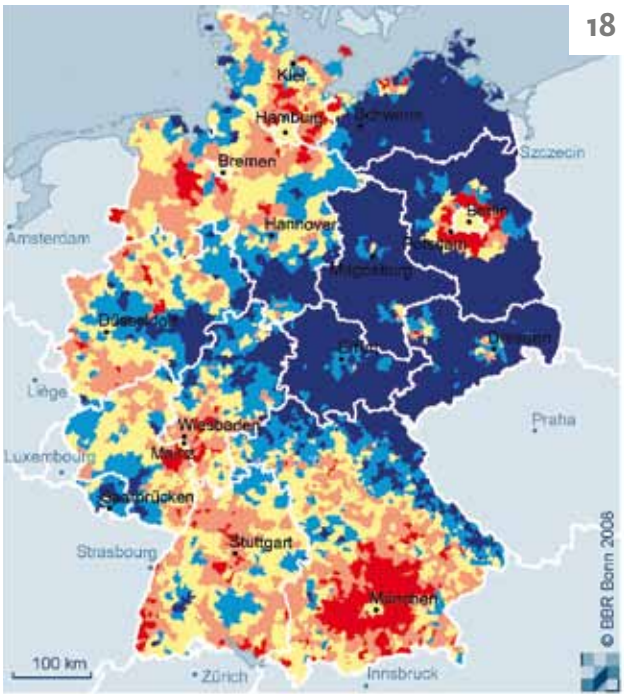
In many regions, today's negative trend in the population development will continue, whereas others will see a growth in population.

Future population dynamics

18

Changes in population development from 2005 to 2025 as a %

- to below –10
- –10 to below –3
- –3 to below 3
- 3 to below 10
- 10 and more



Source: BBR-Bevölkerungsprognose 2005-2025/bbw

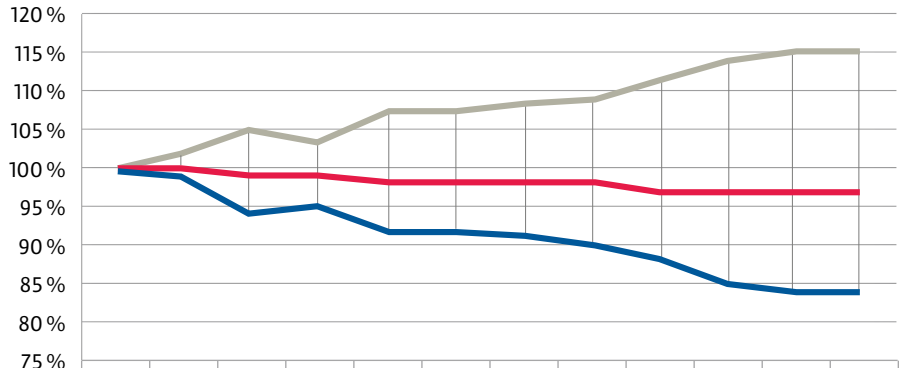
In some regions, the decline in population exacerbates the already existing infrastructural problems. Many utilities have already initiated adequate short to long-term precautions and planning measures. These include, among others, increased flushing of mains, adjustment of dimensions or even deconstruction of networks and facilities, and schemes for decentralised wastewater disposal.

Due to the high fixed costs for water supply facilities, the base price should be weighted more realistically in relation to the volume price. Moreover, a further reduction of water consumption supported by politicians is counterproductive. Urban development programmes of the German Federal Government and the German Laender should take adequate account of these correlations.

Water supply and wastewater utilities must therefore be early included in urban development planning processes and concepts for the development of rural areas.

Effects of decreasing water deliveries on total and specific costs 19

Relative evolution over time



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
water delivery [m³]	100 %	98%	94 %	95 %	92 %	92 %	91 %	90 %	87 %	85 %	84 %	84 %
total costs [€]	100 %	100 %	99 %	99 %	98 %	98 %	98 %	98 %	97 %	97 %	97 %	97 %
specific costs [€/m³]	100 %	102 %	105 %	104 %	107 %	107 %	108 %	109 %	112 %	114 %	115 %	115 %

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

An adjustment or deconstruction of certain network sections always involves the risk of an increase in fees as the infrastructure costs have to be defrayed by a smaller number of customers. Furthermore, network sections can be adjusted only to a limited extent: in view of climatic effects, sufficient capacities need to be kept available for safeguarding the safety of supply and disposal (see Chapter A.5.3).

5.3 Climate change

According to current forecasts, the following changes are in principle likely to occur in Germany. During the 21st century, temperatures will rise on an annual average, summers will get hotter and drier and winters milder and wetter. There are large regional differences which are partly contrary to general trends. The probability of natural disasters such as storms, torrential rainfall and dry spells basically tends to increase.

The regional and seasonal variability of the climate is increasing. For instance, an increase in the groundwater recharge of 25 % until 2050 is forecast for Hesse, whereas a 40 % decrease is expected for Brandenburg (Source: Grundwasser in Deutschland, BMU, 2008). For example, forecasts of precipitation development, groundwater recharge or changes in the water quality, which are of fundamental importance to the water sector, are very uncertain and their reliability is decreasing as a result of the greater variety of possible weather conditions.

The availability and quantity of raw water as well as the operation of infrastructures may be affected by climate change. There is no universally valid pattern of action for adjusting to climate changes. A need for adjustment and the relevant possibilities of intervention will always depend on the respective bio-geographical conditions, technical structure of a supply or disposal system and interaction with other factors such as population growth and economic development, industrial and agricultural use of water.

All things considered, it can be said that climate change does not necessitate a fundamental reorientation of the German water sector. Numerous examples in the past of the handling of extreme occurrences have shown that the central water supply and wastewater disposal functioned without any major problems (e.g. dry year 1976, extreme summer 2003) and that disturbances and failures could be compensated relatively quickly (e.g. 2002 Elbe river flood, 2010 Neisse river flood). Nevertheless, water supply and wastewater disposal as public services in the general interest should be given priority treatment when it comes to sovereign decisions on utilising water resources or protecting critical infrastructures.

Activities of the EU, the German Federal Government and some German Laender carried out to date with a view to adjusting to climate change must be welcomed. The planning of flood control measures for example has been adjusted and research activities have been intensified in this area. In cooperation with the utilities and associations, the German strategy for adjusting to climate change will be elaborated by spring 2011, showing the indicators of climate change and possible measures to be taken in different areas. At the same time, the German water sector participates in research projects for developing concrete concepts and technologies to adjust to climate change, such as in the KLIMZUG funding programme of BMBF (German Federal Ministry of Education and Research).

The water sector is affected by a wide range of impacts which need to be examined and assessed individually by the local utilities. For instance, there may be a decrease in the amount of water in lakes and reservoirs usable for water supply. An exacerbation of this situation may be caused by concurrent utilisation through preventive flood protection. Water availability may decrease according to the season, possibly leading to a higher concentration of nutrients and pollutants in water bodies. There is also increasing competition for water use, for instance through irrigation in the agricultural sector. Local occurrences such as torrential rainfall and floods can affect the supply and disposal infrastructure and even cause outages in special cases.

There are many varied possibilities of adjustment

being examined by the utilities and the sector as a whole. When it comes to trend analyses and long-term water availability and demand forecasts, utilities take increasing account of the regional impact of climate change. They include certain aspects of risk and crisis management in their company organisation structure and workflow management. In technical terms, wells and pumping facilities will possibly be adjusted. Drinking water supply must have precedence over other kinds of water use. Decision makers and administrative bodies have to ensure that water supply and wastewater disposal are safeguarded by protecting critical infrastructures.

5.4 Micro pollutants

In a highly industrialised, densely populated country such as Germany with intensively farmed areas, water resources are exposed to various impacts. Anthropogenic micro pollutants such as pharmaceuticals and cosmetics and their impact on water bodies have attracted growing attention over the past few years. Obtaining a balance between avoidability and non-avoidability of pollutions is a socio-political task.

Refined analytical technologies permit even better detection of micro pollutants that previously remained unidentified. For new pollutants, comprehensive hazard analysis and risk assessment is still not possible in many cases due to insufficient knowledge of interactions and inadequacy of data.

To ensure precautionary and sustainable water protection, it is indispensable for all stakeholders to make corresponding efforts. In this context, it is necessary to weigh the benefit associated with a substance according to its intended use (e.g. pharmaceuticals, PFT in extinguishing agents, textiles) against the damage caused by the occurrence of this substance in the aquatic environment (e.g. carcinogenic effect of PFT). The prevention principle is also considered by the legal principle according to which the quality of raw water for producing drinking water should be such as to enable drinking water to be produced by near-natural treatment processes. As a precaution, non-natural, amphibious substances that are not easily biodegradable should be kept away from water bodies and the environment. As a matter of principle, focus must be on measures for minimising input at the immediate source, e.g. by separate treatment of hospital sewage and circulation systems for pharmaceuticals. Whether and to what extent additional measures will be necessary for wastewater disposal and water supply is something that has to be considered on a case-by-case basis.

At the moment, it must be said that legal regulations and the implementation of existing provisions are not sufficient to sustainably protect water bodies from unwanted pollution. Close co-operation among all stakeholders is necessary with regard to the protected assets (water resources for drinking water supply, aquatic eco-systems, fishing, sports and recreation areas, food); in other words, manufacturers, users, consumers, politicians, administrative bodies, suppliers and disposal utilities must work together to find solutions with a view to minimising or preventing the pollution of protected assets.

The current situation is unsatisfactory for operators of drinking water processing and sewage treatment plants, with politicians and the general public creating huge pressure for action in the case of identified or assumed pollution, although scientific findings are not available to serve as a basis for investment decisions. Furthermore, the lack in legal certainty makes it more difficult to assert the associated costs by means of prices and charges. It is therefore essential to establish legal certainty in order to ensure systematic, scientifically and technically oriented action on a national and European level.

PART B – Performance of the German Water Sector

Performance characteristics of the German water sector are long-term safety of supply and disposal, high drinking water quality, high wastewater disposal standards, high customer satisfaction and sustainable utilisation of water resources while paying attention to economic efficiency (5-pillar benchmarking model).

This performance is illustrated by the sector's indicators represented in the following chapters. These figures are based on inquiries carried out by the Statistical Offices of the EU, Germany and the German Laender, on inquiries carried out by the German and European sector associations and on the results of indicator comparisons and benchmarking projects with the participation of water supply and wastewater disposal utilities.

Many practical examples emphasise the importance of benchmarking for continuously enhancing the sector's performance and efficiency.

Benchmarking regularly enables the participating utilities to identify potential for efficiency increase and to develop and implement concrete measures for their realisation (see Section C).

1 Safety

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. Usually, wastewater treatment plants are well utilised and there are sufficient reserves available.

1.1 Safety of supply and disposal

According to the international standard of the International Water Association, interruptions of supply are deemed negative if at least 0.1 % of the population supplied is cut off from the water supply for more than 12 hours. Regional benchmarking projects show that this situation practically does not occur in Germany.

Concrete figures can only be obtained by more detailed differentiation. For instance, the benchmarking projects carried out in Rhineland-Palatinate and Lower Saxony established interruptions of supply affecting 50 domestic connections or more with an interruption of water supply for at least 3 hours. The requirements of the IWA standard are therefore clearly exceeded. According to the Rhineland-Palatinate benchmarking project, only 0.006 % of inhabitants were affected by an interruption of supply. Similar results have been obtained from the benchmarking projects in Lower Saxony.

These results are attributable to the high technical standards for abstraction, treatment and distribution and the excellent condition of networks and plants in comparison with other European countries. Suppliers and disposal utilities keep additional capacities available for use in outage and emergency situations to ensure supply and disposal without any interruptions.

In Germany, it is taken for granted that interruptions of water supply do not occur. However, this does not apply to the same extent on an international scale. The performance of the German water sector is far above average when compared on an international level.

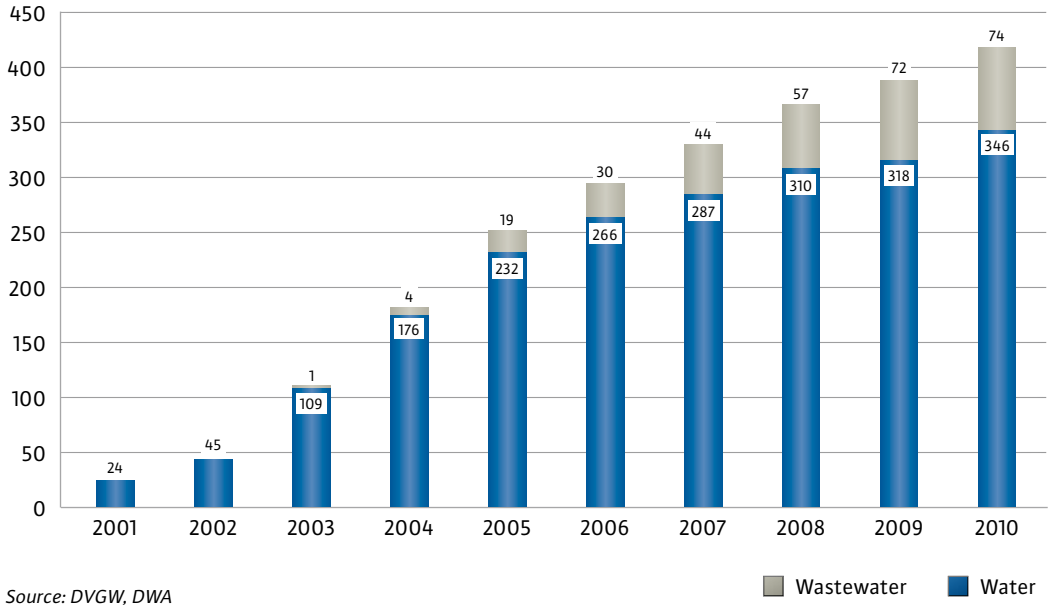
The capacity utilisation of municipal wastewater treatment plants varies; usually, adequate and sufficient reserves are available, as confirmed by the wastewater benchmarking projects carried out in different German Laender.

1.2 Organisational safety within the utilities

Apart from high-capacity facilities and qualified personnel, a well-functioning organisation is a mainstay of safe operation of plants. Numerous management systems are used today to support the organisational processes within the utilities. The best known scheme is the certification according to the requirements of ISO 9001 and 14001. One management system adjusted to the needs of water supply and wastewater disposal is the Technical Safety Management (TSM) developed by DVGW and DWA for the operational practice.

Water supply and wastewater disposal utilities with TSM confirmation

20



Source: DVGW, DWA

1.3 Advanced training

Qualified personnel making use of continuous advanced training are a fundamental prerequisite for safe water supply and wastewater disposal. The sector is aware of this responsibility: 92.5 % of the energy and water supply utilities take care of their staff's advanced training. Compared to the German average of 69.5 %, the sector thus holds a top-level position. Related to the number of employees, the sector's rate of advanced training amounting to 55 % is almost twice as high as the German average of approximately 30 % (Source: German Federal Statistical Office 2009).

But the sector's benchmarking projects show that there is definitely potential for improvement in the area of advanced staff training.

The evaluation of the projects in 10 German Laender shows that the participating companies, representing almost half of nationwide water deliveries, offer 2 days per year for advanced training per person employed. The number of advanced training days shows a distinct increase where time sequences are available (e.g. in Bavaria from 2 to 3, on average, in Baden-Württemberg from 2.3 to 2.8 and in Lower Saxony from 1.5 to 2 days). The median value of advanced training in wastewater disposal on the basis of Laender-wide benchmarking projects amounts to 2.3 days per full-time equivalent. However, all values are still below the reference value of 5 days of advanced training per person employed and year as recommended by the OECD.

2 Quality

The statutory requirements for the drinking water quality are observed throughout the country. Drinking water of an excellent quality is available to the population at all times in sufficient quantities. In contrast to many other EU Member States, wastewater is treated in Germany almost nationwide with the highest EU purification standards.

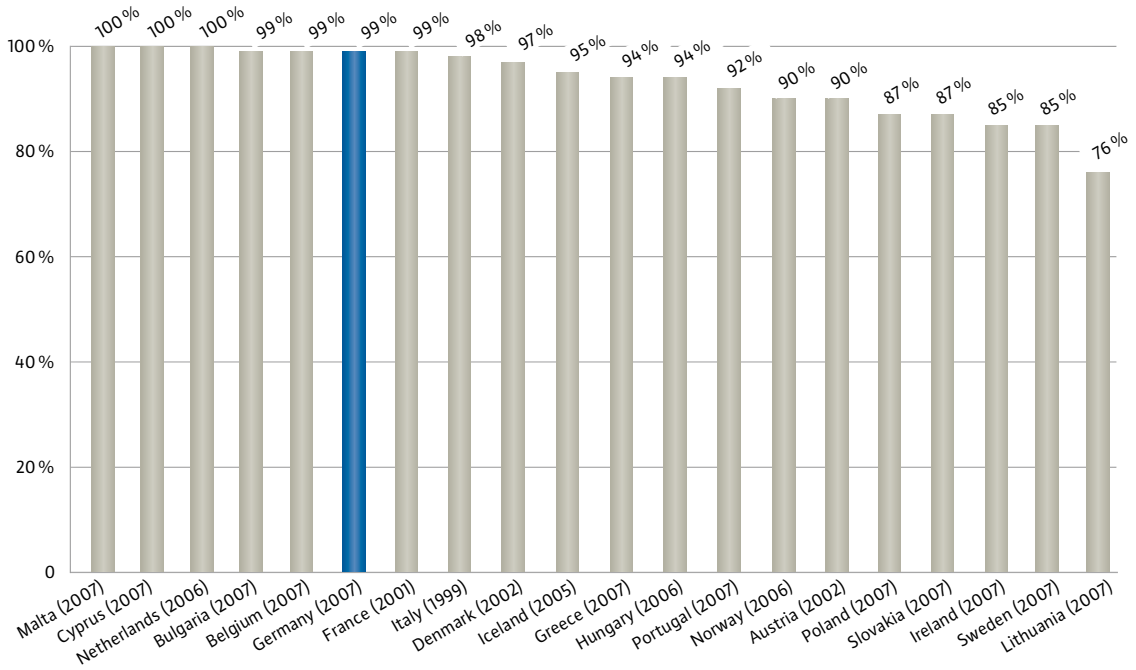
2.1 Connection degree and network length

In Germany, the degree of connection to the public water supply is above 99 % and thus on a very high level compared to other European countries.

No exact data are available regarding the length of the drinking water network, but the total length of the drinking water network in Germany is likely to be 530,000 km (without house connections).

Degree of the population's connection to public water supply in Europe

21



Source: Eurostat, status: 06/2010

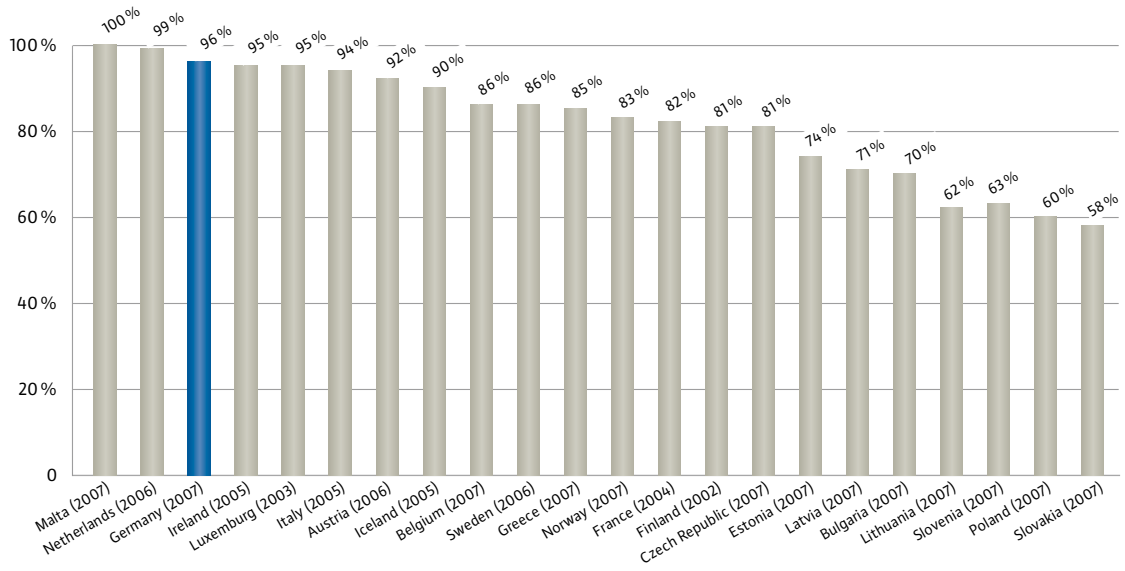
With a connection degree of 96 %, Germany holds a top position in comparison with other European countries. The degree of connection to sewage networks and wastewater treatment plants has increased slightly since 2001.

The population's share in wastewater treated according to the highest EU standard (i.e. biological wastewater treatment plants with nutrient elimination, called "tertiary treatment") has again increased considerably from 88 % (2001) and 90 % (2004) to 95 % at the present time.

Degree of the population's connection to the sewage network

22

regardless of the availability of sewage purification plants

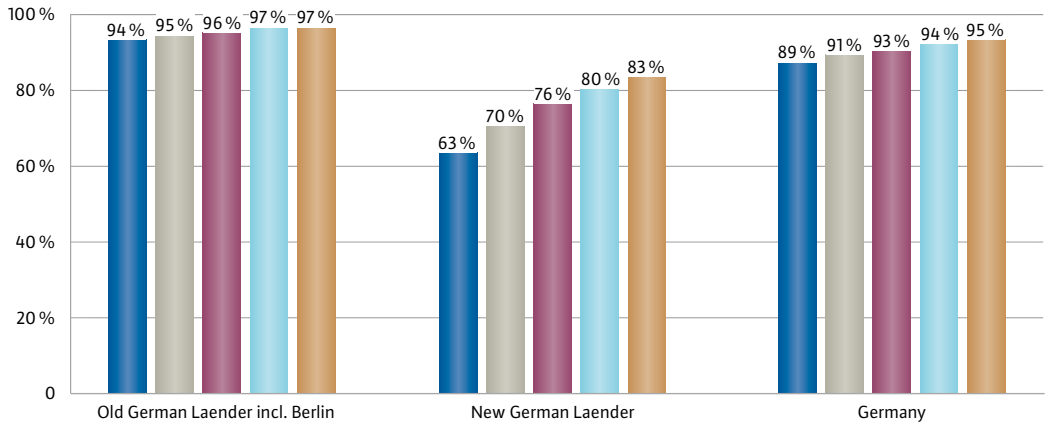


Source: Eurostat, status: 06/2010; German Federal Statistical Office

It is interesting to note that even countries resembling Germany in terms of their structure and economic power are still very slow to catch up – such as Belgium from 82 % (1998) to 86 % (2007).

Development of the population's degree of connection to wastewater treatment plants

23



Source: German Federal Statistical Office, Fachserie 19

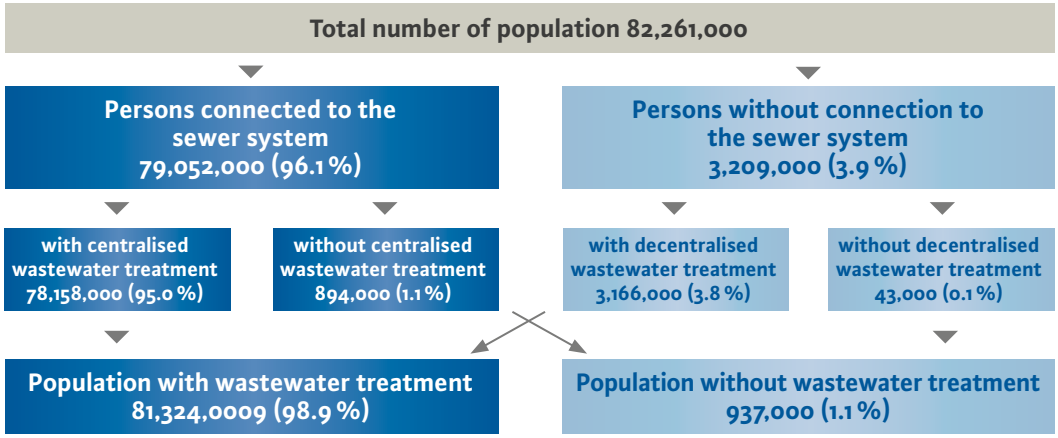
The total number of plants is declining, as some small plants have been taken out of service and wastewater is diverted to existing larger, more powerful plants. The wastewater of households which are not connected to central wastewater systems is treated by decentralised small sewage works so that the degree of connection to wastewater treatment plants is almost 100 % (99 % in 2007; source: German Federal Statistical Office).

The German public sewage network is approximately 540,000 km in length, with combined sewers prevailing. In addition, there are about 66,000 storm water drainage systems.

Wastewater disposal in Germany in 2007

24

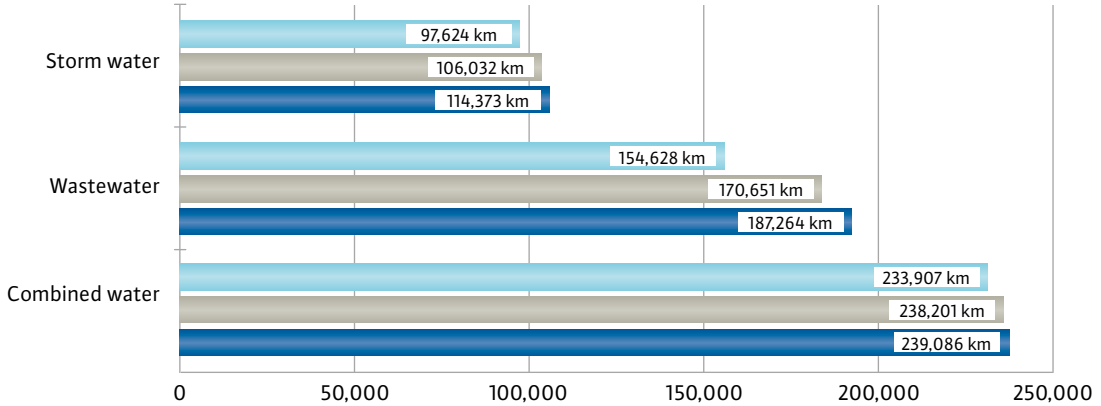
Degree of connection



Source: German Federal Statistical Office

Length of the sewer network

25



Source: German Federal Statistical Office, Fachserie 19 Reihe 22.1, Heft 207 (published in 2009), Heft 2004 (published in 2006), Heft 2001 (published in 2003)

2.2 Quality of water supply and sewage networks

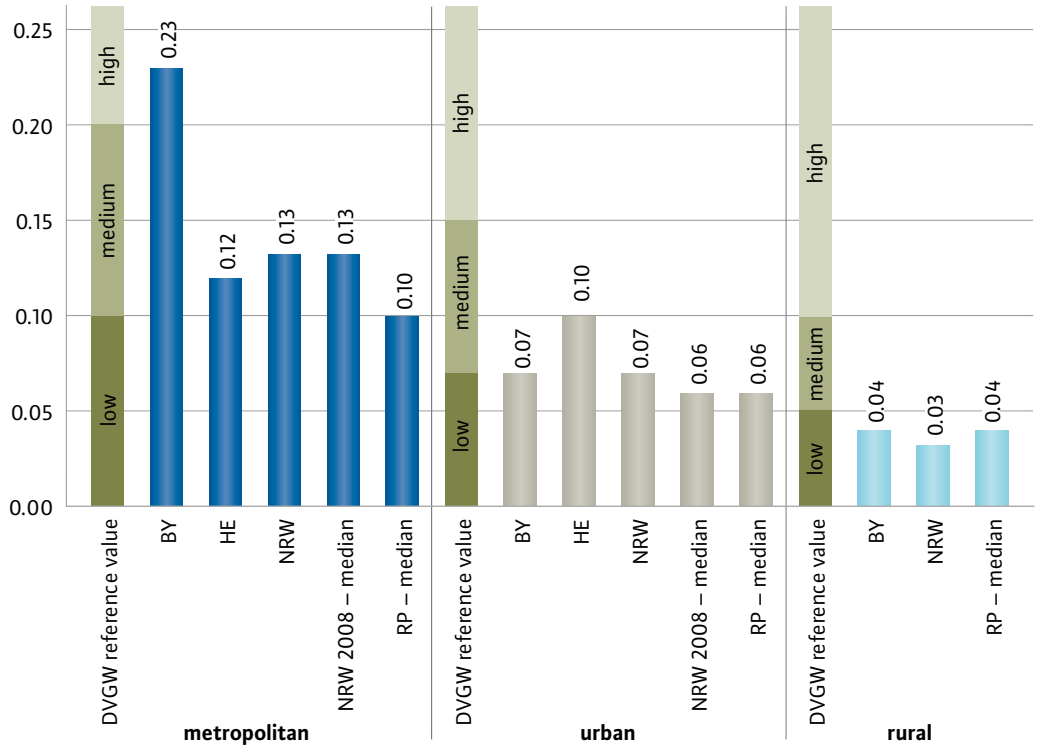
Low water losses in the public drinking water network are an important indicator of the quality of mains and safety of supply. Water losses in Germany continue to decline.

Public reports about the benchmarking projects of the German Federal Laender show that water losses are medium or low with one exception (according to DVGW reference value).

Average real water losses

26

Results from public benchmarking reports (drinking water) in m³/(km*h)



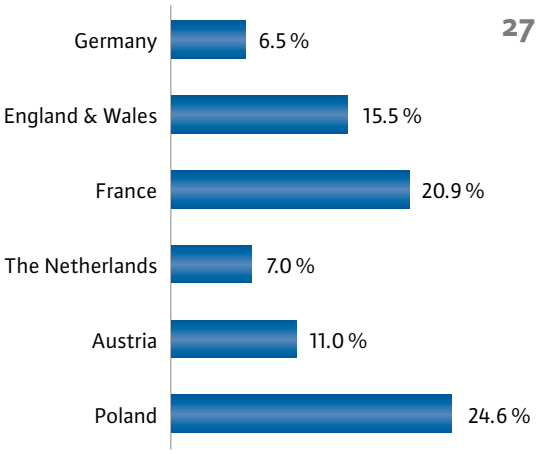
BY = Bavaria
HE = Hesse
NRW = North Rhine-Westphalia
RP = Rhineland Palatinate

Source: IGES/TU Berlin; Study carried out on behalf of BDEW, 2010

Water losses in the public drinking water network[1]: most important indicator of network quality and safety of supply

27

Data as percent
(status 2007; for F: 2004)



1) Extractions for operational purposes and fire control were rated as losses.

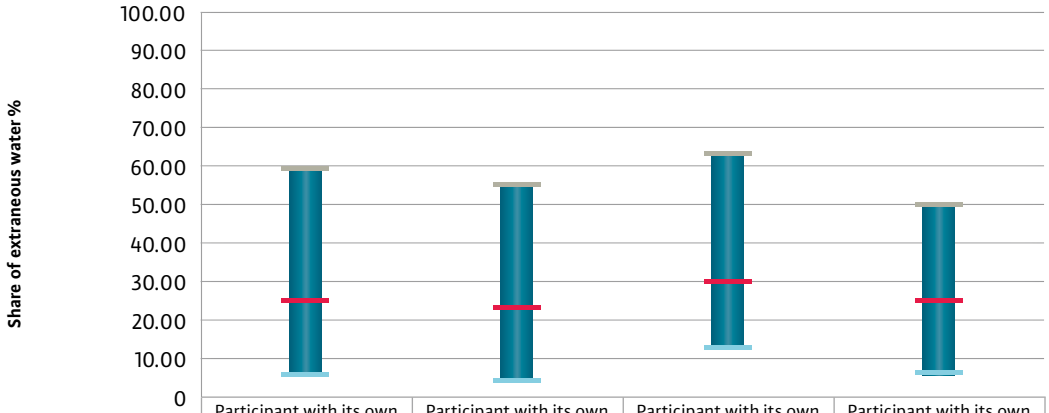
Source: VEWA Study 2010 carried out on behalf of BDEW

With 6.5 %, water losses in Germany are low in comparison with other European countries.

While the density of supply mains can be measured against water losses, a high share of extraneous water is frequently an indicator of leaking sewers. In many cases, extraneous water is groundwater penetrating into the sewer trough leakages. Furthermore, the share of extraneous water can be increased by water introduced without permission via faulty connections or by surface water flowing into the sewer. Median values are generally inconspicuous. The large range of results underlines the need for action on a case-by-case basis.

Range of amounts of extraneous water

28



	Participant with its own local drainage	Participant with its own local drainage and a total sewer network length of <= 150 km	Participant with its own local drainage and a total sewer network length of 150–300 km	Participant with its own local drainage and a total sewer network length of > 300 km
10 % percentile	5.46	3.73	11.90	5.36
median	25.10	23.00	30.00	24.50
90 % percentile	59.40	55.10	64.10	50.00
Number of participants	407.00	209.00	100.00	69.00

Source: DWA

On a national average, the failure rates of mains, service connections, and mains fittings in recent years have been on a constantly low level in Germany. During the past 13 years, the rate of mains failures has decreased from 11.7 to 9.9 incidents per year and per 100 km of network length. These figures show a very low rate of damage compared with other European countries with a tendency to decrease even further. There have been huge improvements particularly in the new German Laender since reunification.

This not only documents a high quality of supply but also illustrates that the German water sector's maintenance and investment strategies are sustainable and effective.

Development in mains failures compared with other European countries

29

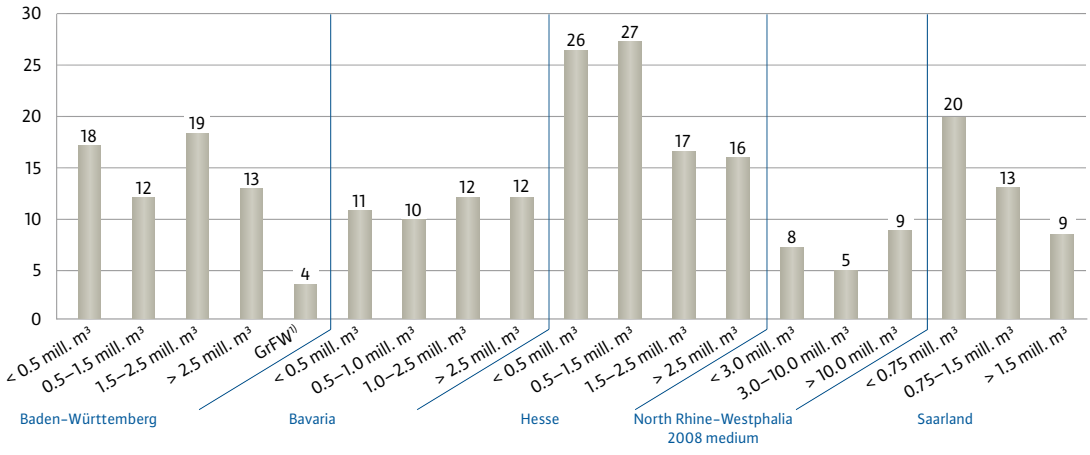
	Period	Damage/ 100 km
Germany	1997 – 2004	11.7
	2005 – 2009	9.9
England & Wales	2000 – 2005	20.0
	2006 – 2007	18.7
Scotland	2002 – 2005	19.7
	2006 – 2007	16.6

Source: DVGW Damage Statistics 1994–2004; Benchmarking projects carried out in Bavaria, Baden-Württemberg, Mecklenburg-West Pomerania, Lower Saxony, Rhineland Palatinate, Schleswig Holstein; OFWAT (2007, 2008) for Great Britain

Average number of mains failures per 100 km of supply network

30

Results obtained from public benchmarking reports (drinking water)



Source: IGES/TU Berlin, Study on behalf of BDEW, 2010

[1] Group and district water suppliers

With regard to wastewater, 90 % of the sewage network operators had checked their entire network through inspection in 2001. In 2004, this percentage amounted already to 95 %. Benchmarking projects carried out in the different German Laender (see Part C) show that sewers needing rehabilitation in the short term have a share of between 4 and 9 % (median values).

2.3 Drinking water quality

The latest report (2008) of the Federal Republic of Germany to the EU Commission on the implementation of the EC Drinking Water Directive (see Chapter A.2.3) shows that the minimum number of investigations required by law is distinctly exceeded. These investigations are carried out by the Public Health Authorities not only on the water suppliers' premises but also on the consumers' water taps. The requirements of the Drinking Water Ordinance are met in 99 % of the analyses. This is proven by the continuously high drinking water quality in Germany. 99 % of the analyses carried out during the previous periods under review (2002 to 2004 and 2005 to 2007) also met the requirements of the Drinking Water Ordinance.

Minor violations of limit values are caused primarily by pesticides, nitrate and coliform bacteria, The occurrence of coliform bacteria refers to sporadic cases of exceeding the limits that were not confirmed by further analyses. Except for 2006, violations of limit values continued to decrease according to a trend observed in recent years for nitrate: from 1.1 % in 1999 and 0.13 % in 2004 to 0.08 % in 2007. In view of the fact that nitrogen and nitrate pollution in groundwater in particular diminishes only very slowly (cf. Chapter A.1) or increases again in regions with intensive agricultural use, these improvements are mainly attributable to measures implemented by the water supply utilities.

In many places, the use of disinfectants in water treatment can be foregone without reducing the high hygienic drinking water standard in Germany.

A Europe-wide comparison of compliance with the EC Drinking Water Directive would be informative. But this is difficult to implement on account of a lack of data. The EU currently publishes figures for the period from 2002 to 2004 (status: 15 July 2010).

2.4 Wastewater disposal standards

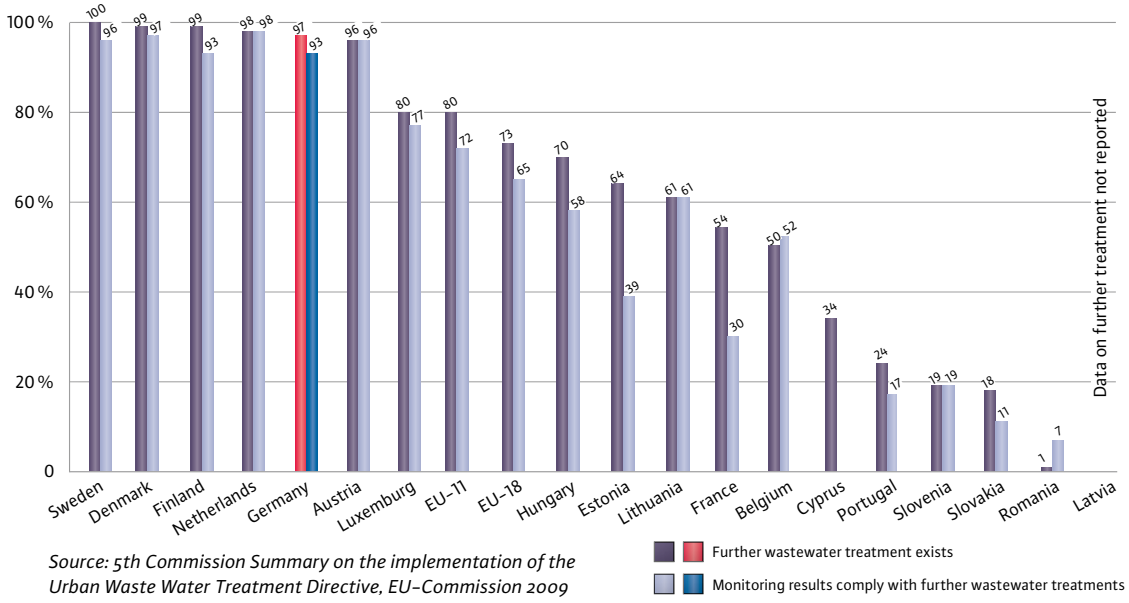
In Germany, 97 % of the wastewater volume is treated with the highest EU standard, that is biological treatment with nutrient elimination, i.e. tertiary treatment pursuant to the EC Directive on Urban Wastewater Treatment (source: EU Commission 2009). In Germany, the DWA performance comparison of municipal sewage treatment plants carried out in 2009 determined an average degradation degree of 81 % for nitrogen and 91 % for phosphorus. Smaller sewage plants which do not have to meet certain requirements in terms of nutrient elimination also showed good degradation values.

According to EU legislation, it is left to the discretion of the Member States to specify "sensitive areas" (see Chapter A.2.3). Germany had already made this specification for the most part in the early 1990s, whereas other EU Member States have increasingly specified certain areas as sensitive only in recent years. The latest report from the EU Commission on implementation of the EC Directive on Urban Wastewater Treatment criticises that some Member States have not reported any data. Implementation deficits in the Member States rank among the largest problems in terms of compliance with EU environmental standards. The data available for the 18 EU countries show that in contrast to many other States, Germany fully complies with the requirements of the EU and performs very well in comparison with other EU countries (source: EU Commission 2009, BMU 2009).

Status of further wastewater treatment based on a comparison of EU countries

31

Share of wastewater quantities (total number of inhabitants and population equivalents – PT) subject to further treatment (%)



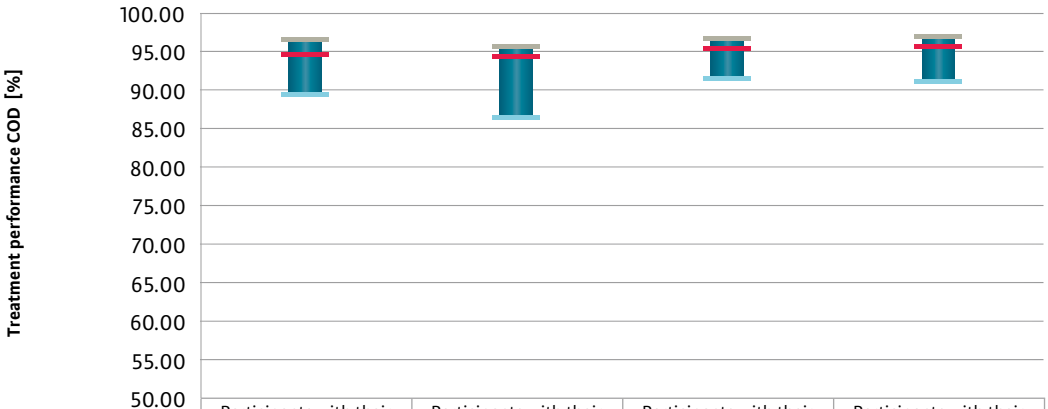
Source: 5th Commission Summary on the implementation of the Urban Waste Water Treatment Directive, EU-Commission 2009

The good treatment performance of wastewater treatment plants in Germany is also reflected by the results of the benchmarking projects.

Performance of municipal wastewater treatment plants

32

related to chemical oxygen demand (COD)



	Participants with their own sewage treatment plants	Participants with their own sewage treatment plants and <= 30,000 PT [1]	Participants with their own sewage treatment plants and 30,000 – 100,000 PT [1]	Participants with their own sewage treatment plants and > 100,000 PT [1]
10 % percentile	89.60	86.20	92.30	91.90
median	94.90	94.30	95.10	95.50
90 % percentile	96.80	95.70	96.90	97.00
number of participants	425.00	235.00	121.00	69.00

Source: DWA

[1] total number of inhabitants and population equivalents (PT)

3 Customer satisfaction and customer service

Safety and quality of supply are of utmost importance to the customers. The vast majority of customers consider their water and wastewater bill as adequate.

Customers of the water supply and wastewater disposal utilities are interviewed at regular intervals by the associations of the water sector through nationwide representative surveys about quality, prices and charges, safety, sustainability and service. In 2009, the BDEW customer barometer asked customers for the fourth time about water supply and for the third time about wastewater disposal. In 2009, the VKU domestic customer survey asked customers for the second time about their opinion on municipal water supply. Local water supply utilities also carry out their own customer surveys at regular intervals. Within the scope of the second round of drinking water benchmarking projects in North Rhine-Westphalia, an independent customer survey was successfully carried out for the first time in the customer satisfaction pillar with the participating utilities, and documented in the final report.

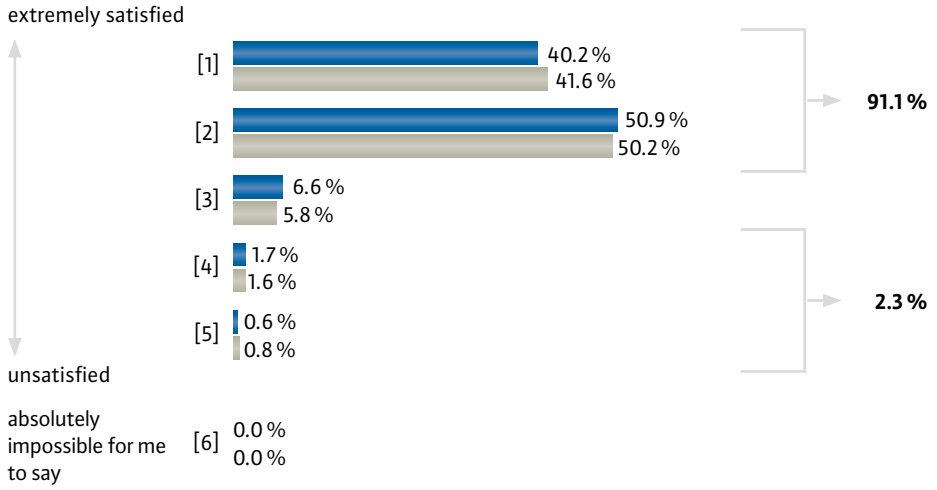
3.1 Drinking water supply

3.1.1 Drinking water quality

Customers have given drinking water quality good to very good marks for many years. Customer satisfaction has stabilised on a very high level. More than 91 % are extremely satisfied or satisfied. In 2005, 3.6 % were still unsatisfied or very unsatisfied. This share has decreased clearly to 2.3 %.

How satisfied are customers with water quality in general? 33

Data as percent



Source: 2009 BDEW Customer Barometer ø = 1.7 n = 1,000, Study 2009 ø = 1.7 n = 1,000, Study 2007

Two thirds of the customers consider that drinking water in Germany ranks among the best in comparison with other countries (source: 2009 BDEW Customer Barometer).

In North Rhine-Westphalia, 72 % of the customers interviewed judge their drinking water to be very good or good and 15 % to be satisfactory, given a range of grades from 1 to 6 (source: 2010 benchmarking report of North Rhine-Westphalia on drinking water).

3.1.2 Service

Customer satisfaction with service provided by the water supplier is on a constantly high level of more than 80% (source: BDEW Customer Barometer).

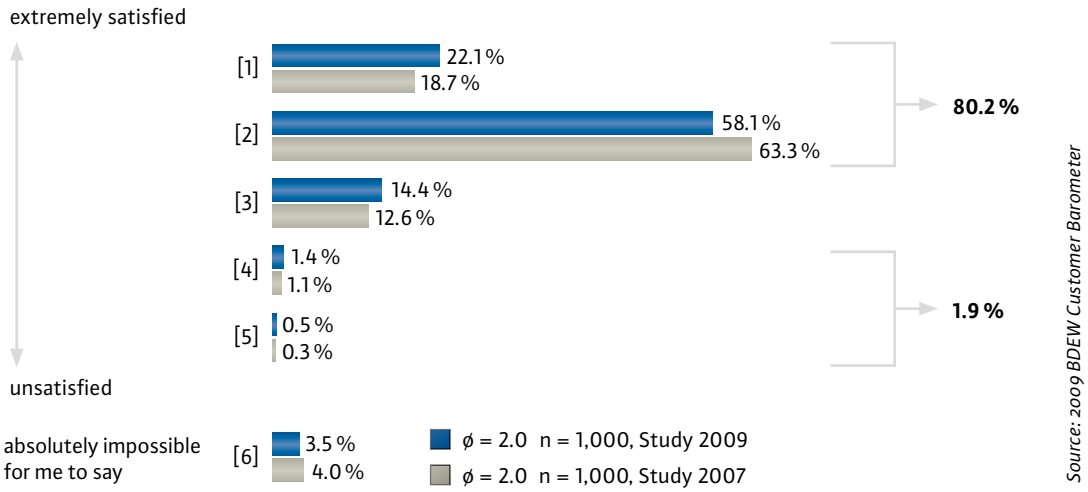
In North Rhine-Westphalia, more than 86 % of the customers who had contact with their water supplier are very satisfied or satisfied; just about 7 % of customers were partly satisfied (source: 2010 benchmarking report of North Rhine-Westphalia on drinking water).

In 2009, the most important criterion was the regular control of drinking water.

Customers' satisfaction with the service of their water supplier

34

Data as percent

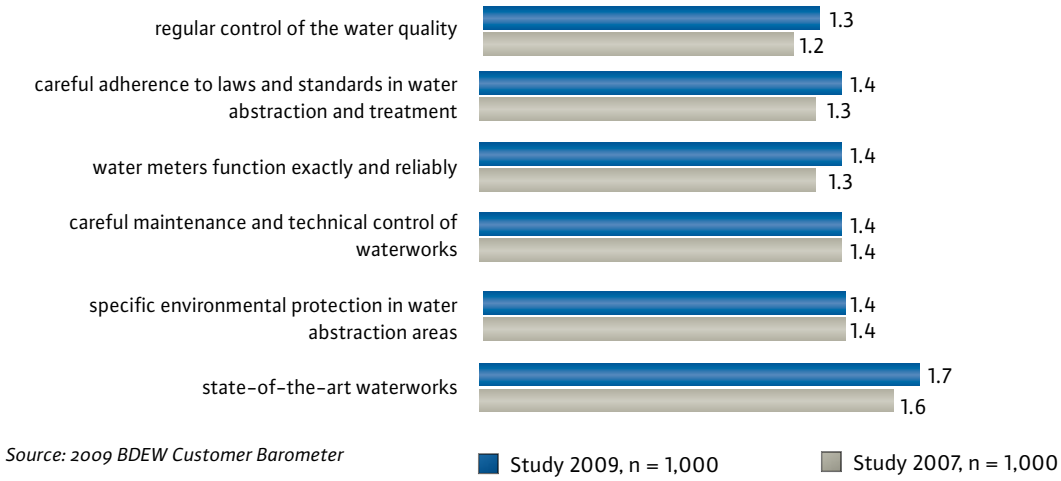


Source: 2009 BDEW Customer Barometer

Which services are important to the customer?

35

Assessment scale: 1 (important) to 5 (unimportant)



Source: 2009 BDEW Customer Barometer

Customers still give top marks to the reliability of water supply (24/7, grade 1.4) and to the diligence and reliability in meter exchange and reading (grade 1.6).

Reliability of 24/7 water supply is the most important performance indicator, followed by speedy troubleshooting. The grades given by the customers to their supplier for these services are 1.4 for reliability and 1.7 for troubleshooting (assessment scale: 1 to 5).

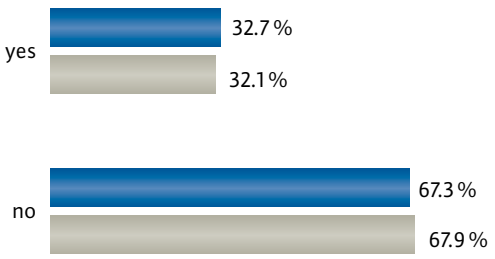
Almost 80 % of the customers interviewed said that they economise water consumption. The main reason for this is to save money (71 %).

There is still a large share of customers who say they do not know how much drinking water costs them each year (66 %), decreasing only slightly compared to 2007 (2007: 68 %). Many customers think the price for 1,000 litres of drinking water is far higher than it actually is.

Customers who had been in contact with their supplier gave marks from 1.6 to 2.2 for performance. Customers were also still very satisfied in 2009 with the supplier's adherence to agreements (grade 1.6). They still see slight potential for improvement in terms of the supplier's availability on the Internet (grade 2.2).

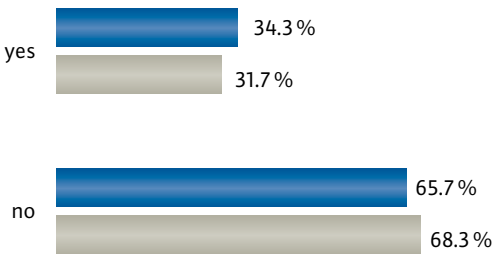
Do water customers know how much water they consume each year?

Data as percent



Do water customers know how much tap water costs them each year? 36

Data as percent



Source: BDEW Customer Barometer 2009

n = 1,000, Study 2009 n = 1,000, Study 2007

3.1.3 Awareness of drinking water consumption and drinking water prices

The share of customers claiming to know their actual water consumption amounts to nearly 33 %. It has slightly increased from 31.5 % in 2005.

In North Rhine-Westphalia, more customers think they know their water bill exactly or at least roughly (31 % and 19.5 %), but not even every second customer can accurately assess the price of drinking water, neither as an annual amount nor as the consumption price per cubic metre (source: 2010 benchmarking report on drinking water in North Rhine-Westphalia).

Almost two thirds of the customers consider the price-performance ratio as being adequate (source: VKU 2009 domestic customer survey).

In North Rhine-Westphalia, 37 % of the customers were satisfied (6 % of them even very satisfied) with the price-performance ratio. 20 % were explicitly unsatisfied. Almost the same percentage rate is reached by the groups that did not make any statements (21 %) or that were partly satisfied or partly unsatisfied (23 %) (source: 2010 benchmarking report on drinking water in North Rhine-Westphalia).

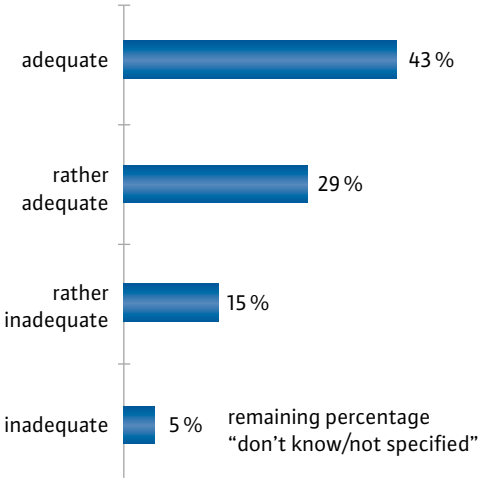
3.1.4 Public image and rate of complaints

The public image of the German water suppliers is constantly positive, as confirmed again by the 2009 survey. All grades have remained unchanged: when asked about the image of their water supplier, customers still gave top marks for reliability (grade 1.6) and quality awareness (grade 1.8). Good marks were also given for aspects such as "fair water prices" (grade 2.5) and "unbureaucratic utility" (grade 2.5) within a possible range of 1 to 5.

For many years, the rate of complaints has been extraordinary low at 4%. The number of persons unsatisfied with the water supplier's response to their complaints has decreased from 52 % to 35 % (2009). Approximately 43 % of the customers are extremely satisfied or satisfied with the response to their complaints (source: 2009 BDEW Customer Barometer.)

Price-performance ratio in water supply 37

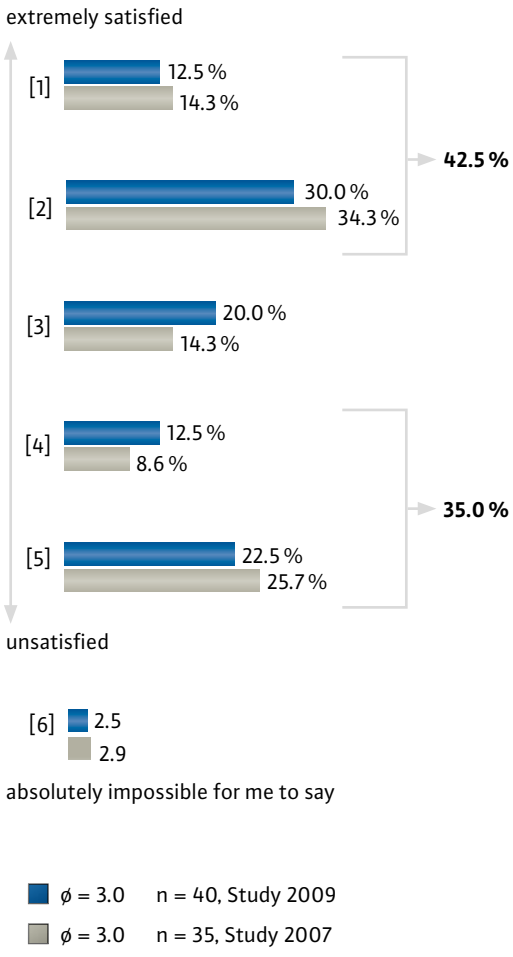
Question: Looking at the water quality and the safety of supply, how do you rate the levied water price?



Source: VKU 2009 domestic customer survey

Customer satisfaction with suppliers' response to complaints 38

(drinking water) data as percent



Source: 2009 BDEW Customer Barometer

3.2 Wastewater disposal

3.2.1 Service

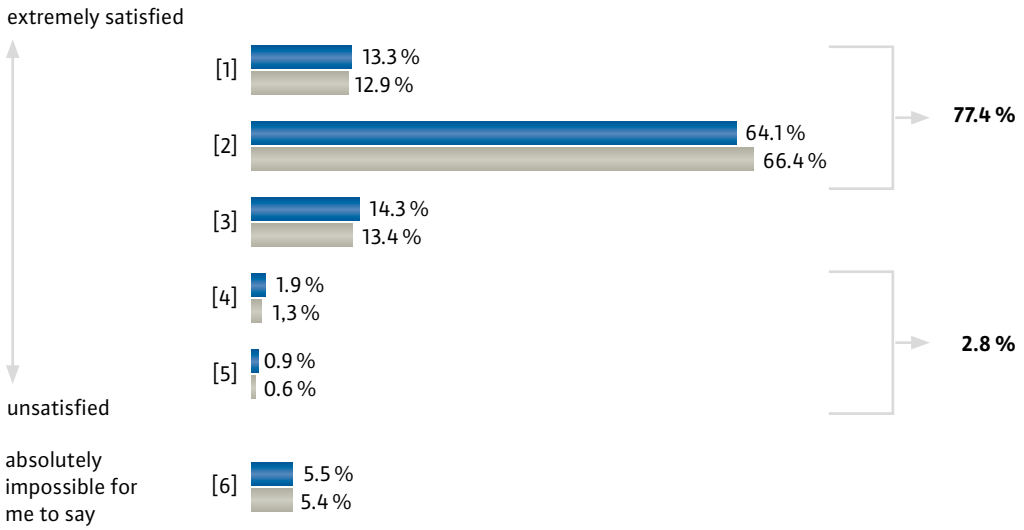
The overall satisfaction of customers with their wastewater disposal utility is constantly high. More than 77% are extremely satisfied or satisfied.

74 % of the customers who had contact with their wastewater disposal utility are extremely satisfied or satisfied with the quality of performance which is at the same level as in 2007.

The contribution of wastewater disposal to environmental protection is still assessed as very important or important by approximately 96 % of the persons interviewed.

Overall satisfaction of customers with the services of their wastewater disposal utility 39

Data as percent



Source: 2009 BDEW Customer Barometer ø = 2.1 n = 1,000, Study 2009 ø = 2.1 n = 1,000, Study 2007

3.2.2. Awareness of the wastewater disposal utility and the level of wastewater disposal charges

In 2009, more than 50 % of the customers knew their wastewater disposal utility, about 2.5 % more than in 2007. As in the years before, the wastewater charge estimated in 2009 was essentially higher than the real charge.

66 % of house owners understand their wastewater bill, 3 % said they didn't and almost 31 % do not make any comments. It still is in the interest of the utilities to offer more appropriate information to their customers.

4 Sustainability

With total capital expenditure of more than €110 billion since 1990, the German water sector is one of the biggest customers for private industry, with the activities involved in planning, construction and operation being outsourced to external contractors to a great extent.

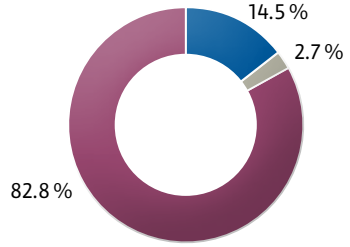
4.1 Availability of resources and their utilisation

The Federal Republic of Germany is a water-rich country (see Chapter A.1). Its total annually renewed water resources amount to 188 billion m³. Only 17 % of these resources are actually utilised by different users. Public water supply uses approximately 5.1 billion m³ per year; this corresponds to only 2.7 % of the available resources. The water use of public water supply decreased from 2.9 % (2004) to 2.7 % (see Chapter A.5.1). The volume of unused water increased from 81.0 to 82.8 %.

In the light of such a comfortable situation, safe water supply is guaranteed in Germany in the long term, given sustainable use of water resources.

Water utilisation in Germany in 2007 — 40

Total available water resources:
188 billion cubic metres



Total water consumption 17.2 % (32.3 billion m³)

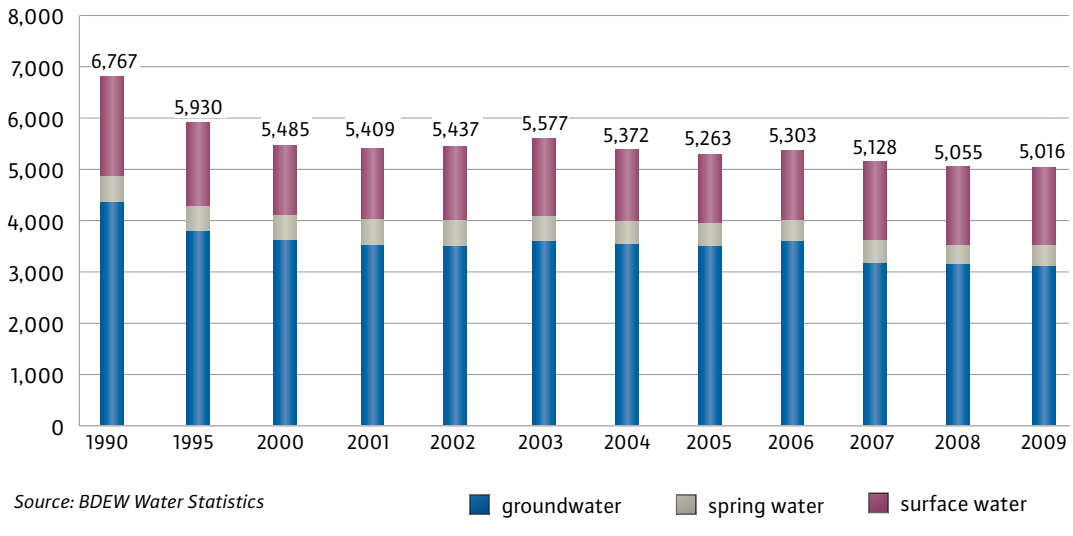
- Non-public water supply and wastewater disposal 27.2 billion m³
- Public water supply 5.1 billion m³
- Unused 155.7 billion m³

Source: German Federal Statistical Office, Fachserie 19, Reihe 2.1 (published in 09/2009); German Federal Institute of Hydrology

With a share of approximately 61.8 %, groundwater (including 69.9 % spring water) is still the most important resource for drinking water abstraction. The share of utilised surface water resources (reservoirs, bank filtrate, enriched groundwater, direct extractions from rivers and lakes) amounts to 30.1 %. Since 1990, annual abstraction volumes have decreased continuously by about 25 %.

Development of water abstraction for public drinking water supply in Germany — 41

Data in million m³



Source: BDEW Water Statistics

4.2 Network renewal

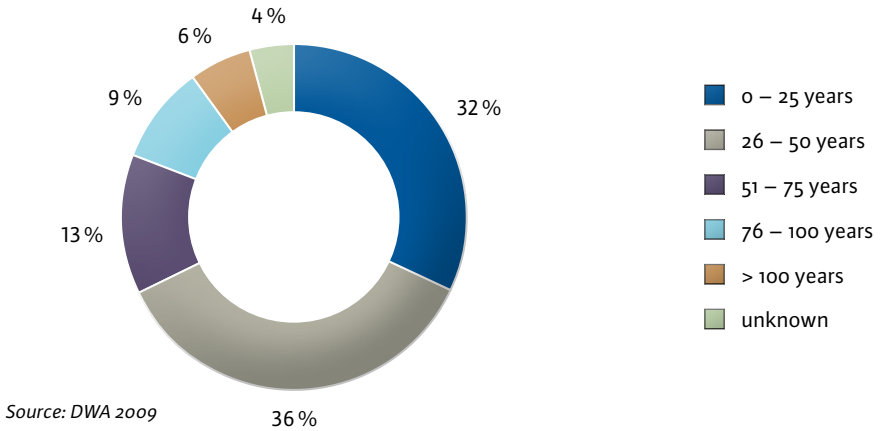
Drinking water and wastewater networks have a service life of up to 100 years. This means that these networks require continuous maintenance and renewal. A technically and economically reasonable rate of network renewal must be determined by every utility on the basis of local conditions, such as mains material, network age, damage rates, leakages.

The benchmarking projects (drinking water) carried out in Baden-Württemberg, Bavaria, Hesse, North Rhine-Westphalia, Rhineland Palatinate and Saarland published the values of network renewals averaged over the past 10 years. Accordingly, the average annual rates of renewal for the participating utilities are between 0.4 and 1.2 % of the mains network.

However, it should be noted that the renewal strategies take many aspects into account. For instance, a lower rate of renewal can initially be reasonable for a younger network, as also revealed by the permanently low water losses and damage rates (see Chapter B.2.2) and by the extremely low number of interruptions of supply (see Chapter B.1.1). Total annual capital expenditure in drinking water supply amounts to €2 billion (see Chapter B.5.2).

In the wastewater sector, about 31 % of the existing sewers were constructed over the last 25 years. 39 % of the existing sewers are between 25 and 50 years of age. Consequently, approximately 70 % of sewers are less than 50 years old.

Age pattern in the sewer network 42



Source: DWA 2009

From 2004 to 2008, the mean costs for sewer rehabilitation, based on the costs for repair, renovation and renewal measures, amounted to approx. €908 per meter of overhauled sewer.

On average, operators plan capital expenditure of about €8,000 per year and sewer kilometre. This corresponds to capital expenditure of €16 million p.a. for a large city with a sewer network of 2,000 km in length (source: DWA survey 2009).

4.3 Sewage sludge

In Germany, the volume of sewage sludge in 2008 amounted to about 2 million tons, using different disposal methods.

Recent years have seen thermal procedures gaining in significance. On the other hand, there has been a decrease in landfilling due to the prohibition of waste landfilling containing higher levels of organic substances. The use of sewage sludge in agriculture and landscaping is decreasing. Sewage sludge recycled in agriculture and landscaping has significantly lower heavy metal contents than sludge subjected to thermal treatment.

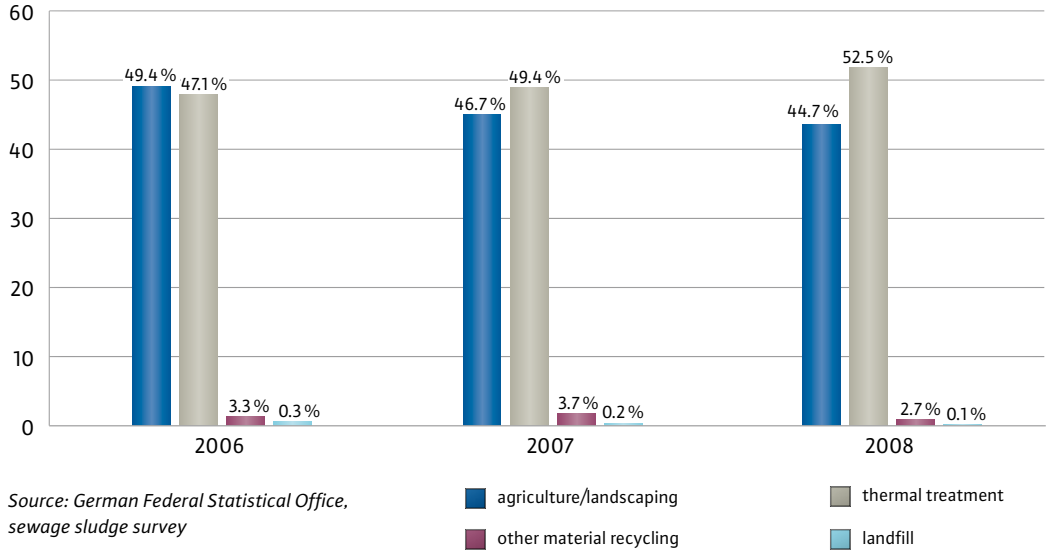
The DWA sewage sludge survey shows that pollutant levels in municipal sewage sludge are far below the limits of the applicable German Sewage Sludge Ordinance and of the applicable EC Directive. The German reports to the European Commission prove a continuation in the multi-annual trend towards decreasing levels of the main parameters lead, cadmium, chrome and mercury and zinc (Source: BMU).

The comprehensive measures introduced by municipal wastewater management have improved the acceptance of agricultural sewage sludge recycling by politicians, consumers and in the agricultural sector. One essential prerequisite to this end consists in the observance of ambitious quality requirements and dialogue with the local stakeholders. Quality assurance systems improve the quality of sewage sludge and its utilisation.

Methods of sewage sludge disposal

43

Data as percent



Source: German Federal Statistical Office, sewage sludge survey

4.4 Training

Training of junior staff is an essential component in sustainable corporate development. The utilities of the energy and water supply sector have provided training on a constant level for more than 10 years. With a mean share of trainees of 5.8 %, they almost reach the average of the manufacturing sector amounting to 6.1 % (source: BIBB 2007).

Similar results are also obtained from the latest survey of the sector. In early September 2010, 38,294 persons paying social insurance contributions worked in water supply and wastewater disposal for 709 member companies of the BDEW. 2,031 of these persons were trainees; the training rate was therefore 5.3 % (source: BDEW 2010).

In 2010, 380 of the aforementioned member companies provided training in water supply and wastewater disposal. 270 of these companies said that they trained more skilled workers than they need for their own demand.

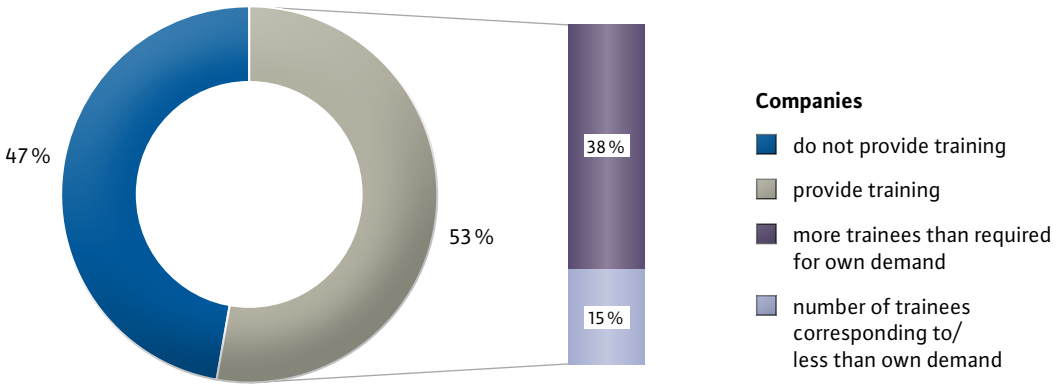
As reasons for not providing training, 41 companies said they had no trainer capacities. Most of them had less than 10 employees in the water/wastewater branch.

116 of the companies not providing any training said they had no need for junior staff in the year under review.

Training in the water sector 2010

44

Training situation of the BDEW member companies (water/wastewater)



Source: BDEW survey on openings for apprentices in the energy and water sector 2010

The rate of training is also determined in the benchmarking projects carried out in Baden-Württemberg, Bavaria, Hesse, Mecklenburg West Pomerania, Lower Saxony, Rhineland Palatinate, Saarland and Schleswig-Holstein. The average training rate of the different projects shows a wide range from 2.3 to 10.0 %.

4.5 Energy consumption and efficiency

The water sector accounts for about half a percent of primary energy consumption in Germany (source: German Federal Statistical Office 2009).

It takes on average 0.51 kWh to provide 1,000 litres of drinking water. There is a large fluctuation range; the amount of energy required depends for instance on whether spring water is available or deep-seated ground water needs to be abstracted, and on the differences in altitude to be overcome for water transport and distribution. The specific per-capita energy demand for drinking water supply thus amounts to about 29 kWh p.a.. The electricity consumption for instance of a modern fridge/freezer combination of the energy efficiency class A++ amounts to approx. 170 kWh/year.

Wastewater disposal plants are among the largest infrastructural energy consumers so that the focus here is on further energetic optimisation, as well as generating their own energy. Here there have been considerable improvements to wastewater treatment plants in recent years, with regard to heat production, for example: heat produced from biogas accounts for about 1.1 % of heat production from renewable energies in Germany. In 2009, electricity generation from biogas accounted for 0.2 % of gross electricity generation. During the period from 1995 to 2005, the amount of digester gas produced in wastewater treatment plants increased by a factor of 7. Further increases could be achieved by making corresponding use of available dimensioning and utilisation reserves, with additional input of biomass, for example (co-fermentation).

In addition to these well-proven procedures, utilities are developing and testing new technologies for saving or producing energy, such as the use of energy-efficient pumping technologies or heat recovery from wastewater. For example, a major operator of wastewater treatment plants could reduce the energy demand by 13 % and simultaneously increase its own energy generation by 42 % over 6 years.

Efficiency benefits may possibly be negated by increasing requirements made of water or wastewater treatment (e.g. the energy-intensive removal of micro pollutants).

5 Economic efficiency

Increases in the drinking water prices and wastewater charges have mostly remained below the inflation index for many years. Taking account of the respective water consumption and performance standards, customers in Germany pay less for their drinking water than customers in other comparable EU countries.

5.1 Water fees and wastewater charges

Every citizen pays 23 Cent per day on a national average (i.e. €84 p.a.) for drinking water (figures for 2008, BDEW) and 32 Cent per day (corresponding to €115.62 p.a.; status: 2009) for wastewater disposal.

In theory, a four-person household covering the minimum recommended beverage demand just with drinking water would pay about €3.50 p.a.

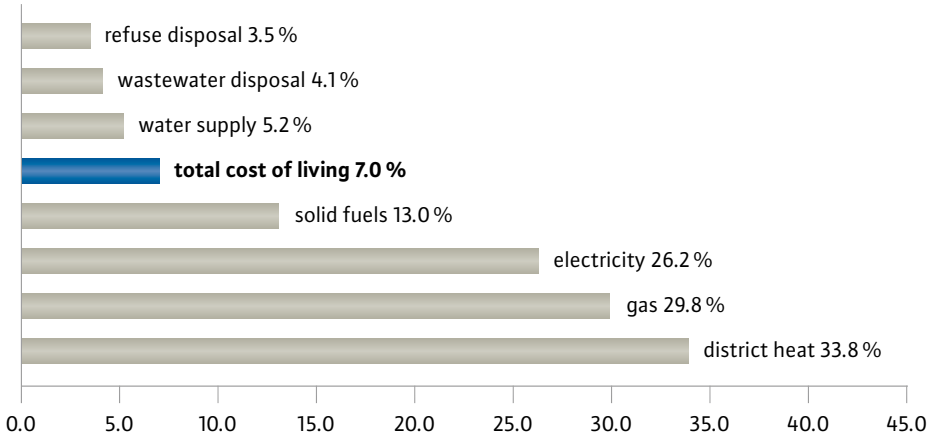
In 2009, **drinking water prices** in Germany remained almost stable; they increased only by 1.1 % on average.

The price increase was therefore far below the average general price increase rate of 0.4 % (source: German Federal Statistical Office). Since 1995, the general price index in Germany has risen by 22.4%. The per-capita burden from drinking water increased only by 16.7 % during the same period.

Overhead costs

45

Increase in overhead expenses from 2005 to 2009 as %



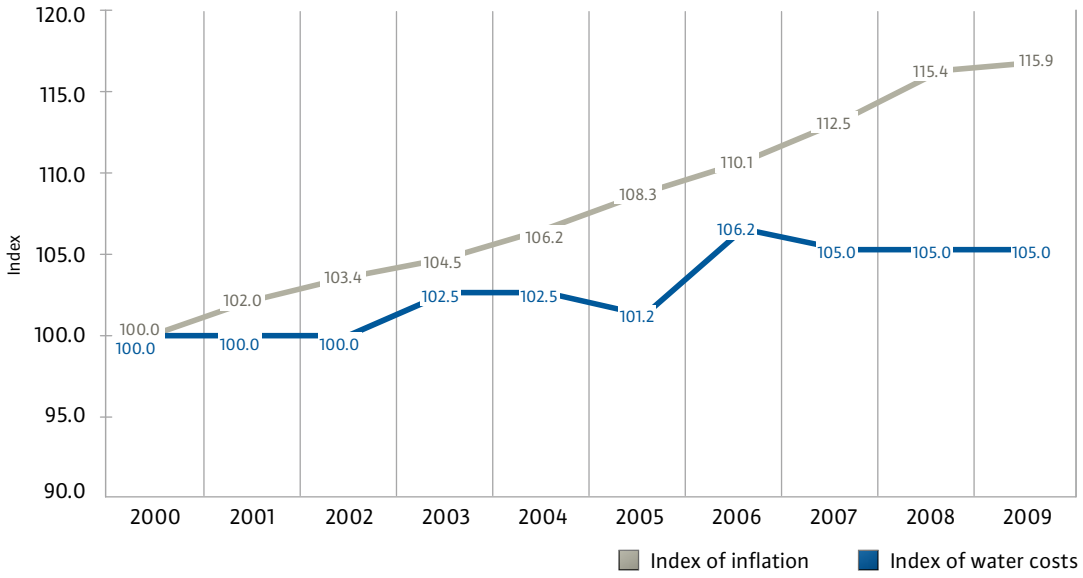
Source: German Federal Statistical Office

A comparison of the per capita costs of drinking water p.a. with those in other countries (taking account of the higher water consumption in those countries and an equal standard of performance) shows that the costs in Germany amounting to €83 (2007) are as low as in the Netherlands. These costs are lower than in Germany only in Poland, while customers have to pay more for water in England and Wales (€97), in France (€109) and in Austria (€91). Another possibility is to look at the share of available income spent by the individual citizen on drinking water (given a standard level of performance). A comparison among six countries puts Germany together with England and Wales well down the scale (0.32 %). Citizens in the Netherlands pay somewhat less for drinking water than in Germany. In France and Austria they pay distinctly more and in Poland almost twice as much (source: VEWA Study 2010).

Development of per capita expenditure on drinking water compared to inflation

46

per capita p.a., 2000 to 2009

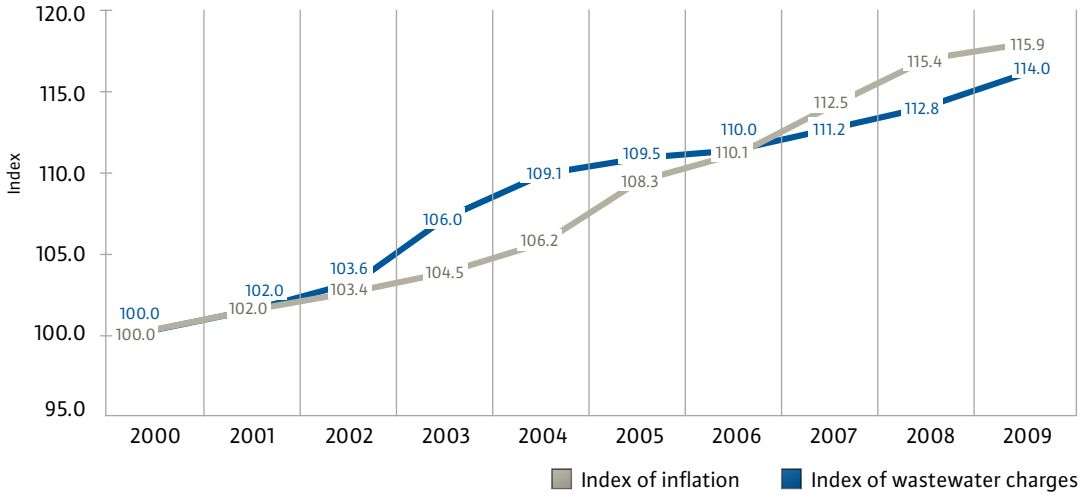


Source: BDEW, German Federal Statistical Office

Wastewater charges from 2000 to 2009 and inflation

47

Index (year 2000 = 100)



Source: German Federal Statistical Office

In 2009, **wastewater charges** increased slightly compared to the preceding year. Where the freshwater standard was applied, the increase was 2.48 %. Based on split wastewater charges, the increase amounted to 1.40 % for sewage water and 1.56 % for precipitation water. In 2009 the increase therefore exceeds the historically low inflation rate of 0.4 %.

A comparison of annual per capita expenditure on wastewater (taking account of the higher water consumption in other countries and given a uniform standard of performance) shows that charges in Germany amounting to €123 (2007) are lower than in England & Wales (€170), France (€135) and the Netherlands (€127). Wastewater expenditure is lower only in Austria (€119) and Poland (Source: VEWA Study 2010).

Another possibility is to look at the share of available income spent by the individual citizen on wastewater disposal (given a standard level of performance). A comparison between six countries puts Germany (0.48 %) well down the scale together with the Netherlands (0.42 %) and Austria (0.44 %). Citizens in France (0.50 %), England & Wales (0.56 %) pay more for wastewater disposal than in Germany, and in Poland (0.85 %) almost twice as much (source: VEWA Study 2010).

Wastewater charges can be levied in the form of

- a sewage charge based on the consumption of freshwater and an additional precipitation charge based on the drained area (split wastewater charges). Approx. 66 % of inhabitants covered by the DWA Survey receive an invoice with a distinction made between wastewater and precipitation water. In the case of split wastewater charges, the mean sewage charge is €1.95/m³ and the precipitation charge €0.89/m² sealed surface (2009).
- a uniform charge according to the freshwater standard using the volume of consumed freshwater as an assessment basis. The costs for the collection and treatment of precipitation water are included in this uniform charge on a pro-rata basis. In 2009, the discharge and treatment of 1,000 litres of wastewater costs the citizen €2.46 on average.

In addition, it is possible to levy a basic charge for more homogeneous distribution of the high fixed costs among all inhabitants connected to wastewater disposal facilities. At the same time, this acts as a stabilising element, cushioning the increase in charges and thus bringing the structure of charges more in line with the real cost structure. As a general rule, a basic charge is levied as a fixed annual amount. About 10 % of the utilities collect basic charges (source: DWA 2008 and 2009).

5.2 Capital expenditure

Continuous capital expenditure in the maintenance and renewal of infrastructure is a crucial factor in long-term safety of supply and disposal, helping to avoid sudden surges in capital expenditure which would cause significant increases in charges. It also leads to a heterogeneous mixture in terms of the age of the supply and disposal facilities.

Since German reunification, water and wastewater utilities have invested more than €110 billion. The water sector invests an above-average share of its sales revenues in plants and networks, making it a driving force for small and medium-sized businesses in terms of employment and environmental policy. In 2008, the share of capital expenditure invested by the water supply sector amounted to 18 % of overall sales revenues and was thus far above the aver-

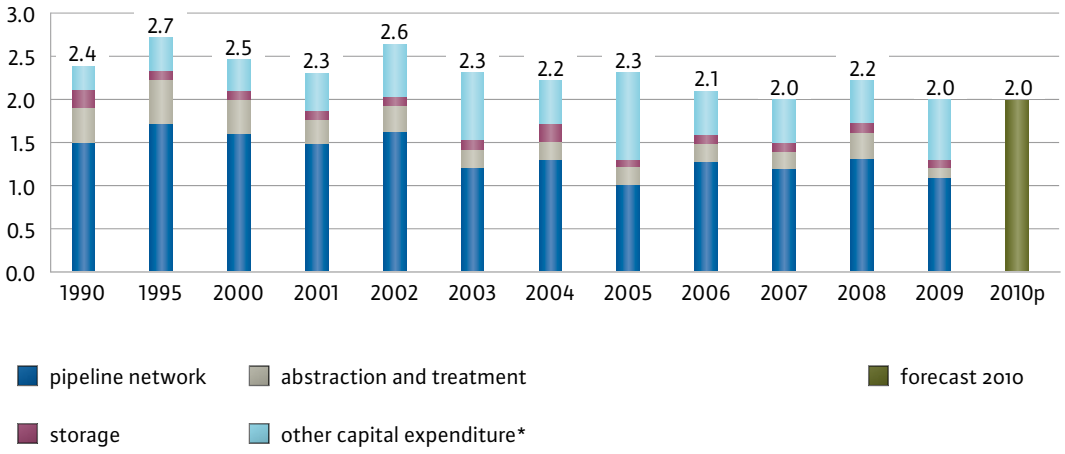
age achieved by other sectors of economy (e.g. manufacturing sector 3.3 % in 2007, utility industry 3.1 % in 2008 as a whole; German Federal Statistical Office 2009).

In 2008 alone, water and wastewater utilities invested almost €6 billion, with plans to invest another €6.5 billion each year in 2009 and 2010. Most capital expenditure was spent on networks.

Development of capital expenditure in public water supply from 1990 to 2010

48

according to asset areas, in billion Euro



* other capital expenditure =
meters and measuring devices, and capital expenditure which cannot be broken down into asset areas.

Source: BDEW Water Statistics

The decrease compared to the years before 2000 is attributable to the phasing-out of capital investment as part of implementing the EC Directive on Urban Wastewater Treatment.

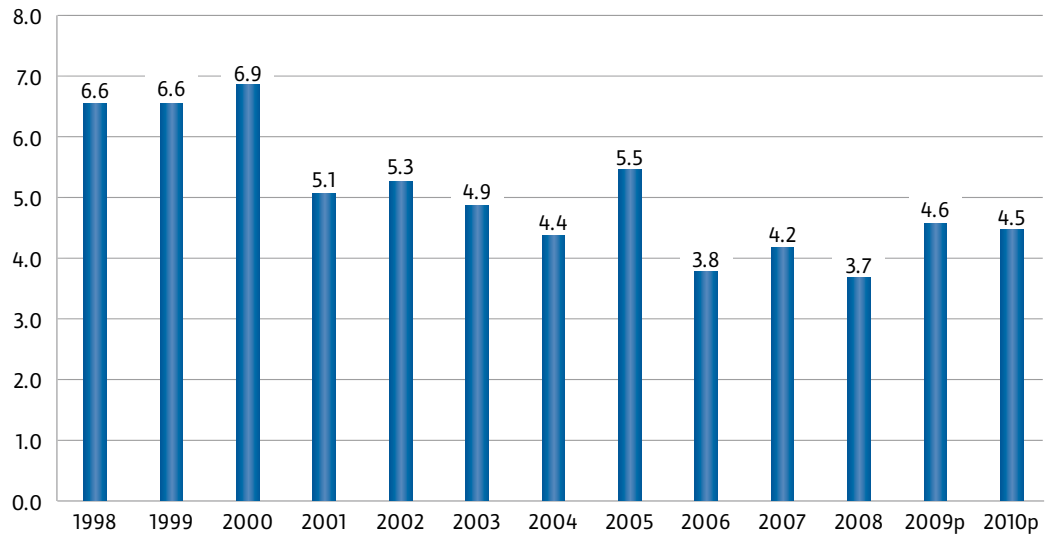
Moreover, in the wastewater sector it is common practice for third parties to be involved in the provision of partial services.

In 2008, wastewater disposal utilities put approx. €6.4 billion into the regional economy. Measured against total expenditure, about 60 % of services are provided by private companies. Planning and construction services account for about 56 % and plant operation for 44 % of this investment volume.

Development of capital expenditure in public wastewater supply from 1998 to 2010

49

in billion Euro



Source: BDEW/DWA/Deutscher Städtetag – wastewater survey, p = provisional

Compared to other European countries, Germany's average capital expenditure in drinking water per cubic metre amounting to €0.55 per m³ is higher than in Poland, Austria (€0.30 per m³), France (€0.43 per m³) and the Netherlands (€0.44 per m³). Only England and Wales (€0.62 per m³) show a higher value on account of the backlog that has to be covered here (source: VEWA Study 2010).

In the wastewater sector, a comparison of average capital investment per cubic metre in Europe shows that this value is higher in Germany (€1.18 per m³) than in Poland, the Netherlands (€0.93 per m³), France (€0.97 per m³) and England & Wales (€1.03 per m³). Only Austria shows a higher value (€1.44 per m³) (source: VEWA Study 2010).

In Germany, all capital expenditure costs are included in prices and charges, whereas in other countries, capital expenditure is partly financed by the municipalities from the general budget (source: VEWA Studies 2006 and 2010).

PART C – Conclusions

The German water sector undergoes a constant modernisation process. It is essential to maintain and refine the high standards and to ensure adequate pricing for customers. Voluntary benchmarking is applied to a large extent throughout the country. As a result, utilities have improved their performance with respect to safety, quality, customer service, sustainability and economic efficiency.

This Profile documents the performance of Germany's water sector for the third time. The wide range of activities reveals the continuous, dynamic development of the sector. The discussion about water fees shows that the sector must improve the visualisation of its performance, with the utilities making their fees more transparent. To this end, the Associations have launched numerous local and national initiatives to emphasise the great variety of services provided by the sector.

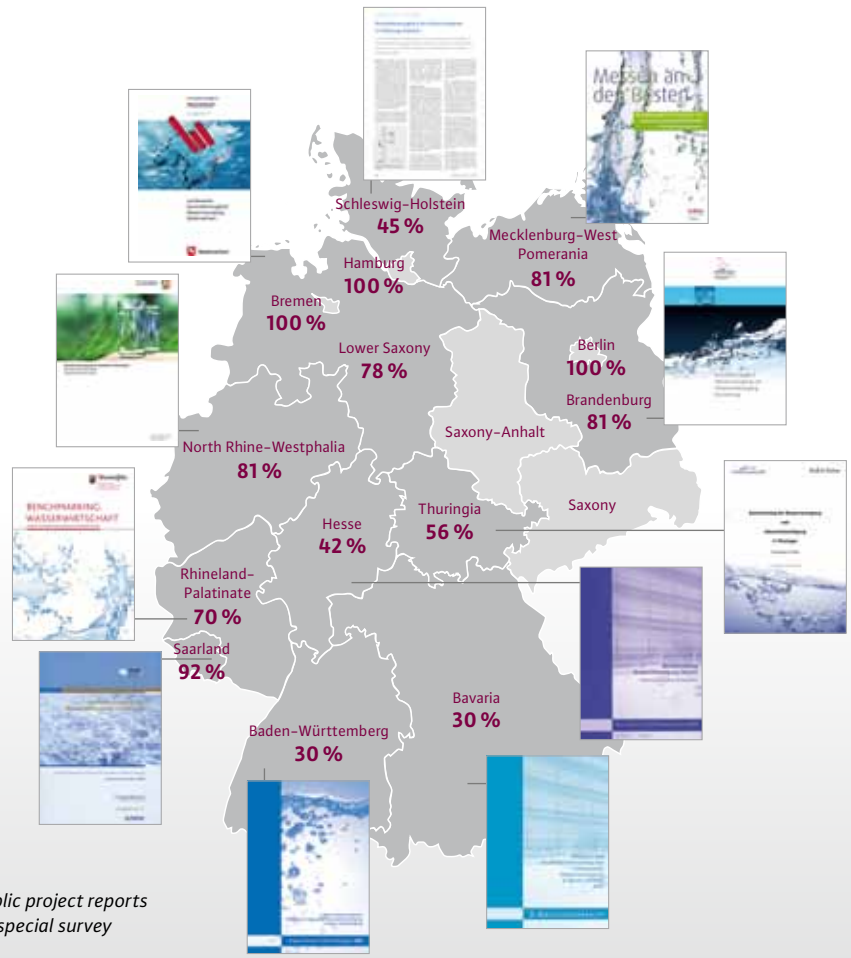
This Profile and the large number of benchmarking projects outlined therein show both decision makers and the general public the sector's performance in terms of customer service, safety of supply, economic efficiency, quality and sustainability.

The Associations therefore also support the various benchmarking projects of the German Laender which are usually commissioned by the Laender Ministries of Economics, the Interior and the Environment. To some extent, the Associations commission the projects themselves.

Independent business consultants are responsible for comparing the performance of the utilities.

Distribution of Laender-wide water supply benchmarking projects

50



Source: Public project reports and BDEW special survey

with Land-wide project

without Land-wide project

BDEW special survey

Saxony-Anhalt: 63 %
Saxony: 77 %

xx %

share of drinking water quantities covered by benchmarking projects.

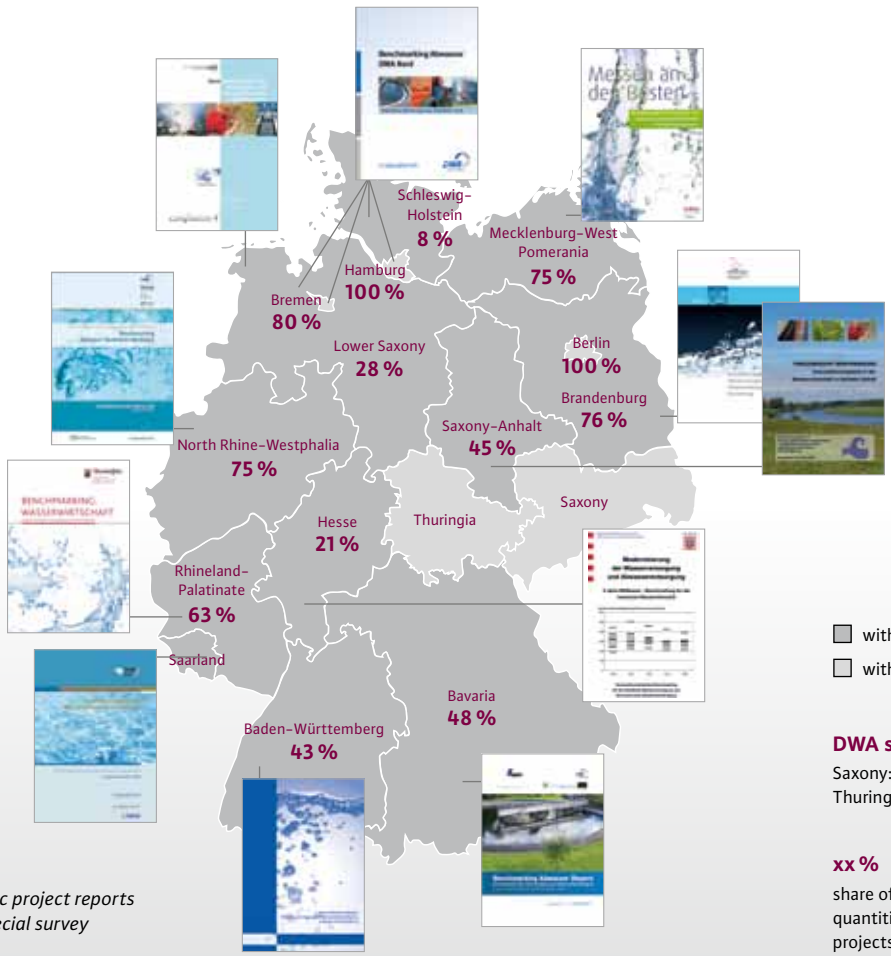
The results are forwarded to the stakeholders in the form of confidential project reports. Additional public reports are issued in certain cases. Benchmarking is based on the international performance indicator system of the International Water Association (IWA), or the DWA system of sample indicators for the wastewater sector.

Some German Laender have already completed four benchmarking sessions. In the second project on water supply in North Rhine-Westphalia, benchmarking was successfully advanced in the customer service pillar. For the first time, the customers of the participating utilities were involved in the project right from the start, with an independent institute asking their opinion. The results of the survey were taken into consideration in the final report on the customer satisfaction pillar, and document the assessment of the water suppliers' performance by the customers. In the current benchmarking project carried out in Bavaria, this pillar was extended to customer satisfaction.

The maps provide an overview of the distribution of benchmarking in the German Federal Laender. They show the Laender where public project reports are already available and indicate the percentage of the area covered by the projects.

Distribution of Laender-wide wastewater disposal benchmarking projects

51

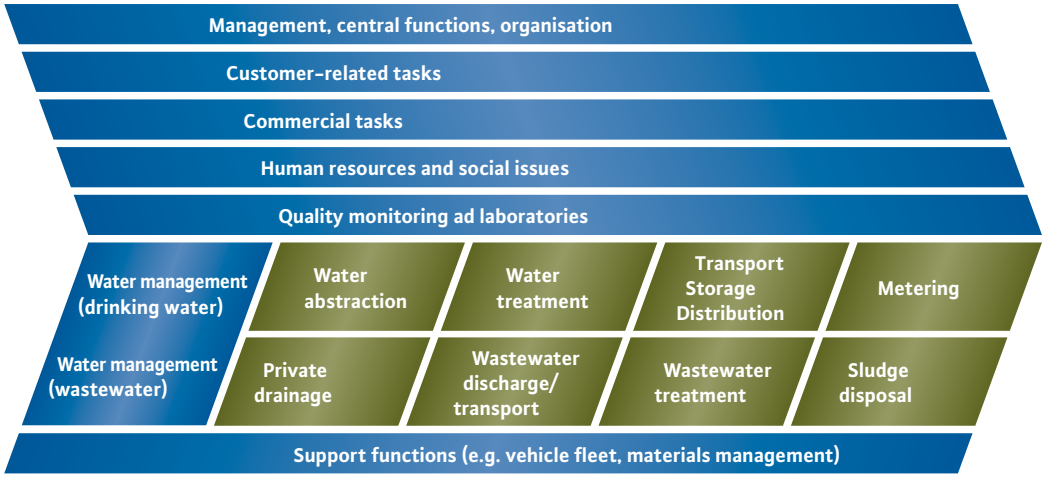


Source: Public project reports and DWA special survey

Apart from Laender-wide projects, various additional comparison sessions are conducted throughout Germany. For instance, for more than 60 years the BKV/Benchmarking (comparison of operation of municipal utilities) and the ÜBV (inter-company comparison of performance of urban supply utilities) have enabled cross-sector performance assessment. Process benchmarking projects are carried out today for all important processes of water supply and wastewater disposal.

Water supply and wastewater disposal processes

52



Source: DVGW W 1100 (Code of Practice), DWA M 1100, 03/2008 (Code of Practice)

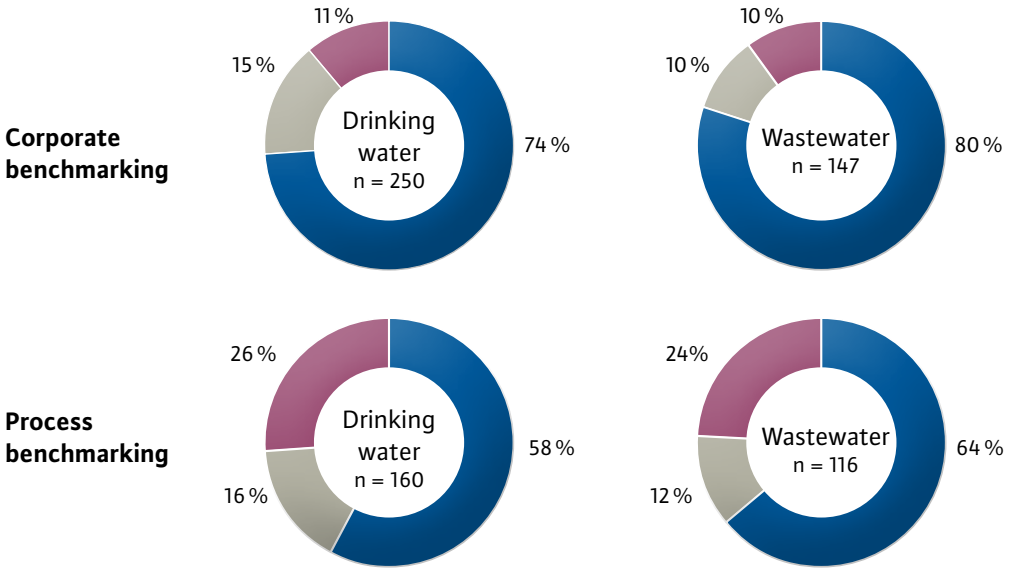
When it comes to the operation of reservoirs, a benchmarking project focusing on buildings and tasks has been carried out since 2004 with the participation of reservoir operators from Lower Saxony, North Rhine-Westphalia and Saxony (source: ATT 2009). Other national performance comparisons are carried out by business consulting firms (an overview is given by the table in the Annex). The benchmarking system is continuously refined by research institutes working together with practitioners from the water sector. An example of this cooperation is the development of more detailed indicators for the water abstraction, water processing and water distribution processes.

More than three quarters of the utilities which have participated in corporate benchmarking consider the cost-benefit ratio to be justifiable. With regard to process benchmarking, this percentage is somewhat lower, but still clearly above 50 % on account of the higher expenditure required for process benchmarking compared to corporate benchmarking.

A number of utilities have been shown to improve in all five performance columns after benchmarking in their utility.

Cost-benefit ratio of corporate and process benchmarking projects

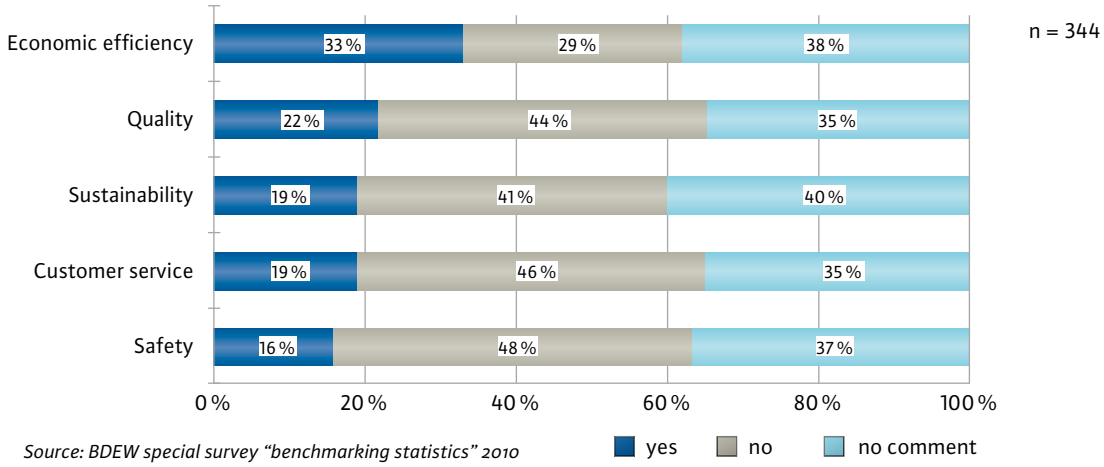
53



Source: BDEW special survey "benchmarking statistics" 2010

After utilities had participated in benchmarking projects, they improved in the following fields:

54



n = 344

Source: BDEW special survey "benchmarking statistics" 2010

The Associations have launched numerous local and national initiatives to emphasise the great variety of services provided by the sector, including VKU local consumer dialogues of VKU, BDEW customer balance, procedures for structural comparability of supply utilities (DVGW), core indicators and information about the application of benchmarking results (DWA).

Future generations should benefit to the same extent from high-quality drinking water supply and wastewater disposal. One of the central questions for the German water sector is how to ensure today's standard of performance in the future too for the purpose of public services in the general interest. The German water sector with its long-term capital expenditure is forced today already to develop concepts for coping with future challenges. Apart from more intense conflicts regarding the use of water bodies and increased discharge of substances into the aquatic environment, adequate solutions are demanded primarily to deal with demographic development and climatic effects. The German water sector proves that it is capable of coping with these challenges thanks to its comprehensive technical, economic and scientific expertise and its practical research activities.

Voluntary benchmarking is used to a large extent throughout the country. As a result, utilities have improved their performance with respect to safety, quality, customer service, sustainability and economic efficiency. By means of concrete practical examples, the Annex illustrates how utilities use benchmarking to optimise their efficiency and capability in accomplishing their supply and disposal duties, ranging from the energy efficiency of technical facilities and maintenance management through to customer services.

Annex 1

Practical examples of benchmarking effects

PRACTICAL EXAMPLE 1

Utility:	Multi-sector utility in charge of drinking water supply, wastewater disposal, public baths, local public transport and other services.
Size:	Feed-in of drinking water into the network: about 5 million m³ per year Service area: approx. 15,000 house connections
German Land:	Bavaria
Benchmarking projects:	Process benchmarking

INITIAL SITUATION:

Indicator comparisons carried out between 2005 and 2007 showed an anomaly in the distribution system. In-depth analysis confirmed the relative inefficiency in the distribution system. It turned out that the established non-conformities were essentially due to the costs which by far exceeded the average costs incurred for the rehabilitation and renewal of house connections.

MEASURES AND ACHIEVEMENTS:

On the basis of the results obtained from the indicators, a workshop was held with the utility's senior executives for constructive analysis of the production technology used to date. It appeared that the established installation procedure ("open trench") is not the most efficient method. Following consultation and discussions with various engineering firms, it was decided to use trenchless methods in future for the rehabilitation and renewal of house connections, without any detrimental impact on the quality of service.

The costs incurred for participation in the benchmarking projects, the detailed analysis and the workshop amounted to about €20,000. On the other hand, the financial benefit to be expected will be about €125,000 p.a. due to the significant reduction in expenditure per rehabilitated and/or renewed house connection and in the annual programme of measurements. This forecast was confirmed by initial concrete measures carried out in the business year 2009.

The utility will use the respective financial savings to extend its rehabilitation and renewal programme with a view to ensuring the sustainable use of the distribution system without having to increase the fees.

PRACTICAL EXAMPLE 2

Utility:	Wastewater disposal utility
Size:	About 300 km of sewer network, approx. 80,000 inhabitants
German Land:	Baden-Württemberg
Benchmarking projects:	Corporate wastewater benchmarking, process benchmarking

INITIAL SITUATION:

The participation of the utility in corporate wastewater benchmarking revealed that the operational expenditure for "wastewater discharge" was far above average. To find the reasons and identify optimisation measures, the utility continuously participates in the "sewer operation" process benchmarking. The "specific cleaning effort" indicator in the sub-process called "cleaning of sewers and shafts" showed the utility to be 20% above the average for the comparison group. The reasons were found to be the higher-than-average cleaning frequency and the comparably poor cost-benefit ratio attributable to higher vehicle costs.

MEASURES AND ACHIEVEMENTS:

The results of the projects led to the following measures:

- extension of cleaning intervals
- reduction in the number of large cleaning vehicles

Extending the cleaning intervals permits a reduction in the specific cleaning expenditure. The extended intervals mean that it will no longer be necessary to use the entire fleet of cleaning vehicles. The utility therefore plans to reduce the number of vehicles and to deploy the staff thus released for restoration of sewers with a sustainable increase in rehabilitation activity. Possible cleaning peaks or special orders will be outsourced in future. Extending the cleaning intervals to 4 years on average (given a constant cost-benefit ratio) generates potential savings of €75,000 p.a., while reducing expenditure on vehicles results in potential savings of about €25,000 p.a. This corresponds to a reduction of about 6% in operational expenditure.

PRACTICAL EXAMPLE 3

Utility:	Multi-sector utility with drinking water (district and end-user supplier)
Size:	17.5 million m³/a of drinking water supplied
German Land:	Bavaria
Benchmarking projects:	Participation in benchmarking projects in Bavaria, corporate and process benchmarking

INITIAL SITUATION:

The utility obtains a fair number of technical services from other Group subsidiaries, e.g. network construction, network service, electrical engineering service. To date, these services were charged to the water utility as approximate flat-rate fees without any specific stipulations regarding the scope and quality of the respective service. A corporate and process benchmarking project showed that the group companies had not given any exact values for the costs of the services. Furthermore, it became apparent that some of the services provided by the group companies are considerably worse in terms of cost and quality than the values of the best performers in the benchmarking comparison.

MEASURES AND ACHIEVEMENTS:

Based on the benchmarking results, an action plan was established with the following contents:

- creation of cost transparency by implementing a customer/contractor relationship within the group (asset management/asset service).
- elaboration of a detailed product catalogue along the same lines for external calls for tender
- inquiries about market prices
- pricing of the product catalogue

Calculation of market prices and more precise review of the actually required tasks generated a potential cost reduction of up to 50 %. Service quality has been substantially improved by giving precise specifications for asset management (materials and implementation standards).

PRACTICAL EXAMPLE 4

Utility:	Special-purpose water and wastewater association
Size:	Drinking water supply to 70,000 inhabitants 80,000 PT (total number of inhabitants and population equivalents) for wastewater disposal
German Land:	Saxony-Anhalt
Benchmarking projects:	Regular participation in indicator comparisons since 2001. Participation in process benchmarking projects for operating sewer network, operating sewage treatment plants, operating a mains network, consumption billing, setting up house connections and support processes

INITIAL SITUATION:

Participating in the benchmarking projects and particularly sharing experience associated with the projects has allowed the special-purpose association to ascertain organisation reserves and human resources potential.

MEASURES AND ACHIEVEMENTS:

Evaluation of the results was followed by TSM checks and implementing a quality management system according to ISO 9001 together with a human resources development concept. According to the human resources development concept, staff deployment is to be reduced by 15 % in several steps through to 2020, taking social aspects into consideration. Furthermore, specific advanced training should contribute to personnel development and to optimising the individual organisational processes.

Implementation of the human resources development concept is helping to keep fees on a stable level. Savings of about €200,000 p.a. have been generated by the steps that have already been introduced, while the association expects annual savings of €700,000 p.a. once the concept has been finally concluded.

Introduction of the quality management system led to the optimisation of many organisational processes. Business efficiency has also been enhanced in addition to the financial effects.

PRACTICAL EXAMPLE 5

Utility:	Drinking water supply
Size:	Drinking water supplied: 78.0 million m^3
German Land:	North Rhine-Westphalia (NRW)
Benchmarking projects:	Participation in the NRW 2009/2010 benchmarking project with partial module "customer survey"

INITIAL SITUATION:

For the first time, the 2009/2010 benchmarking project in North Rhine-Westphalia included a customer survey as a voluntary module for the participating utilities. In this particular context, the sample utility ascertained that direct and fast availability (no waiting time) of the water supplier is of great importance for customer satisfaction, with customers using the phone as the main means of contact.

MEASURES AND ACHIEVEMENTS:

Following the benchmarking project, phone availability was further optimised with a view to improving customer service and communication. The chargeable customer service hotline has been toll-free since 1 July 2010. While corresponding evaluation is still pending, improved customer satisfaction at justifiable costs is to be expected.

PRACTICAL EXAMPLE 6

Utility:	Water and wastewater association
Size:	Drinking water supply to 90,000 inhabitants 140,000 PT (total number of inhabitants and population equivalents) for wastewater disposal
German Land:	Lower Saxony
Benchmarking projects:	Participation in five performance indicator comparisons since 2000 Participation in five benchmarking projects since 2002

INITIAL SITUATION:

Regular participation in performance indicator comparisons and process benchmarking projects has let the utility establish potential for improvements in terms of customer satisfaction, among others, while identifying deficiencies in the information supplied to customers about the legal principles of supply and disposal and the customer billing procedure.

MEASURES AND ACHIEVEMENTS:

Improved customer satisfaction was generated by a better layout of bills (2003), a customer-friendly explanation of the legal principles of supply and disposal, annual newsletters and by setting up a homepage (2004). The measures were examined by means of a customer survey in 2008. Distinct improvement in customer satisfaction validated the success of the measures.

PRACTICAL EXAMPLE 7

Utility:	Wastewater treatment
Size:	300,000 PT (total number of inhabitants and population equivalents) for wastewater disposal
German Land:	Hesse
Benchmarking projects:	Participation in process benchmarking on organisational processes, operational management in process engineering, and operating costs

INITIAL SITUATION:

The process benchmarking projects revealed potential for improvements in energy consumption, process engineering, electricity generation and with regard to maintenance expenditure.

MEASURES AND ACHIEVEMENTS:

The utility has introduced a number of measures in the field of technical optimisation. Among others, this reduced electricity costs for heating digestion towers while optimising electricity production from biogas and processes involved in floating sludge management. Together with a considerable CO_2 reduction, about €35,000 can be saved annually for digestion tower heating.

The maintenance expenditure for the operation of wastewater facilities was reduced by establishing and implementing maintenance management. This also ensured value conservation of the facilities while improving safety and functionality.

A rating matrix for risk analysis which was set up in cooperation with those responsible for maintenance helped to reduce maintenance expenditure by about 10 % without affecting the operational safety of the facility. Since then, risk analysis is carried out for every unit that requires maintenance.

PRACTICAL EXAMPLE 8

Utility:	Special-purpose water and wastewater association
Size:	200,000 PT (total number of inhabitants and population equivalents) for wastewater disposal
German Land:	Mecklenburg-West Pomerania
Benchmarking projects:	Participation in performance indicator comparisons since 2003 Participation in process benchmarking on operational cost analysis and planning of measures 2008

INITIAL SITUATION:

The 2003 comparison of performance indicators showed the energy use and the operating costs of the wastewater treatment plant to be at the top of the scale. Initial concrete measures led to a revised cost-of-materials model together with several trials with the involvement of a university in Mecklenburg-West Pomerania for the acceptance and utilisation of energy-rich industrial wastewater. At the same time, further data were collected for comparison purposes by means of the continuous regional performance indicator comparison. This resulted in an improved positioning for energy utilisation, although this was not yet satisfactory for the special-purpose association. Process benchmarking on operational cost analysis and planning of measures was therefore commissioned in 2008 together with benchmarking partners, focussing on wastewater components, structural conditions, capacity check of plant components, determination of manpower requirements according to DWA M 271 and energy utilisation.

MEASURES AND ACHIEVEMENTS:

The analysis led to 34 measures for efficiency increase, including 11 high-priority measures (avoiding gas losses, adjusting scheduled drainage services, optimising natural gas procurement), 9 medium-priority measures (e.g. reservoir management), 4 low-priority measures (parallel charging of rotary screens, generation of solar energy).

2009 saw the complete implementation of 7 of these measures, generating annual savings of at least €54,000 p.a.. The financial effects were accompanied by reductions in material and energy consumption, an increase in the use of renewable energies and further optimisation of the treatment capacity.

PRACTICAL EXAMPLE 9

Utility:	Wastewater disposal
Size:	750,000 PT (total number of inhabitants and population equivalents)
German Land:	Saxony
Benchmarking projects:	Regular participation in corporate and process benchmarking projects of large cities, e.g. in the fields of sewer construction, sewer network, sewage treatment plants, analyses, indirect dischargers, materials management and control. Since 1998, annual participation in process benchmarking for sewage treatment plants.

INITIAL SITUATION:

Energy consumption is an essential cost factor for sewage treatment plants. The largest electricity consumers are the pumps for wastewater transportation and the compressed air blowers for the biological secondary treatment. Total metered electricity consumption in the sample sewage treatment plant was approx. 21,900 MWh in 2009. Solutions for reducing the utility's own energy consumption were obtained from sharing experience and transferring knowledge during the benchmarking projects.

MEASURES AND ACHIEVEMENTS:

At the end of 2004, the utility installed a water turbine for energy generation. The investment costs came to about €200,000. The plant has a rated capacity of 120 kW, the power output depends on the amount of water inflow and the fall head (water level), and varies between 20 and 120 kW. The energy generated is fed directly into the power system of the sewage treatment plant. As a result, the consumption of purchased energy was reduced by 672 kWh (2008).

The sewage treatment plant's aim of becoming self-sufficient in terms of energy supply and fleet mobility is to be attained by a further increase in energy efficiency based on energy monitoring associated with extending the utility's own energy generation (CO fermentation and alternative energy conversion solutions, hydropower, heat from wastewater).

PRACTICAL EXAMPLE 10

Utility:	Sewage treatment plant
Size:	50,000 inhabitants
German Land:	North Germany
Benchmarking projects:	Continuous participation in process benchmarking since 2004

INITIAL SITUATION:

In 2005, process benchmarking for the sample sewage treatment plant revealed that the indicator "specific electrical energy consumption kWh/(inhabitant x year) " clearly exceeded the corresponding reference value according to the North Rhine-Westphalia energy manual. There was therefore a need for action concerning the plant's energetic optimisation. Aerobic-thermophile sludge stabilisation (ATS) was identified as causing high energy consumption in this sub-process.

MEASURES AND ACHIEVEMENTS:

A profitability analysis compared two scenarios: rehabilitation of the ATS reactor and construction of a new digestion tower. Preference was given to construction of a new digestion tower, as this scenario

- entails lower annual costs over a period of 20 years
- enables the utility to generate its own energy (utilisation of digester gas in a CHP plant, thus making it more independent of rising energy prices,
- allows additional heating of the administration building through waste heat from the CHP plant.

The benchmarking results show that conversion to anaerobic sludge stabilisation reduced specific electricity consumption by more than 4 kWh per inhabitant and year in the sludge stabilisation sub-process. As an additional effect of this optimisation, in 2008 the utility covered almost 45 % of its electricity demand through generation in its own CHP plant.

Reduction of the total specific energy consumption together with the utility's own generation of electrical energy in the CHP plant generated a significant decrease in annual electricity costs of about €90,000. Taking account of the costs of the utility's own electricity generation as well results in net savings of €55,000 p.a.. The measures identified and implemented in process benchmarking lead to total annual savings of about €1.60 per inhabitant and thus to about 9 % of the operational expenditure.

PRACTICAL EXAMPLE 11

Utility:	Water supplier
Size:	About 110,000 inhabitants for the described waterworks (total number of inhabitants: 2.04 million)
German Land:	Hamburg
Benchmarking projects:	Participation in process benchmarking 2008

INITIAL SITUATION:

A waterworks plant of the utility participated in a process benchmarking project in 2008. An evaluation of the results showed relatively high energy consumption for clean water abstraction of the plant compared to the other waterworks participating in the project.

MEASURES AND ACHIEVEMENTS:

In view of the results, the internal planning department was instructed to examine the possibility of replacing the pumps. The study revealed a high degree of wear attributable to the age of the pumps – in spite of their correct maintenance. Furthermore, state-of-the-art engineering has made further progress since the clean water pumps had been installed. Moreover, management of the waterworks has changed in the course of time so that the previously optimally dimensioned pumps are no longer economically efficient.

The result of the study shows that a clear efficiency improvement of about 24 % can be reached by replacing the plant's clean water pumps. This corresponds to energy savings of about 26 % and energy cost savings of about 16 %.

As experience shows that system efficiency is somewhat lower in practice than in theoretical calculations, safety factors were defined between 0.5 and 0.75 for the level of savings. Even so, the savings then determined still amount to 15.5 % for energy consumption and 4.3 % for energy costs. The likely reduction of energy consumption thus varies between 15.5 and 26 %, and the resulting energy cost saving between 4.3 and 16 %. The apparent discrepancy between energy savings and energy cost savings results from the development of the energy price between 2007 and 2010. The pumps were exchanged in 2010.

Annex 2

Benchmarking projects and indicator comparisons in the German water sector

No.	Project/Process	Branch	Session or year of survey	Utilities	Drinking water		Wastewater	
					network supplies (million m³)	inhabitants supplied (million)	annual amount of wastewater (million m³)	PT [1] (million)
Indicator comparisons and corporate benchmarking								
	▸ PROJECTS RELATED TO GERMAN LAENDER							
1	Association model of indicator comparison in Baden-Württemberg	DW	2006	75	168.0	2.8		
			2007	102	121.0	2.0		
			2008	93	118.0	2.0		
			2009	98	143.0	2.4		
			2010	ongoing				
2	Wastewater benchmarking in Baden-Württemberg	WW	2006	77			200.9	6.7
			2007	60			193.2	6.4
			2008	46			159.5	5.3
3	Efficiency and quality analysis of municipal water supply in Bavaria **(corporate and process benchmarking)**	DW	2002	95	267.0	n. s.		
			2004	84	196.0	n. s.		
			2007	89	170.0	2.1		
			2008	78	64.0	0.6		
			2009	86	82.0	1.4		
			2010	ongoing				
4	Wastewater benchmarking (Bavaria)	WW	2006	167			279.0	8.8
			2008	89			158.3	4.5
5	Indicator comparison of water supply and wastewater disposal (Brandenburg)	WW	2009	60			74.7	2.4
		DW	2009	52	93.4	2.0		
6	Operational indicator comparison on water (Hesse)	WW + DW	2000–2006	50	44.7			
			2008	37	13.9	0.27	63.1	3.1
7	Water supply benchmarking in North Rhine-Westphalia **(corporate and process benchmarking)**	DW	2008	58	825.0	9.8		
			2009	98	982.0	12.5		
			2010	ongoing				
8	Wastewater benchmarking (NRW)[2]	WW	2006	107			351.7	21.1
			2008	60			308.3	17.2
9	Water benchmarking (NRW)[2]	DW	2008	8	16.2	0.30		
10	Benchmarking of Saarland (German Land)	DW	2005	28	47.2	0.9		

[1]PT = total number of inhabitants and population equivalents, [2]North Rhine-Westphalia
DW = Drinking Water
WW = Wastewater

Other performance indicators	Executing organisation / supporter	Project information / public project report
	Executing organisations: VfEW, VKU, DVGW (their regional groups) *Supporters:* Federation of towns in Baden-Württemberg, Association of municipalities in Baden-Württemberg	*Public project report:* *www.benchmarking-bw.de*
	Federation of towns in Baden-Württemberg, DWA regional organisation Baden-Württemberg	Voluntary benchmarking including the entire supply area with a multi-level survey system adjusted to the utility size. Extensive individual documentation reports. *Public project reports:* *www.abwasserbenchmarking-bw.de*
	Executing organisations: StMUG (Bavarian State Office for the Environment), VBEW, DVGW *Supporters:* Bavarian Federation of towns, Bavarian Association of municipalities	*Public project reports:* *www.effwb.de*
	Bavarian Federation of towns, Bavarian Association of municipalities, DWA regional group Bavaria, Bavarian State Ministry for the Environment and Health	Voluntary benchmarking including the entire supply area with a multi-level survey system adjusted to the utility size. Extensive individual documentation reports. *Public project reports:* *www.abwasserbenchmarking-bayern.de*
	Initiators: KOWAB – water and wastewater cooperation in Brandenburg East, Brandenburg South and Brandenburg West, regional "Wasserverbandstag" Brandenburg, BDEW regional group Berlin/Brandenburg, DVGW regional group Berlin/Brandenburg, DWA regional association Northeast, VKU Association of Local Utilities *Supporters:* Ministry for the Environment, Health and Consumer Protection	*Public project report:* *www.kennzahlen-bb.de*
	DWA regional association Hesse/Rhineland-Palatinate/Saarland, Hessian Association of cities and municipalities	Voluntary benchmarking including the entire supply area with a multi-level survey system adjusted to the utility size. Extensive individual documentation reports. *Public project reports:* *www.bkwasser.de*
	Executing organisations: Ministry of Economics, Medium-Sized Businesses and Energy, Ministry for the Environment and Nature Protection, Agriculture and Consumer Protection and Ministry of the Interior of North Rhine-Westphalia *Supporters:* BDEW regional group of North-Rhine Westphalia (NRW), DVGW regional group of NRW, VKU Association of local utilities	*Public project reports:* *www.benchmarking-nrw.de*
	DWA regional association of NRW, Association of cities and municipalities of NRW, Federation of towns of NRW, Federation of trade associations in North Rhine-Westphalia	Voluntary benchmarking including the entire supply area with a multi-level survey system adjusted to the utility size. Extensive individual documentation reports. *Public project reports:* *www.abwasserbenchmarking-nrw.de*
	Association of cities and municipalities of NRW, Federation of towns of NRW, district council of NRW	Voluntary benchmarking to judge the own utility's performance by means of the 5-pillar model and by looking at the individual frame conditions. *Project information:* *www.wasserbenchmarking-nrw.de*
	Association of the energy and water industries of Saarland, VEW Saar	*Public project report:* *www.wasserbenchmarking-saarland.de*

No.	Project/Process	Branch	Session or year of survey	Utilities	Drinking water		Wastewater	
					network supplies (million m³)	inhabitants supplied (million)	annual amount of wastewater (million m³)	PT [1] (million)
Indicator comparisons and corporate benchmarking								
	▸ PROJECTS RELATED TO GERMAN LAENDER							
11	Comparison of water supply indicators throughout NRW[2]	DW	2008	90	279.0	5.6		
12	Indicator comparison of Wasserverbandstag in Lower Saxony	DW + WW	2001	23	157.0	2.50	43.1	1.0
			2006	22	171.0	2.45	16.7	0.6
13	Indicator comparison of water supply and wastewater disposal utilities in Mecklenburg West-Pomerania	DW + WW	2003	20	63.7	1.35	47.6	1.6
			2004	13	33.5	0.66	23.8	0.9
			2005	14	34.9	0.71	25.3	1.0
			2006	14	32.3	0.60	26.6	0.9
			2007	12	31.1	0.58	23.9	0.8
			2008	9	22.1	0.38	17.5	0.7
14	Benchmarking Rhineland-Palatinate	DW	2004	96	162.0			
			2007	63	93.7			
		WW	2004	109				3.8
			2007	77		1.6	12.0	2.7
15	Comparison of wastewater and drinking water indicators, corporate benchmarking on wastewater by Wasserverbandstag Saxony	WW	annually since 2004	32			30.0	1.2
		DW	annually since 2009	11	10.0	0.4		
16	Indicator comparison of the water associations in Schleswig-Holstein	DW	1	11	28.6			
17	Wastewater disposal benchmarking in Thuringia	WW	2007	15			36.5	0.8
			2010	18			46.0	1.1
18	Water supply benchmarking in Thuringia	DW	2003	16	38.7	0.9		
			2008	13	43.0	1.0		
			2010	23	n. s.	n. s.		
Comparison of indicators and corporate benchmarking								
	▸ OTHER PROJECTS							
19	BkV[3]/Benchmarking – operational comparison of municipal utilities	DW	annually for more than 50 years	46 (reported values DW)	205.2	3.57		
20	Inter-utility performance benchmarking of utilities supplying big cities	DW	annually for more than 60 years	18 (reported values DW)	644.1	11.0		
21	WABE – comparison of water supply and wastewater disposal indicators	DW + WW	2000	8	45.4	0.8	20.9	0.67
			2001	6	35.9	0.7	28.3	0.8
			2003	14	85.9	1.5	19.0	0.7
			2005	17	97.9	1.9	36.9	1.3
			2007	29	155.0	2.9	50.7	1.7
			2009	25	121.7	2.2	31.0	1.1
22	Main indicators of local utilities	DW	2003	11	51.0	0.7		
23	EBC European Benchmarking Co-operation	WW + DW	2008	45 utilities from 21 countries, including 2 from Germany				
24	Pilot project on reservoirs – corporate and process benchmarking	DW	2004, 2008–2010	2				

[3] *BkV =Betriebskostenvergleich (operational cost comparison)*

Other performance indicators	Executing organisation / supporter	Project information / public project report
	Executing organisation: Ministry for the Environment and Climate Protection of Lower Saxony *Supporters:* BDEW regional group North, DVGW regional group North, Association of local utilities, Water associations' federation of the city of Bremen, Lower Saxony, Saxony Anhalt, Federation of towns of Lower Saxony, Association of cities and municipalities of Lower Saxony	*Public project report:* *www.kennzahlen-h2o.de*
	Executing organisation: Water associations' federation of the city of Bremen, Lower Saxony, Saxony Anhalt	*Public project report:* *www.wasserverbandstag.de/main/siwa_informationen.php?navid=8*
	Executing organisation: Association of water supply and wastewater disposal utilities of Mecklenburg-Western Pomerania within BDEW, BDEW regional group Northern Germany	*Public project report:* *www.kennzahlen-mv.de/info.html*
Annual wastewater quantity treated [million m³]: 319.0	*Executing organisation:* Ministry for the Environment, Forestry and Consumer Protection of Rhineland-Palatinate *Cooperation partners:* Association of cities and municipalities of Rhineland-Palatinate Federation of towns of Rhineland-Palatinate, DWA regional association of Hesse/ Rhineland-Palatinate, Saarland, DVGW regional groups of Rhineland-Palatinate, regional association for energy and water management of Hesse/ Rhineland-Palatinate (LDEW), VKU regional group of Rhineland-Palatinate	*Public project reports:* *www.wasserbenchmarking-rp.de*
	Executing organisation: Water associations' federation of Bremen, Lower Saxony, Saxony Anhalt	The wastewater project has been going on since the survey year 2004 for comparison of indicators, corporate benchmarking and process benchmarking (theme days). From the survey year 2009 it is planned to carry out a comparison of indicators on drinking water with one part of the member companies of the water associations' federation. *Public project report: www.verbandstag.de*
	DVGW research centre at the Technical University of Hamburg-Harburg	Results presented in "Energie Wasser Praxis" 9/2009
	Executing organisation: Schmalkalden University of Applied Sciences and a business consulting firm *Supporters:* BDEW regional group "Mitteldeutschland", Ministry for the Environment of Thuringia	*Public project reports:* *www.fh-schmalkalden.de/ET_Versorgungswirtschaft-html*
	Executing organisation: Parties participating in operational cost comparison/benchmarking *Supporter:* Association of local utilities	*www.bkv-benchmarking.de* No public project report available, closed user group
	Executing organisation: Parties participating in inter-utility performance benchmarking	*www.uebv.de* No public project report available, closed user group
	Executing organisation: participating utilities from different German Laender	
	Executing organisation: BDEW regional group of North Germany	
	European Benchmarking Cooperation	*www.waterbenchmark.org*
Storage surface 990 ha Total storage volume 154.7 million m³		

No.	Project/Process	Branch	Session or year of survey	Utilities	Drinking water		Wastewater	
					network supplies (million m³)	inhabitants supplied (million)	annual amount of wastewater (million m³)	PT [1] (million)
Comparison of indicators and corporate benchmarking								
	▸ OTHER PROJECTS							
25	Corporate benchmarking – big cities	WW						
			2002	9			484.4	n. s.
			2003	9			505.4	n. s.
			2004	9			488.2	n. s.
			2005	10			517.5	11.1
			2006	10			516.7	15.3
			2007	10			504.3	15.1
			2008	10			508.6	15.5
			2009	11			n. s.	n. s.
26	Corporate wastewater benchmarking – large utilities	WW						
			2005	7			33.2	1.1
			2006	7			32.3	1.0
			2007	8			31.2	1.2
			2008	7			23.8	0.9
27	Corporate benchmarking – associations instituted on a special statutory basis in North Rhine-Westphalia	WW						
			2004	2				n. s.
			2005	5				8.2
			2006	6				10.1
			2007	6				10.0
			2008	6				9.8
			2009	7				n. s.
28	Corporate benchmarking – district suppliers	Water	2007, 2008	12	509.0	n. s.		
29	Corporate drinking water supply benchmarking	DW	2004–2006	15	441.2	27.6		
30	Human resources benchmarking	WW + DW	2007	9				
31	Wastewater benchmarking – DWA North	WW	2007	31			178.8	6.5
			2008	18			53.0	1.9
Process benchmarking								
32	Process benchmarking: waterworks	DW	2005 2006 2007 2008 2009	25 (48 water-works)	approx. 460	n. s., as individual waterworks were con-sidered		
33	Process benchmarking: drinking water laboratories	DW	2005 2007 2009 (planning stage)	10	approx. 1,000	n. s., as district suppliers without end-users included		
34	Sewer network operation benchmarking	WW	2001	13			37.3	1.1
			2004	7			22.5	0.57
			2007	9			27.5	0.63
35	Sewer network operation benchmarking in NRW[2]	WW	2005	11			36.0	0.65
			2006	11			51.1	0.82
			2007	9			53.3	0.99
			2008	7			43.5	0.76

Other performance indicators	Executing organisation / supporter	Project information / public project report
Annual waste-water quantity treated [million m³]:		Inter-utility comparison of operators in large cities. Comprehensive and conclusive individual documentation reports.
938.0		
857.4		
850.4		
919.9		
920.7		
971.8		
951.5		
n. s.		
Annual waste-water quantity treated [million m³]:		Inter-utility comparison of operators performing the same tasks. Individual comparison with general indices. Exchange of experience.
52.3		
69.1		
96.3		
52.1		
Annual waste-water quantity treated:		Inter-utility comparison of operators performing the same tasks. Individual comparison with general indices. Exchange of experience.
872.0		
1,312.8		
1,486.5		
1,694.0		
1,525.6		
n. s.		
		Project exclusively for district water suppliers, taking account of their particular structure of functions. No public project report available.
		Previous project of today's corporate district water and direct supplier benchmarking.
		Human resources management benchmarking for utilities with (previous) public participation.
	DWA regional association North, Ministry for the Environment and Climate Protection of Lower Saxony, the Senator for the Environment, Housing and Urban Development, Transport and European Issues of the City of Bremen, Ministry for Agriculture, the Environment and Rural Areas of Schleswig-Holstein	Voluntary benchmarking including the entire supply area with a multi-level survey system adjusted to the utility size. Extensive individual documentation reports. *Public project reports:* *www.abwasserbenchmarking-nord.de*
		Intensive exchange of experience and individual final report of the different utilities. No public project report available.
		Intensive exchange of experience and individual final report of the different utilities. No public project report available.
	Executing organisation: participating utilities from different German Laender	Comparison of processes for mechanical sewer network clearance, overhaul/repair, inspection (CCTV inspection), supervision of pump stations, maintenance, inspection and overhaul. Comparison of processes for operations scheduling, reporting and network documentation. Organisation of standby service.
	Executing organisation: participating utilities	Comparison of processes for mechanical sewer network clearance, overhaul/repair, inspection (CCTV inspection), supervision of pump stations, maintenance, inspection and overhaul. Comparison of processes for operations scheduling, reporting and network documentation. Organisation of standby service.

No.	Project/Process	Branch	Session or year of survey	Utilities	Drinking water		Wastewater	
					network supplies (million m³)	inhabitants supplied (million)	annual amount of wastewater (million m³)	PT [1] (million)
Process benchmarking								
36	Operation benchmarking of sewage treatment plants	WW	2002	14			61.5	1.49
			2004				44.9	0.94
			2007	9			24.7	0.54
			2009	5			19.7	0.40
37	Investment benchmarking in sewer network	WW	2003	12			72.0	1.2
38	Operation benchmarking of mains network	DW	2001	20	81.4	1.75		
			2003	11	43.1	0.7		
			2005	9	38.4	0.8		
			2009	12	62.8	1.3		
39	Operation benchmarking of waterworks	DW	2009	8	35.3	0.6		
40	Support processes benchmarking	DW + WW	2006	12	60.0	0.9	29.0	0.6
41	Provision of house connection benchmarking	DW + WW	2000	14	127.0	1.7		
			2002	11	6.2	0.15		
			2005	7	14.5	0.2		
			2008	10	24.0	0.6		
42	Implementation of consumption billing benchmarking	DW + WW	2000	14	127.0	1.7	22.2	0.5
			2001	12	6.2	0.15	21.0	0.58
			2003	6	22.1	0.35	17.8	0.26
			2005	7	14.5	0.3	6.2	0.2
			2008	10	24.0	0.6	18.0	0.5
			2009	6	219.0	5.5	198.0	5.5
43	Materials management and control process benchmarking	WW						
			2002				234.0	n. s.
			2003				234.7	n. s.
			2004				247.1	n. s.
			2005				436.4	11.8
			2006				526.0	18.7
			2007				451.7*	19.2
			2008				440.3*	19.1
			2009				n. s.	n. s.
						* cannot be determined for all participants		
44	Geo data service	WW + DW	2009	3			n. s.	n. s.
45	Administration benchmarking	WW	2007	3			30.3	0.56
46	Flowing waters		2003–2006	3				
47	Private drainage	WW	2009	8				
48	Analyses	WW						
			2005	2				15.0
			2006	6				9.1
			2007	9				8.8
			2008	7				10.8
			2009	9				10.1

Other performance indicators	Executing organisation / supporter	Project information / public project report
	Executing organisation: participating utilities from different German Laender	Processes of wastewater and sludge treatment: comparison of the man-power structure /M 271/ degree of outsourcing, comparison of operational organisation incl. risk management, energy analysis. Processes: operate aeration, carry out laboratory/factory production control, manage sludge dewatering, facility and surface management.
	Executing organisation: participating utilities from different German Laender	Planning and construction processes through to warranty monitoring
	Executing organisation: participating utilities from different German Laender	
	Executing organisation: participating utilities from different German Laender	
	Executing organisation: participating utilities from different German Laender	Procurement of services and materials up to and including purchase invoices and booking, IT support, human resources administration and accounting, billing of ancillary services, establishment of business plan, preparation of annual financial statements, procurement of funding.
	Executing organisation: participating utilities from different German Laender	Provision of house connection and associated sub-processes: application system, construction, accounting.
	Executing organisation: participating utilities from different German Laender	Processes of annual consumption billing for drinking water supply and wastewater disposal (centralised and decentralised), monthly billing of special customers, master data administration and management of receivables.
Full-time-equivalent materials manage-ment and control 175.5 177.5 193.5 277.6 243.6 237.7 235.4		Comparison of company organisation, procurement structure, and ac-complishment of duties. Comparison of the strategy of procurement of selected catalogue items, comparison of procurement processes through call-forward notices and orders of C-articles and services. Continuous comparison of conditions, annual changing of in-depth analyses of pur-chase relevant processes, instruments and conditions.
Not yet determined		Pilot project for the processes of measuring, GIS and works documentation of 4 operators from the drinking water and wastewater sectors.
Manpower in waste-water disposal [FTE]: 271.5		Modern administration and an integrated management system is vital for an up-to-date supply and disposal utility. Carried out for the first time in 2008 as pilot project in Rhineland-Palatinate for the wastewater sector.
Length of water bodies managed 4,800 km		A differentiation is made between 15 functions, such as mowing, weed control and hedge management at water bodies; expenditure and perfor-mance indicators are determined to identify differences in efficiency be-tween various concepts or measures for the maintenance of water bodies.
815,000 realties		Pilot project for the comparison of processes for private drainage.
Annual waste-water quantity [million m^3]: 2,226.7 604.1 810.8 721.4 796.9		The extent, type and frequency of analytical activities are considered and compared. The comparison of the analytical performance is based on the uniform national point model elaborated cooperatively with all parties concerned.

No.	Project/Process	Branch	Session or year of survey	Utilities	Drinking water		Wastewater	
					network supplies (million m³)	inhabitants supplied (million)	annual amount of wastewater (million m³)	PT [1] (million)
Process benchmarking								
49	Sewer construction	WW						
			1998	18				
			2002	9				
			2003	10				
			2004	12				
			2005	11				
			2006	10				
			2007	10				
			2008	10				
			2009	11				
50	Sewer operation	WW						
			2003	23				
			2004	18				
51	Sewer operation in big cities	WW						
			2002	14				
			2005	19				
			2006	14				
			2007	16				
			2008	15				
			2009	15				
52	Sewer operation – North	WW						
			2006	4				
			2007	6				
			2008	7				
			2009	10				
53	Sewer operation –South	WW						
			2006	3				
			2007	5				
			2008	10				
			2009	9				
54	Sewer operation – large utilities	WW						
			2006	7				
			2007	8				
			2008	8				
			2009	7				
55	Sewer operation – Rhineland-Palatinate	WW	2007	8				
56	Sewer operation – industry network	WW						
			2008	3				
			2009	3				
57	Sewage treatment plants online	WW						
			2003	10 operators / 21 plants			417.6	8.5
			2004	10 operators / 21 plants			615.9	13.2
			2005	15 operators / 31 plants			816.3	16.6
			2006	18 operators / 36 plants			998.6	19.7
			2007	17 operators / 35 plants			1,004.0	19.3
			2008	23 operators / 39 plants			1,086.4	20.8
			2009 (status: March 2010)	21 operators / 34 plants			n. s.	23.4

Other performance indicators	Executing organisation / supporter	Project information / public project report
Network length [km]:		Planning and construction of sewers (cost of the planning and construction control process, construction work costs, project duration, budget compliance, aspects of contract awarding), subjects for in-depth analyses (e.g. productivity of engineering services). Since 2002, more than 1,200 projects entered in the database.
n. s.		
n. s.		
28,628		
30,564		
29,127		
29,302		
29,433		
29,234		
31,336		
Network length [km]:		Focus on cost-intensive sub-processes such as cleaning, inspection, overhaul of sewers and chambers, pump stations and special structures.
36,568		
37,047		
Network length [km]:		
32,898		
36,961		
33,916		
38,867		
37,674		
38,474		
Network length [km]:		
1,924		
2,903		
3,759		
4,859		
Network length [km]:		
1,359		
2,519		
6,089		
5,489		
Network length [km]:		
2,499		
2,912		
2,942		
2,872		
Network length [km]: 4,007		
Network length [km]:		
200		
200		
Annual waste-water quantity [million m³]:		Brief description of the project: First national benchmarking project in the German wastewater sector (1996). An online platform is used for data collection and data analysis. The moderated session provides detailed support (up to seven meetings). Implementation according to the steps described in the DWA guidelines and instructions (DWA-M 1100) Aims of the project: situation analysis definition of benchmarking needs definition of potential optimisation and measures. The project is supported by moderators.
560.6		
804.0		
995.1		
1,400.0		
1,530.8		
1,616.8		
n. s.		

No.	Project/Process	Branch	Session or year of survey	Utilities	Drinking water		Wastewater	
					network supplies (million m³)	inhabitants supplied (million)	annual amount of wastewater (million m³)	PT [1] (million)
Process benchmarking								
58	Sewage treatment plants (DWA North)	WW						
			2009 (status: March 2010)	7 operators / 7 plants				1.6
			2008	7 operators / 7 plants			49.0	1.6
			2007	9 operators / 10 plants			77.9	2.0
			2006	9 operators / 9 plants			62.2	2.0
59	Sewage treatment plants in Rhineland-Palatinate	WW						
			2009 (status: March 2010)	7 operators / 7 plants			n. s.	n. s.
			2008	3 operators / 3 plants			7.7	0.16
			2006	22 operators / 23 plants			41.1	1.4
60	Sewage treatment plant for chemical wastewater	WW						
			2008	7 operators / 8 plants			114.6	4.8
			2005	3 operators / 4 plants			72.3	3.2
61	Waterworks	DW	2005	20	approx. 370	n. s., as individual waterworks are analysed		
			2006					
			2007					
			2008					
			2009 (planning status)					
62	Drinking water laboratory	DW	2005	(38 waterworks)	approx. 1,000	n. s., as district suppliers without end-use customers are included, among others		
			2007					
			2009 (planning status)					
63	Indirect dischargers	WW	2005	14			1,073.2	
			2006	9			458.0	
			2007	10			474.8	
			2008	10			480.8	
64	Civil Engineering Offices (transport safety control, excavation by third parties)	WW	2007	9				
65	Mains construction	DW	2007	2				

Other performance indicators	Executing organisation / supporter	Project information / public project report
Annual waste-water quantity [million m³]:		Brief description of the project: first national benchmarking project in the German wastewater sector (1996). An online platform is used for data collection and data analysis. The moderated session provides detailed support (up to seven meetings). Implementation according to the steps described in the DWA-M 1100) Aims of the project: situation analysis definition of benchmarking needs definition of potential optimisation and measures. The project is supported by moderators.
57.5		
93.8		
72.0		
Annual waste-water quantity [million m³]:		
n. s.		
12.1		
60.2		
Annual waste-water quantity [million m³]:		
123.2		
77.7		
		Intensive exchange of experience and individual utility reports.
		Intensive exchange of experience and individual utility reports.
		After a general overview of the positioning of the different utilities, the separate sub-processes of indirect discharger control "strategy, operation monitoring incl. inspection", "sampling" and "definition" will be considered more closely under the aspect of efficiency, and differences will be worked out. Aims of the project: • situation analysis • common cause analysis for the determination of optimisation measures • exchange of experience between participants • continuous elaboration of possibilities for improvement by participants
Minor excavations = 16,340 (range between 394 and 4,800		Through intensive exchange of experience and the structured comparison of collected data after plausibility control and cause analysis, the search for different influence factors was realised.
		Comparison of the process "planning and implementation of pipe construction projects", carried out as pilot project.

List of Charts

Statement of the Associations of the Water Industry on Benchmarking in the Water Sector[1)]

June 2005

On 22 March 2002, the German Bundestag passed the resolution on a „Sustainable Water Industry in Germany", striving for a modernisation of supply and treatment. For this purpose, the resolution, amongst other things, called for a procedure for performance comparisons among the enterprises (benchmarking). The associations of the water industry,

ATT – Association of Drinking Water from Reservoirs
BGW – Federal Association of the German Gas and Water Industries
DBVW – German Alliance of Watermanagement Association
DVGW – German Technical and Scientific Association for Gas and Water
DWA – German Association for Water, Wastewater and Waste
VKU – Association of Local Utilities

agree with the German Government and Bundestag that performance comparisons serve the purpose of modernisation, and are prepared to jointly draw up and develop further the required conceptional framework for benchmarking in the water industry in terms of a self-administration. The outline concept will ensure that performance and process comparisons of different contents are possible, thus taking account of Germany's long-standing experience. The associations of the water industry assume the following principles in the implementation of their joint benchmarking approach:

- Voluntary benchmarking is a well-proven instrument for the **optimisation of the technical and economic performance and efficiency** of enterprises.
- Optimisation objectives include, besides the **increase of economic efficiency and customer satisfaction, the security of supply and treatment, quality and sustainability** of the water industry.
- The associations of the water industry recommend their members a **voluntary participation** in benchmarking projects, and support their **broadly effective implementation**.
- The associations assist the enterprises by issuing joint and coordinated notes, reports and supplementary information on the benchmarking issue.
- The dissemination of the benchmarking is backed by a guideline jointly set up by DVGW and DWA in coordination with and with the textual support of the other associations.
- DVGW and DWA formulate principles for benchmarking requirements for drinking water supply and wastewater disposal in a joint paper in cooperation with the other associations.
- Within the framework of a uniform concept, the associations consider it helpful to maintain the present **flexibility and diversity of the benchmarking systems** in the water industry. In this context, on the one hand the existing, successfully practised models and concepts are to be continuously developed further, and on the other hand, developments are to be supported which provide for international, European and national comparisons and positions.

The factors for the successful application and broad acceptance of benchmarking include:

- Continuous adaptation to the optimisation objectives
- Confidentiality of company data, since these have to be disclosed in the project in order to identify innovative approaches
- Comparison and analysis of indicators in order to provide for an increase in performance.

To achieve these objectives, compatible structures are required within which benchmarking systems can be applied which are tailored to the respective question. Benchmarking on this basis will lead to a further high-level development of the water industry.

The associations generally welcome the need for information on the part of politics, the public and enterprises. Accordingly, the associations will regularly report on the state and development of the water industry in the form of an aggregated, anonymised „Water Industry Profile".

The following information is provided as core parts of the Water Industry Profile:

- Results of nationwide data collections by the associations, data of institutions and authorities
- Results of a nationwide survey on customer satisfaction levels within the population
- Information on voluntary benchmarking projects.

The Water Industry Profile will have to be continuously developed further against the background of new findings and requirements.

ATT-Vorsitzender	BGW-Vizepräsident	DBVW-Präsident	DVGW-Präsident	DWA-Präsident	VKU-Präsident
Gummersbach, 30.06.2005	Berlin, 30.06.2005	Hannover, 30.06.2005	Bonn, 30.06.2005	Hennef, 30.06.2005	Köln, 30.06.2005

[1)] Translation of the German original version

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as of 15 February 2011