Vewin

Reflections on performance 2006

accenture

High performance. Delivered.

Benchmarking in the Dutch drinking water industry

Reflections on performance

2006

Companies participating in the Benchmark 2006:

Foreword

Ten years of benchmarking and improvements in the drinking water industry

Reflections on performance 2006 is the fourth comparative survey of the Dutch drinking water industry. The study was performed for Vewin by Accenture. TNS NIPO, Interview NSS and Kiwa Water Research contributed in a number of areas.

The study objectively compares the performance of the drinking water companies in terms of their core results (Drinking water quality, Service, Environment and Finance & Efficiency).

The Benchmark gives shareholders and supervisory directors, central government, customers, researchers and last but not least the participating companies themselves a better understanding of the performance of the drinking water companies. All companies affiliated with Vewin took part in the study, and Reflections on performance therefore provides a representative picture of the Dutch drinking water industry. The drinking water industry supports the government proposal to impose the Benchmark, which is currently still voluntary, as mandatory on the entire sector.

Besides making transparent the performance of water companies, the study also aims at offering water companies instruments to help them further improve their business processes. Companies have adopted each other's best practices over the past ten years. Since the introduction of benchmarking in 1997 water quality has continued to improve, good service has been maintained, while costs in real terms have declined. In addition the sector has proved able to operate sustainably.

That the Benchmark is bearing fruit is confirmed by research by Erasmus University Rotterdam. This shows that the sector has attained an efficiency improvement of 23% since the introduction of the Vewin Benchmark. A unique milestone achieved by 10 years' voluntary benchmarking!

Developments in the field of benchmarking are continuing apace. An international benchmark is being prepared with neighbouring countries. This may produce new insights for the operational management of our companies in terms of quality and efficiency. The drinking water industry is also launching initiatives for comparisons with other sectors. This is feasible for financial and general processes and will enable best practices from other industries to be identified.

J.A.M. Hendrikx
Chairman of Vewin

Th.J.J. Schmitz
President of Vewin

September 2007

Unless stated otherwise, the data and charts in this report are based on data sourced from the individual drinking water companies and Accenture has carried out the required examinations (across several years, between different companies) and analyses on them.

Contents

Summary

Water quality further improved, good service maintained, real costs reduced

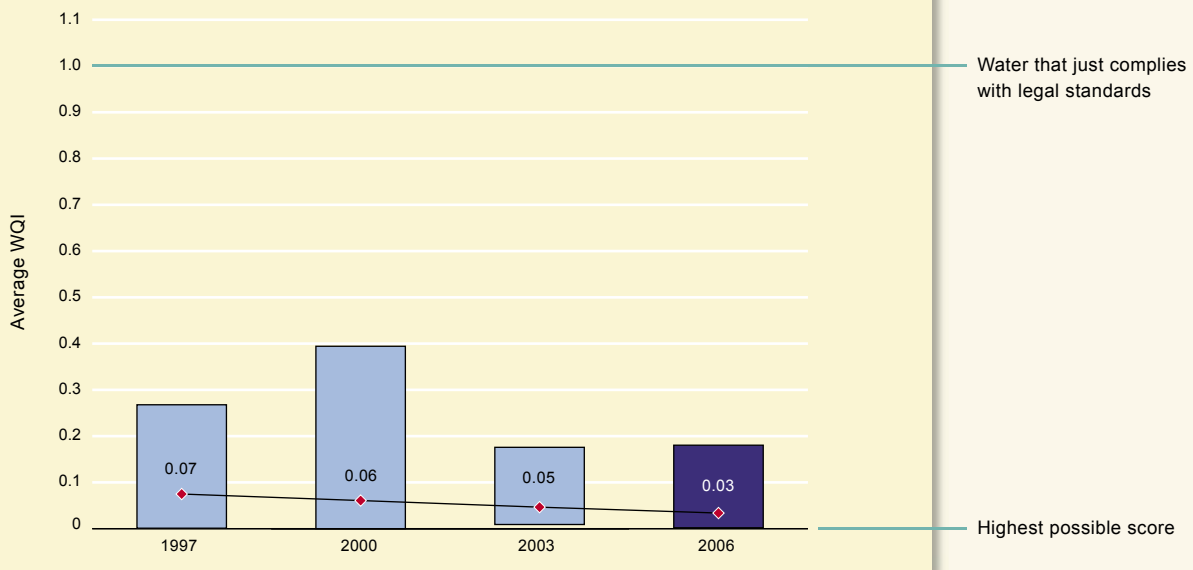
Reflections on performance 2006 is a benchmarking study carried out within the Dutch drinking water industry for the year 2006. The study aims at increasing efficiency, quality and transparency in the industry. The study was previously carried out in 1997, 2000 and 2003, allowing the performance of drinking water companies to be compared over a longer period. The benchmark study is based on four themes: Water quality, Service, Environment and Finance & Efficiency.

Water quality: further improved since 1997

Measurement of water quality uses the Water Quality Index (WQI), which shows the degree to which water complies with the legal standards set in the national Water Act. A '0' score is the highest possible; water that just meets minimum standards receives a score of '1'. Water companies comply comfortably with these standards, with an average WQI of 0.03. The WQI has improved continually since 1997.

Customers appreciate the water quality: 89% of the customers are happy with the price-quality ratio of drinking water. On average customers give water companies a report mark of 8.0 out of 10 for water quality. Customers feel differently about the water hardness: 36% are willing to pay more for softer water.

Figure 1 *The WQI has improved since 1997, from 0.07 to 0.03. (highest possible score = 0.00; legal standard = 1.00)*

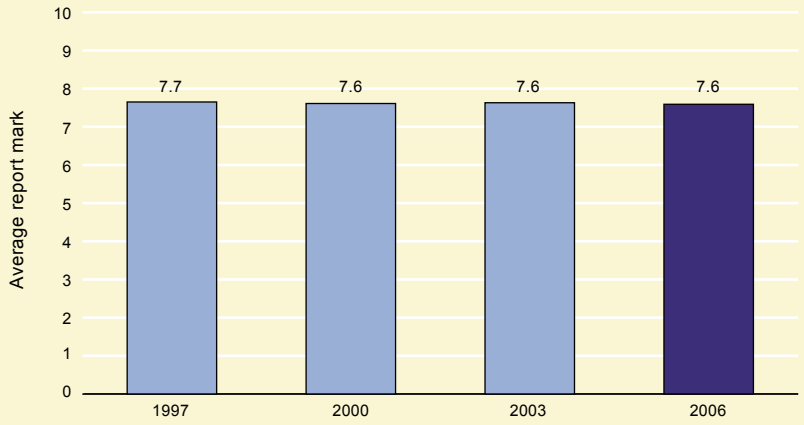


Source: REWAB[1], drinking water companies, Accenture analysis.

Service: on average customers give water companies a 7.6

Customers' satisfaction with the service provided by their drinking water company is undiminished and their average report mark is a 7.6. The sector thus scores better compared to a number of reference sectors, such as energy companies and supermarkets. The difference between the water company with the highest report mark and the lowest report mark was 0.5.

Figure 2 *Customers continue to be positive since 1997 about water companies' service, awarding it a score of 7.6.*



Source: TNS NIPO, Accenture analysis.

The performance of drinking water companies regarding availability by telephone varies strongly. A common indicator has been used to determine this: the percentage of telephone calls answered within 20 seconds at the water companies. This percentage varies between 17% and 79%.

For this Benchmark KIWA Water Research carried out a pilot study measuring the continuity of drinking water supply. This showed that customers had on average experienced supply disruptions of 6 minutes per year. That is low compared with average annual electricity supply disruptions of 36 minutes. In addition drinking water supply is interrupted for an average 8 minutes a year per connection for scheduled maintenance.

Environment: use of sustainable energy further reduces environmental impact

The industry is highly aware of its environmental footprint, i.e. the impact it has on its environment. Initiatives including managing energy consumption, recycling residues and combating dehydration are accordingly priority items on the agenda of drinking water companies.

Since 1997, the total energy use per m^3 of drinking water produced increased by 4%, partly due to the softening process and new water treatment processes. In the same period the share of sustainable energy use went up from 5% to 34%.

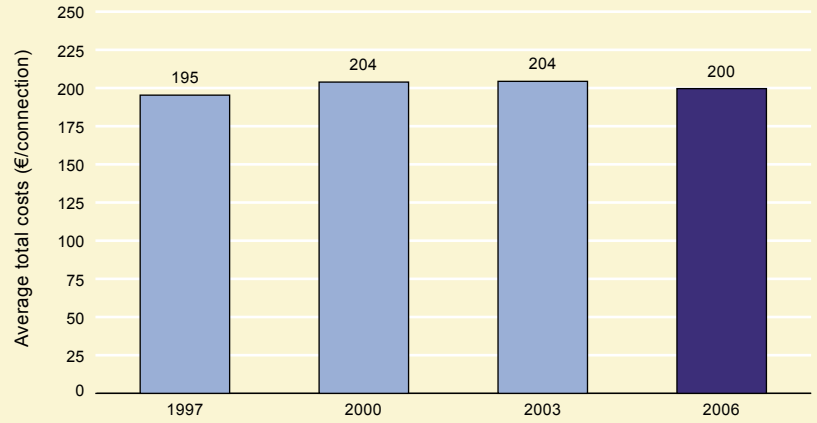
In 2006 94% of the residues of the drinking water production process were reused; an increase of 1 percentage point compared to 1997.

The industry proactively addresses both dehydration and excessive groundwater levels.

Finance & Efficiency: cost increases lower than inflation

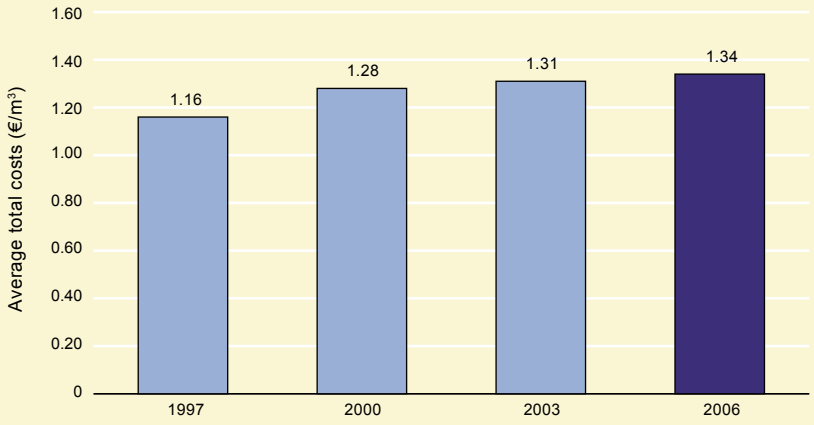
Since 1997 costs per connection declined by 16.9% after adjustment for inflation. Since 1997 costs per m^3 declined by 5.4% after adjustment for inflation. The difference in these trends is related to the declining drinking water consumption per connection (see Appendix E, figure 59). It should be noted that water companies' total costs are not directly related to efficiency.

Figure 3 *Since 1997 costs per connection increased nominally by 2.2% (or decreased by 16.9% if adjusted for inflation).*



Note: costs per connection have increased less steeply than costs per cubic metre, owing to decreasing water consumption per connection.

Figure 4 *Since 1997 costs per cubic metre have increased nominally by 16.3% (or decreased 5.4% if adjusted for inflation).*



1 Introduction

The drinking water industry benchmarking study was previously carried out in 1997, 2000 and 2003. The latest study undertaken in 2006 compares water companies' performance to that of 1997, 2000 and 2003.

The benchmark study has the following objectives:

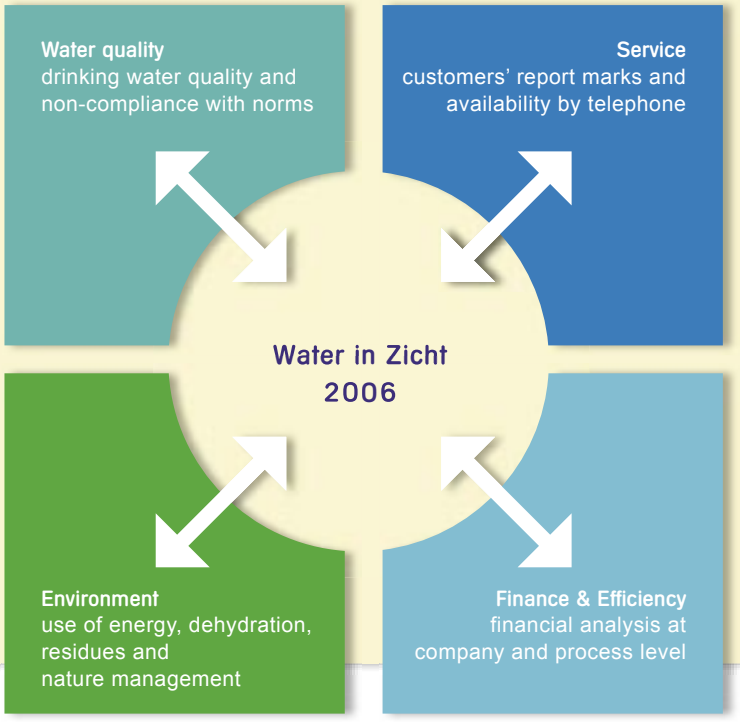
- **Transparency of performance**
  The Benchmark aims to provide greater transparency to interested parties including supervisory directors and shareholders.

- **Efficiency of business processes**
  The Benchmark provides the industry with insight as to how water companies might further improve their processes.

Continuity in approach of Benchmark

As in the previous benchmarks the drinking water companies are compared in terms of four themes:

Figure 5 *The Benchmark focuses on four themes:*



Water Quality

Clean drinking water is essential to customers' health. The government has thus drawn up legal standards stating the permissible amounts of substances in drinking water. The Benchmark applies the WQI using one figure to indicate the extent to which drinking water quality complies with these legal standards. In addition non-compliance with standards will be shown clearly outside the WQI; the way customers feel about the drinking water quality will also be examined.

Service

Costumers can come into contact with their water companies in different ways, for instance when reading meters or moving house. To compare water companies' services an extensive survey was carried out covering 6,199 customers. Availability by telephone and the continuity of water supply were also assessed. A feature newly introduced in the Benchmark 2006 is the measurement of the time during which a connection was not supplied with water owing to disruptions or maintenance.

Environment

Water companies extract, treat and distribute water. Some elements of these processes affect the environment. The environmental impact is caused by three factors in particular: energy consumption, produced residues and land dehydration. Except for environmental impact the contributions of the drinking water industry to nature area management were also mapped.

Finance & Efficiency

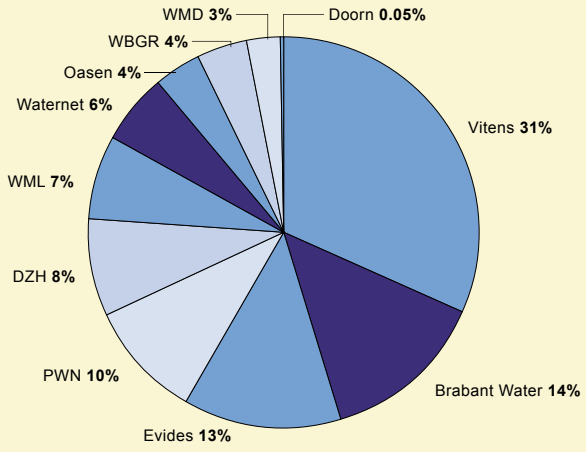
Drinking water tariffs and costs are different for each water company. The Benchmark covers the tariffs. Subsequently, the underlying costs are compared using a closed model on the basis of water companies' financial statements[2]. Costs are compared both at a company and process level.

The Benchmark focuses on several activities, ranging from 'managing the raw water source' to 'supply of drinking water to the end user'. 'Other water' (including industrial water)[3] as well as other non-drinking water activities[4] falls outside the scope of this research. The Benchmark does not cover the two other links forming part of the overall water chain; in addition to drinking water production these are sewerage and waste water treatment. These tasks are managed by the municipalities and water boards, not by the drinking water companies. These parties are also increasingly engaging in benchmarking.

Virtually 100% of the drinking water industry participated

Ten drinking water companies[5] participated in Benchmark 2006, jointly representing almost 100% of the drinking water industry, or 7.4 million connections. The only company that did not participate is N.V. Bronwaterleiding Doorn. 'Water companies' in this report are taken to mean participating water companies. In terms of connections, participation percentages in 1997, 2000 and 2003 were respectively 85%, 90% and 81%.

Figure 6 *Almost 100% of the drinking water industry participated in this Benchmark. In 1997, 2000 and 2003, in terms of connections, this was respectively 85%, 90% and 81%. In 2006 only N.V. Bronwaterleiding Doorn did not participate.*



The Benchmark has obtained a central position in managing and supervising Dutch water companies

Besides water companies, the central government, customers, supervisory directors and shareholders also increasingly use the Benchmark in their evaluation and steering processes. Furthermore, the current voluntary Benchmark will serve as foundation for the planned obligatory Benchmark in the new Drinking Water Act. In short, the Benchmark has come to occupy a central position within the drinking water industry.

Central government:

- The new Drinking Water Act provides for obligatory participation in the Benchmark by the drinking water companies.
- The obligatory Benchmark will be based on the current, voluntary Benchmark.

Customers:

- For customers' industry representatives such as the Association of Energy, Environment and Water (VEMW) and the Consumers Association, the Benchmark is a valuable instrument as it provides better insight into the performance of the drinking water industry.
- Customers can themselves also consult the Benchmark via the internet and therefore the performance of their own drinking water company.

Supervisory directors and shareholders:

- The Benchmark is used to objectively assess efficiency of water companies' operational management.
- The Benchmark is considered to be a proactive communication tool for current supervision.

Drinking water companies:

- The Benchmark helps management teams to continue to improve operational management.
- The companies hold meetings to exchange best practices.
- Business accounting systems are increasingly attuned to the Benchmark model.

2 Water quality: further improved since 1997

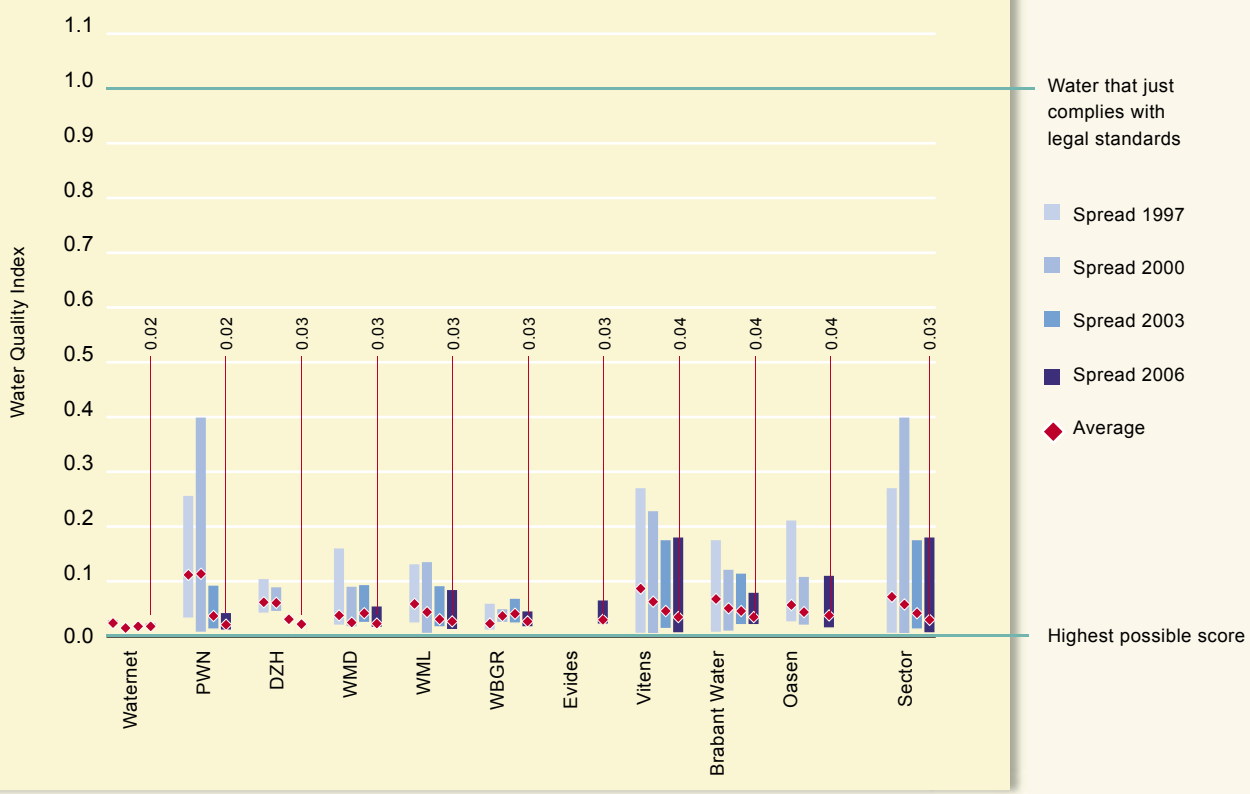
Clean drinking water is essential to consumers' health. The government has therefore drawn up legal standards indicating the quantities of substances that are allowed in drinking water. The Benchmark uses the WQI to indicate in a single figure the degree to which drinking water quality complies with these legal standards[6]. This index has been developed in close cooperation with the industry and the RIVM. In addition, non-compliance with standards is discussed[7] and customers' assessment of drinking water quality is examined.

Drinking water quality complies comfortably with legal standards

Figure 7 shows the WQI per water company including the spread between measuring points. A score of '0' is the highest possible score; water which just complies with the legal standard receives a score of '1'.

Figure 7

The average water quality of all water companies complies comfortably with the standards in the Water Supply Decree. The average WQI has improved continually compared to 1997 and all intervening years.



Source: REWAB, drinking water companies, Accenture analysis.

Water companies comply comfortably with the standards and attain an average WQI of 0.03. That is an improvement compared to 1997, and is mainly due to the ongoing softening process. Compared to 2003 the improvement is 27%, part of which is due to the deletion of a number of parameters in determining the WQI for 2006[8]. The actual quality improvement is 18%.

For several reasons the average WQI remains well below '1'. Firstly, the quality of some of the sources is better than the standard. Secondly, the quality of a specific source fluctuates during the year; that is why the treatment process has been designed to convert even the worst quality water into reliable drinking water. Thirdly, in treating water more substances are removed than is strictly legally necessary. This is intrinsic to the commonly used water treatment techniques.

The following aspects deserve extra attention per company:

- Waternet and DZH present a limited spread between their measuring points, partly because each of these drinking water companies has only two extraction points. Other drinking water companies have more extraction points. By way of comparison: Vitens, with more than 80, has the greatest number.
- PWN's peak in 2000 was caused by an incident involving thermo-tolerant coli bacteria.

Water Quality Index methodology

The WQI is determined as follows:

1. **Determine parameters and standards.** Water quality is defined as the extent to which a number of selected parameters conform to legal criteria. The Water Supply Decree, as it applies in every Benchmark year, is the basis for the selected parameters and related standards. Parameters are weighed depending on the parameter group. Acute health parameters accordingly outweigh other parameters. The parameters used are set out in Appendix B.

2. **Register measured values.** Water companies are legally obliged to regularly carry out measurements and report to inspectorates via the so-called REWAB (Registration Tool for Water Distribution Companies) systems. The Benchmark adopts the REWAB system data as the basis for the WQI.

3. **Calculate the WQI.** Water quality is expressed in a WQI. The calculation is based on the following formula: determine for each parameter the average ratio between the measured value and the corresponding standard stated in the Water Supply Decree. These ratios are first aggregated by parameter group, then by measuring point (usually a pumping station) and finally into a single figure at company level.

4. **Present results.** In addition to a weighted average WQI, the spread between the various measuring points is stated for each company.

The main improvements were achieved in customer-oriented parameters

Although the water quality of all water companies complies comfortably with the legal standards, an understanding of the composition of the WQI helps to indicate the areas that still require improvement. The parameters are divided into parameter groups (see Appendix B). The parameters with the greatest impact on the WQI in daily practice are described below for each parameter group:

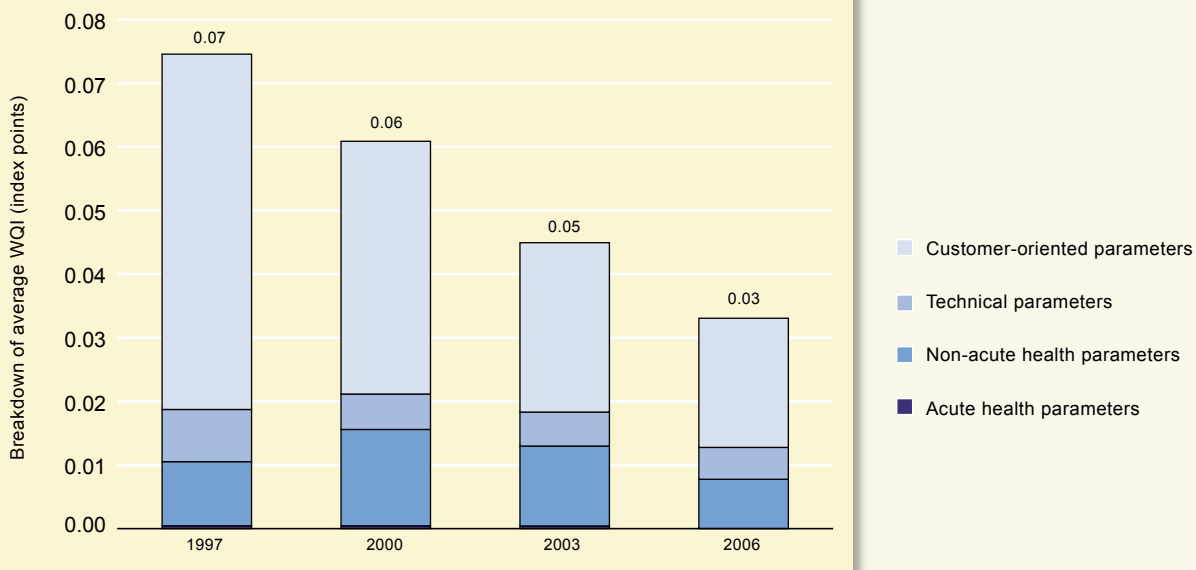
- **Acute health parameters.** These are bacteria and viruses which can form a direct threat to public health. In 1997, 2000, 2003 and 2006 these were hardly found in drinking water.

- **Non-acute health parameters.** These are chemical substances which can only affect public health in case of lifelong exposure. Examples include the parameters boron, bromate and nickel. In 2006 bromate had the greatest impact on the WQI.

- **Technical parameters.** Water companies use these parameters during the water treatment process to ensure good operational management and drinking water quality. They are not directly related to the health of the public. In 2006 the saturation index[9] parameter had the greatest impact on the WQI within this group.

- **Customer-oriented parameters.** These are the parameters that are noticeable by consumers. For instance, they might cause colour deviation and thus be aesthetically undesirable for drinking water. Customer-oriented parameters are not directly related to public health. Improvements introduced by water companies in past years mainly relate to this parameter group, as seen in Figure 8. Especially total hardness[10] decreased due to the intensifying softening process (Figure 9). The main advantage of this is the reduced level of water scale in the main water pipes and household appliances. The parameter colour also improved compared to past reference years.

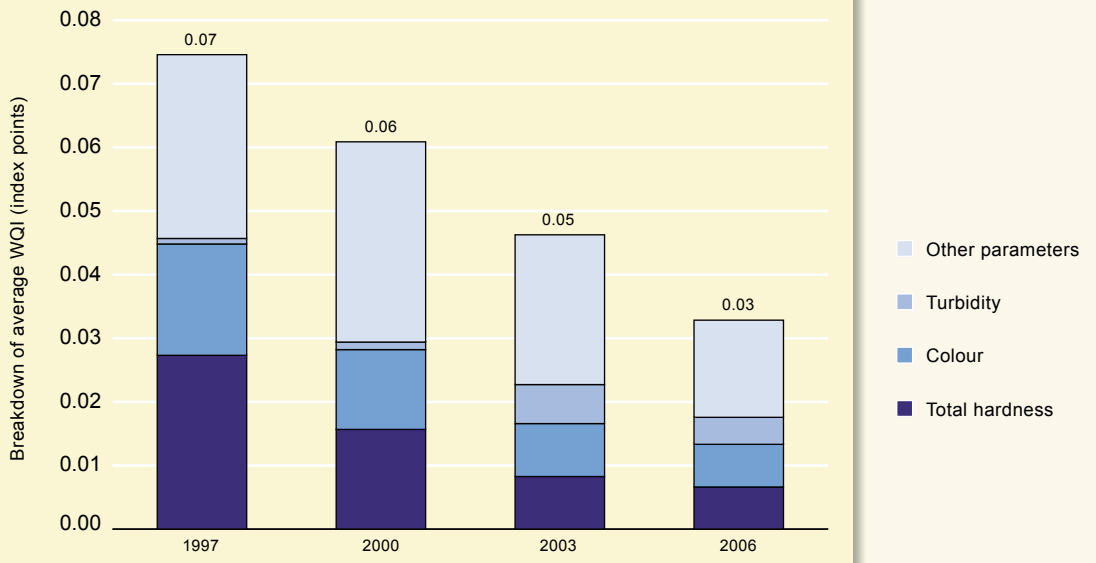
Figure 8 *The main improvements since 1997 were achieved in customer-oriented parameters.*



Source: REWAB, drinking water companies, Accenture analysis.

Figure 9

A significant part of the improvements since 1997 is due to the ongoing softening process. The increase of the contribution of the turbidity level to the WQI in 2003 was due to stricter standards.



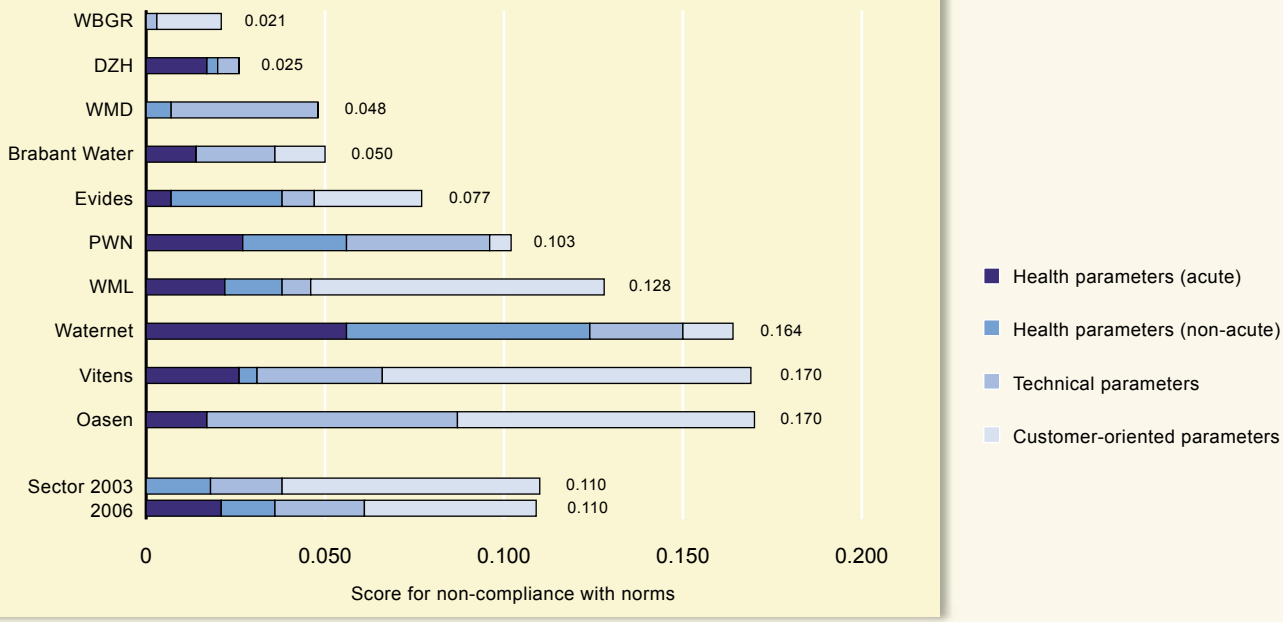
Source: REWAB, drinking water companies, Accenture analysis.

Spread between water companies of scores for non-compliance with norms is a factor 8

Besides the WQI, which indicates the regular quality of drinking water, the non-compliance with norms has been mapped. This score is determined by taking the number of times the norm is exceeded, weighting each instance of non-compliance with the norm[11] on the basis of the seriousness of the parameter and then dividing the total score by the millions of cubic meters supplied by a company.

Figure 10

On average 33% of the score for non-compliance with norms is attributable to acute and non-acute health parameters.



Source: REWAB, drinking water companies, Accenture analysis.

On average 33% of this score is determined by acute and non-acute health parameters.

At seven out of ten participating water companies the score for non-compliance with norms is partly determined by continual non-compliance. The most common ones are structural non-compliance with norms for the saturation index and total hardness. The other parameters involving structural non-compliance with norms are bromite, chlorine, aeromonas, hydrogen carbonate and turbidity level.

Methodology for the score for non-compliance with norms

In addition to the WQI (indicating the regular quality of drinking water) as of the Benchmark 2003 the score for non-compliance with norms is also made transparent.

The score for non-compliance with norms is determined by taking the number of times the norm is exceeded, weighting each case on the basis of the seriousness of the parameter (e.g. legionella is more serious than hardness) and then dividing the total score by the number of millions of m^3 supplied by a company.

The score for non-compliance with norms is based on the same parameters which are used to determine the WQI. Non-compliance with norms is counted and weighted on the basis of the relevant parameter group. Water companies carrying out more measurements than the minimum stated in the Water Supply Degree are not penalised. Non-compliance with norms above the minimum measurement frequency is not included in calculating the score.

In order to increase the reliability and comparability of data among water companies, REWAB data are used for calculating the score for non-compliance. The number of customers afflicted and the duration of non-compliance with norms are not registered and therefore cannot be included in the score for non-compliance with norms.

89% of customers consider the price-quality ratio of drinking water to be good

As in the previous Benchmark, TNS NIPO surveyed around 960 customers to find out how they felt about drinking water quality[12]. Their average report mark was 8.0 out of 10 (Figure 11). That is an improvement compared to 2003, when the average water quality score given by customers was 7.7.

The following marks emphasise customers' satisfaction with drinking water quality:

- 89% were happy with the price-quality ratio of drinking water.
- 94% were happy with the taste of the drinking water.

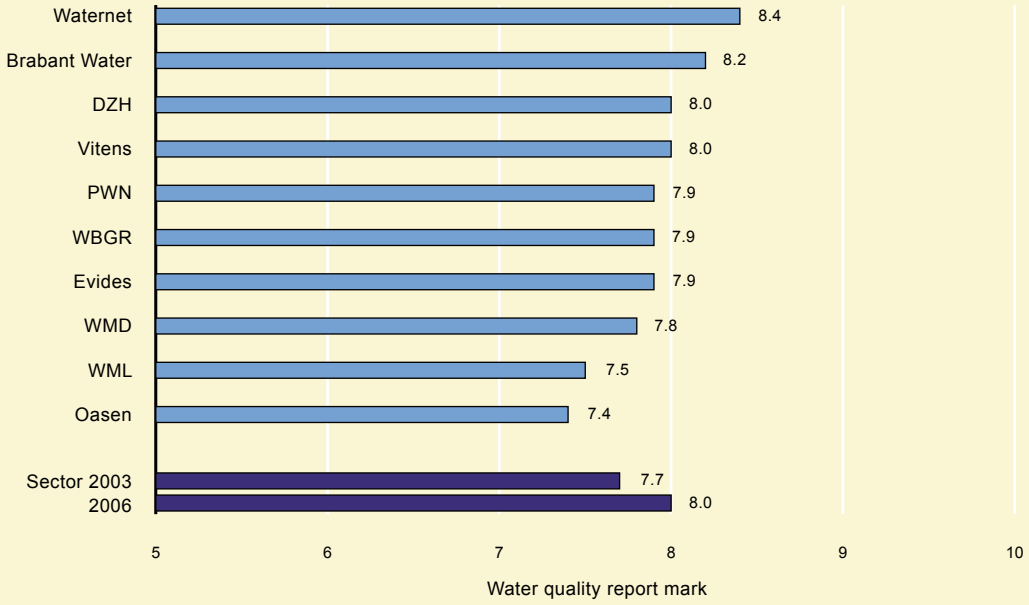
A minor group of customers would like some adjustment to the quality or price of water:

- 23% would be willing to pay more for better-quality drinking water.
- 9% were willing to settle for lower quality at a lower price.

Customers' assessment of water hardness varies:

- 67% of customers were happy with the water hardness level.
- 36% would be willing to pay more for softer water.

Figure 11 *Customers give all water companies a clearly satisfactory assessment for water quality; the sector average is 8.0 out of 10. This is an increase from 7.7 in 2003.*



Source: TNS NIPO, Accenture analysis.

3 Service: customers give water companies an average mark of 7.6

Consumers can come into contact with their water companies in different ways, for instance during a meter reading or when they are moving house. In order to compare customer satisfaction with respect to water companies' services, an extensive survey was carried out covering 6,199 customers. The availability by telephone and water companies' continuity of supply were also investigated.

Customers are positive about water companies' service

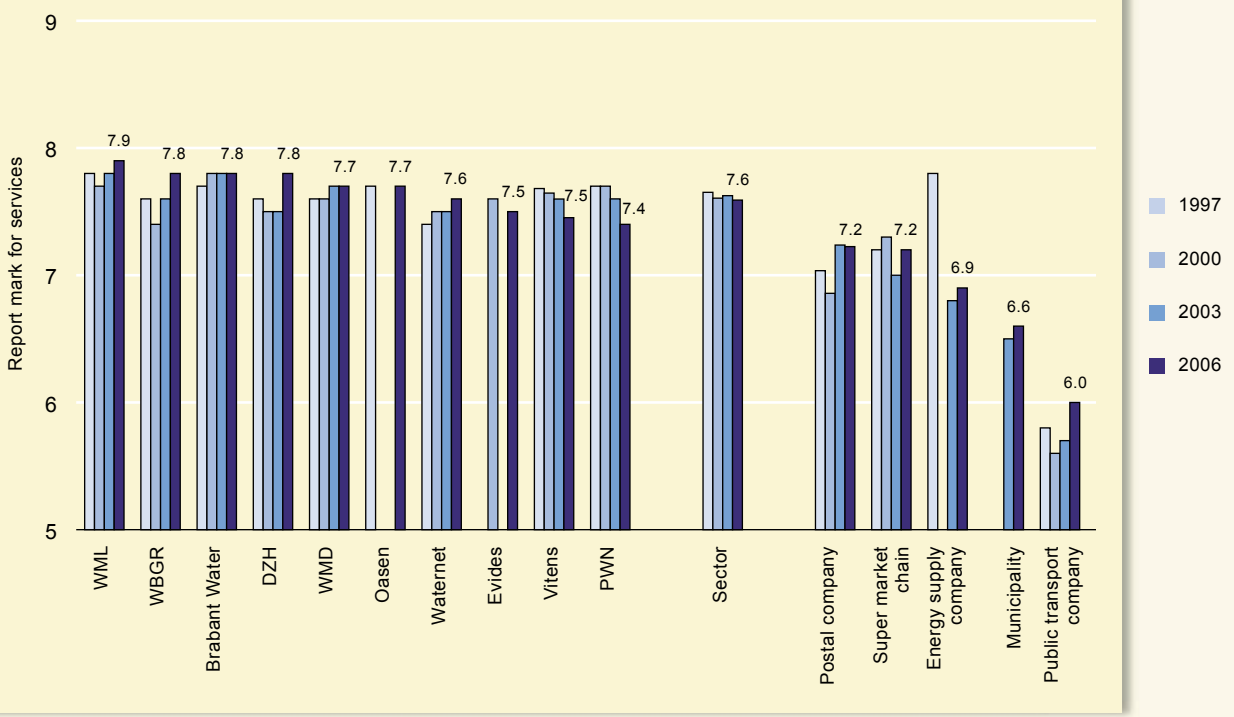
The survey was held among customers who had recently come into contact with their water companies. They were asked to give a report mark for service.

As in 2003, the average report mark for service was 7.6 out of 10 (Figure 12). In 1997 the average report mark was a 7.7. This shows that the level of customer satisfaction about service remains high.

The spread between the water companies with the highest and the lowest report mark was 0.5.

Figure 12

Despite growing increasingly critical, customers remain satisfied with the services offered by the drinking water industry, giving them an average mark of 7.6. This assessment substantially exceeds the assessment given to a number of other national organisations catering to basic needs.



Source: TNS NIPO, Accenture analysis.

The report marks for service provided by water companies were also compared to other national organisations[13] that provide various basic needs. These are the results in order of the report marks for 2006:

- Postal company: 7.2;
- Super market chain: 7.2;
- Energy company: 6.9;
- Municipality: 6.6;
- Public transport company: 6.0.

All water companies scored better than these reference sectors.

Customer questionnaire methodology

Service quality was extensively studied using TNS NIPO's telephone questionnaire. The survey was held among 6,199 customers who had recently come into contact with their water companies:

The quality of service is defined as the degree to which the expectations of the customer were satisfied. This is expressed as a general report mark indicating the level of service. In addition, customers' satisfaction with water companies' separate services was also studied.

Services have been subdivided into six activities: invoicing, meter reading, exchanging the meter, maintenance, assistance during disruptions and change of address. A distinction is also made in terms of form of contact: meters can be read by a meter reader at home, but contact with customers can also be by telephone or in writing.

Customers are satisfied with service aspects

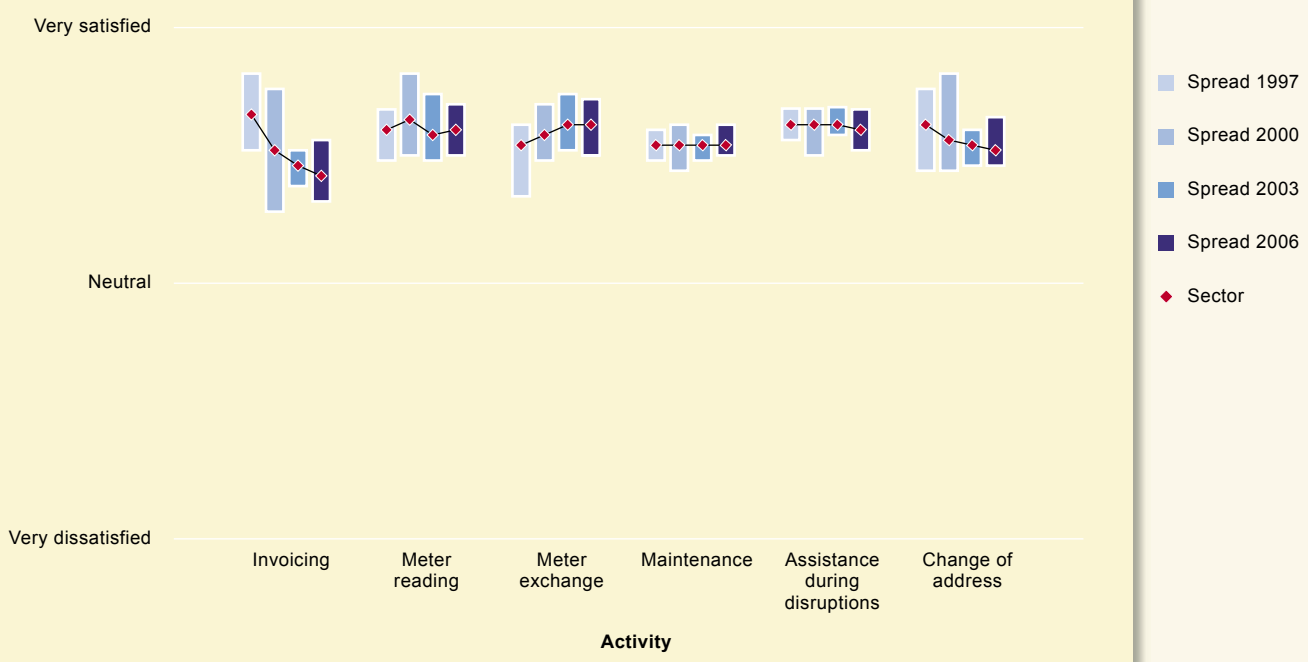
Satisfaction

Customers were asked specific questions about six activities of the water companies, as well as about water companies' performance in terms of form of contact.

- Activities. Since 1997 customers have become increasingly satisfied with regard to the exchange of meters, yet less happy with regard to invoicing, assistance with disruptions and change of address. Satisfaction has remained level for maintenance and meter reading (Figure 13).

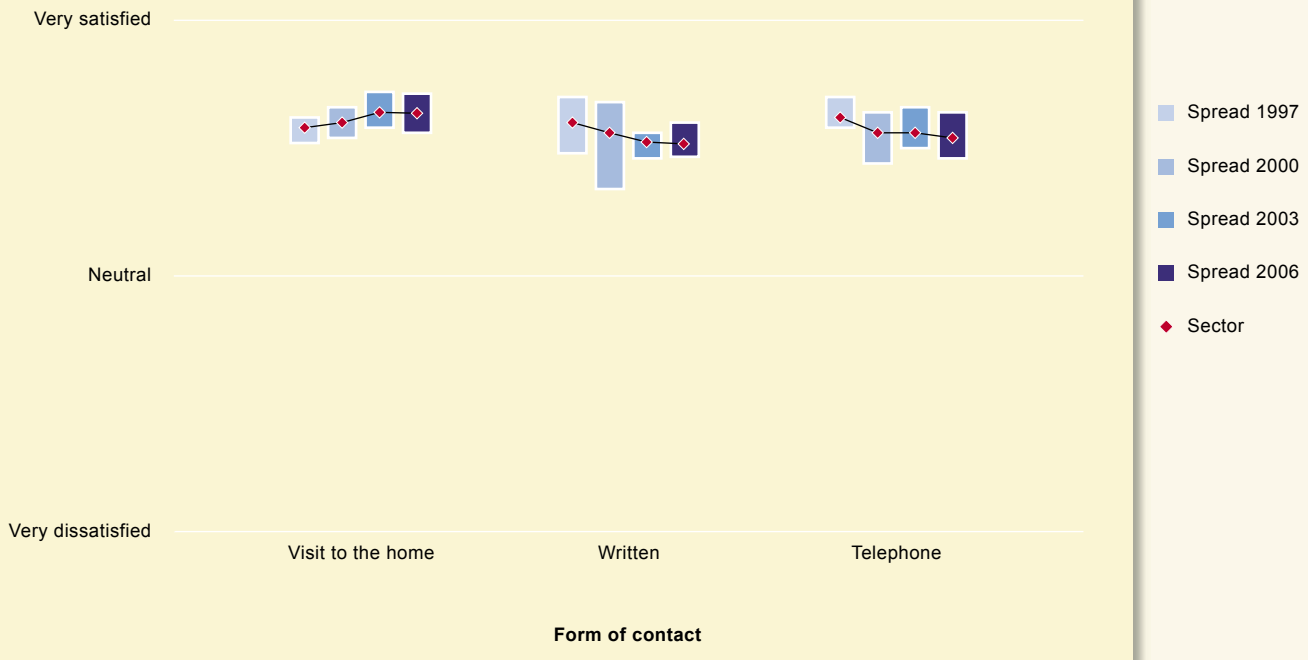
- Forms of contact. Since 1997 customers have become more satisfied with contact in 'visits to the home' (Figure 14). Customers are less satisfied with written and telephone contact. Written contact includes e-mail messages.

Figure 13 *Generally speaking customers are happy with the activities carried out by water companies.*



Source: TNS NIPO, Accenture analysis.

Figure 14 *Satisfaction has increased slightly with regard to visits to homes compared to 1997. With regard to written contact and contact by telephone, satisfaction has decreased slightly.*



Source: TNS NIPO, Accenture analysis.

Dissatisfaction

The dissatisfaction rate too can be used to identify improvements. The dissatisfaction level is indicated by the percentage of dissatisfied customers. Since 1997 customers have become more dissatisfied in the following cases:

- Telephone contact (from 6% to 9%);
- Invoicing (from 8% to 11%);
- Maintenance (from 8% to 10%).

The dissatisfaction rate declined with regard to other activities and forms of contact. The major declines were realised in the following cases since 1997:

- Meter exchanges (from 13% to 6%);
- Contact at home (from 10% to 6%);
- Meter reading (from 5% to 4%).

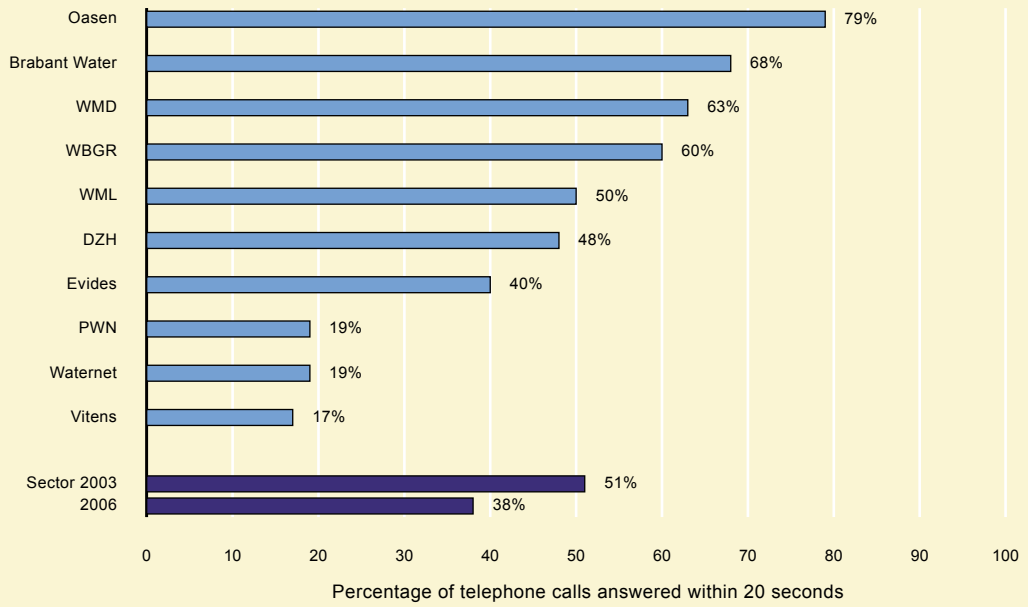
Telephone accessibility shows major differences between water companies

The research company Interview NSS carried out spot checks during an eight-week long period to investigate the water companies' telephone accessibility[14].

A common indicator has been used for this, namely the percentage of telephone calls that are answered by an employee within 20 seconds. This excludes time spent in a menu. The average telephone waiting time (excluding time spent in a menu) was also registered.

38% of the telephone calls made during the spot-check period were answered within 20 seconds. The percentage varies from 17% at Vitens to 79% at Oasen. The average telephone waiting time (95 seconds) is marked by a similar variation, with a spread ranging from 19 to 185 seconds.

Figure 15 *The percentage of spot-check telephone calls answered within 20 seconds (excluding time spent in a menu) shows a substantial spread, with a 38% sector average.*



Source: Interview NSS

Average accessibility taken over the whole of 2006, which is measured by the companies themselves, can deviate from the accessibility as measured in the spot-check period by Interview NSS. Bearing the next Benchmark in mind, research is currently taking place together with the sector to see how the design of the survey can be adjusted in order to give a more representative image of the entire year.

For example: at Vitens the spot-check period coincided with the moving of the call centre to new premises which caused the measured accessibility (17%) during this period to be considerable lower than the year average (45%). And PWN, whose call centre activities are also performed on behalf of Waternet, suffered a series of system faults during the spot-check period whereby accessibility was also substantially less (19%) than the average for the year.

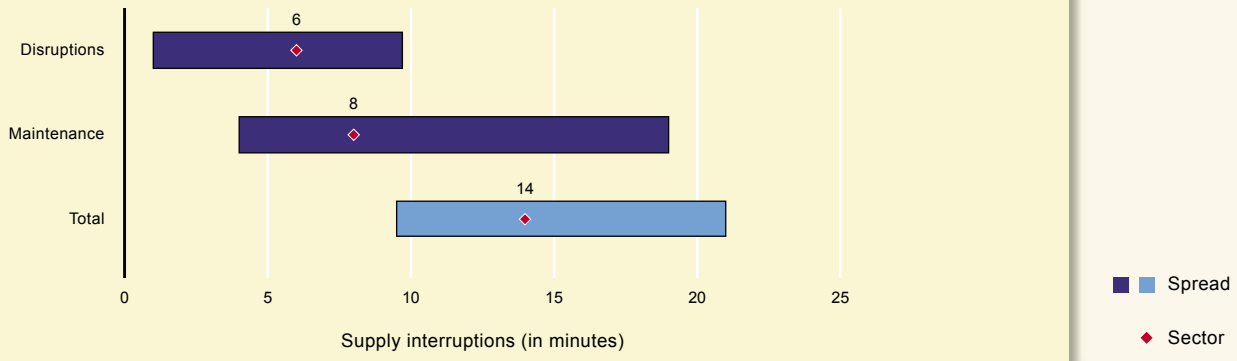
The widely diverse performances of the water companies are representative of the spot-check period. This suggests a number of companies need to implement immediate improvement initiatives to ensure better accessibility.

Water supply disruptions to households in 2006 averaged 14 minutes

Kiwa Water Research carried out a pilot study of continuity in drinking water supply in 2006. This applied a distinction between the impact of disruptions (unscheduled interruptions) and regular maintenance (scheduled interruptions).

Figure 16

In 2006 water supply per connection was interrupted on average for 6 minutes by disruptions and 8 minutes for scheduled maintenance



Source: KIWA Water Research

The average duration of interruptions due to disruptions, resulting for instance from supply lines being broken by digging, is 6 minutes per year. The duration of interruptions varies between 1 and 10 minutes per connection per year. That is low compared to an average of 36 minutes' disruption for electricity. By contrast, gas supplies are interrupted only for 18 seconds per year as a result of disruptions.

The duration of scheduled interruptions for regular maintenance averages 8 minutes per year per connection and varies between 4 and 19 minutes.

It should be borne in mind that clients' perception of supply interruptions can differ from reality. A disruption when no one is at home or at night will for instance not be noticed for drinking water but will for electricity supply (freezer or electrical clock for example).

4 Environment: further reduction in environmental impact through use of sustainable energy

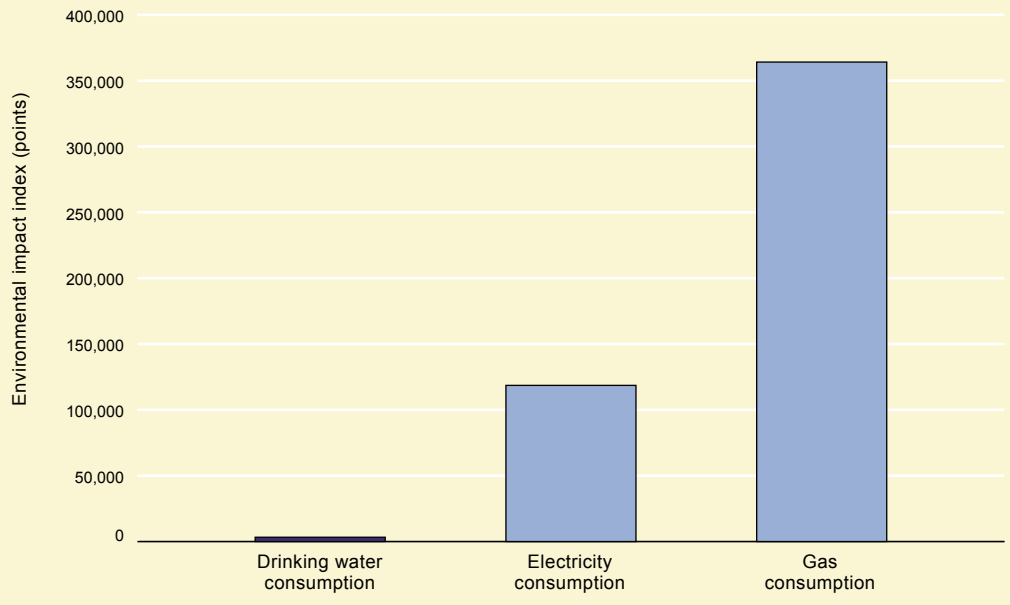
Water companies extract, treat and distribute water. Some of these processes have an impact on the environment. Water companies aim to minimise their environmental footprint by attaining a sustainable balance between water collection, environmental management and nature management. This chapter outlines both the environmental impact and the environmental contributions of drinking water companies.

Environmental impact of drinking water sector is limited compared to other sectors

To quantify the environmental impact of the drinking water sector, the environmental impact index was developed for Reflections on performance 1997. This was refined and once again presented in Reflections on performance 2000. The 2000 results, for the second time, showed that the environmental impact of drinking water consumption is extremely limited, compared to the use of electricity and gas for example. Additionally, it has been established that 93% of the environmental impact of drinking water consumption in 2000 depended on three factors: energy consumption (72%), dehydration (20%), and residues (1%).

As in 2003, this year the decision was made to quantify these three factors separately, to further increase the transparency of these subjects. Dehydration forms an exception: this subject is considered from a qualitative viewpoint, because a uniform quantitative indicator is not available at present.

Figure 17 *Compared to electricity and gas consumption, the environmental impact, per average family, of drinking water consumption is extremely limited.*



Source: Reflections on performance 2000.

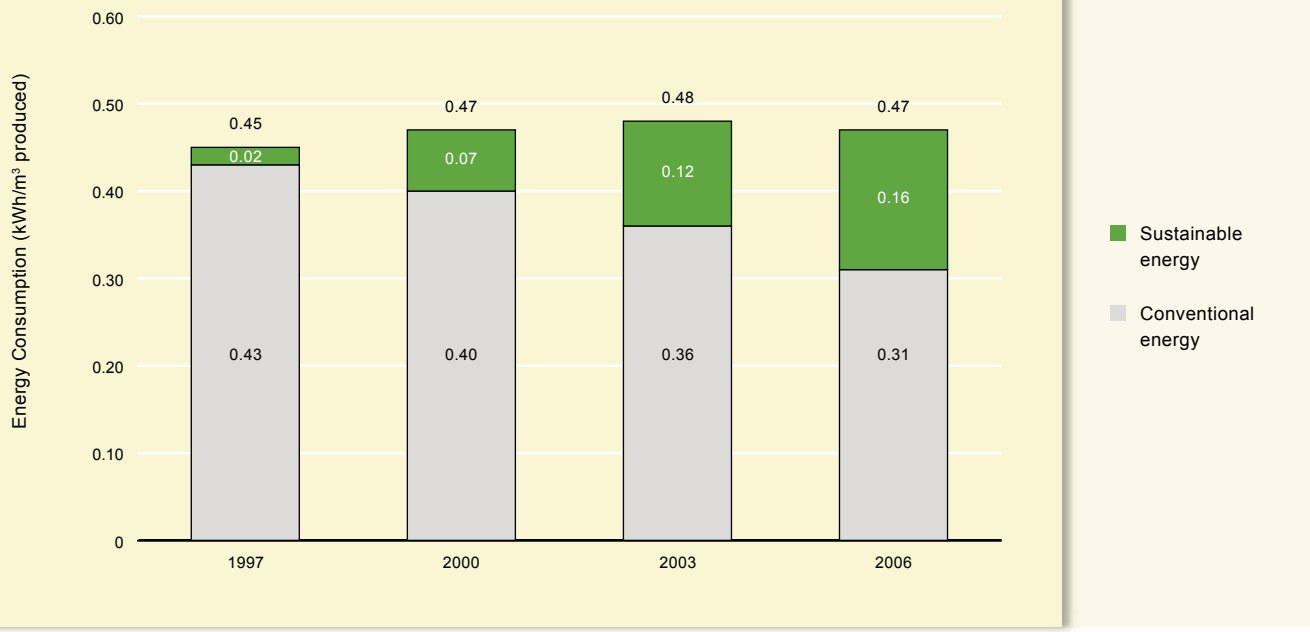
Energy consumption has declined since 2003; the share of sustainable energy has increased

The mapped energy consumption concerns the production and distribution process of drinking water. A distinction is made between sustainable and conventional energy.

Energy consumption has fallen by 2% compared to 2003. Total energy consumption per m^3 drinking water produced has increased by 4% since 1997. This is partly because several water companies have expanded their production process with a softening process and the application of new water treatment technologies (using UV and membrane filtration). This so-called 'central softening' reduces water scale in water pipes. In addition, customers can use fewer or no softeners, resulting in a cost reduction for customers as well as lower environmental impact by customers.

The share of sustainable energy use at sector level has increased from 5% to 34% since 1997. Since 1997, the number of water companies that use sustainably generated energy has grown from 2 to 7.

Figure 18 *The total energy use per m^3 of produced drinking water has increased 4% since 1997, this is partly due to softening and new/more intense water treatment methods. In the same period the share of sustainable energy consumption rose from 0.02 to 0.16 kWh per m^3 (5% and 34%respectively of the total). Energy consumption has declined compared to 2003.*



To continue to limit the impact of energy consumption in the sector, companies are engaged not just in seeking opportunities for saving energy, but also new technologies of sustainable energy generation and storage. For example, WMD has solar panels on its pumping station in Annen that generate 150,000 kWh in energy; PWN is investigating the feasibility of placing windmills on its production locations; Brabant Water is exploring the application of cold/heat storage in groundwater to be able to increase energy efficiency, without affecting the quality of the source.

94% of water companies' residues are recycled

To one company it is a residue, to another it is a raw material. The Residues Union (Restoffenunie) was founded by water companies in 1995 to find new uses for residues from the production of drinking water. The goal is to find solutions which have a lower or no impact on the environment and are also financially interesting for water companies. All water companies in the Netherlands are shareholders in the Residues Union.

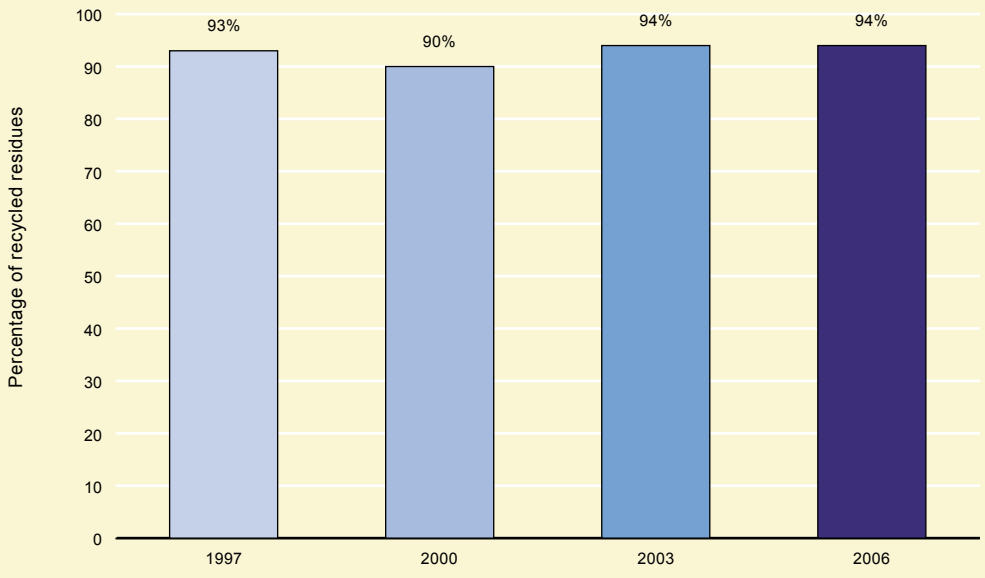
Figure 19 *In 2006 94% of the residues transferred to the Residues Union were recycled[15].*

Type of residue	Production	Recycled	Stored	Uses after recycling include
Chalk granules	61,940 tons	100%		Decorative gravel, coal gasification, ground insulation, steel industry
Iron sludge*	25,000 tons	72%	28%	Biogas, brick industry, household waste fermentation
Aluminium sludge	279 tons	100%		Building
Chalk sludge	5,069 tons	100%		Agricultural manure, road foundation
Filter material	5,490 tons	100%		Noise barriers, concrete products
Sand	8,738 tons	100%		Land elevation and ballast material in construction industrial parks
Powder coal sludge	1,449 tons	100%		Noise barriers, brick industry (interior wall stones)
Total	**107,965 tons**	**94%**	**6%**	

* Iron sludge is recycled in both solid (40% dry matter) and liquid form (10% dry matter).

Source: Residues Union

Figure 20 *The percentage of recycled residues increased by 1 percentage point compared to 1997.*



Source: Residues Union

Currently, 94% of the residues are recycled (Figure 19). Sludge containing iron, which is released in rinsing the rapid filters, is used as colour and filler in the brick industry. The increase in softening means a greater production of chalk granules. These are used among others by the steel industry and for the gasification of coal. Some residues are not of sufficient quality to be usable as raw material; they are used as building materials. An example is the application as filler in a noise barrier, e.g. along the A15 motorway at Barendrecht.

Raw and building materials must comply with strict environmental protection quality requirements. The Residues Union tests whether the residues comply with this. Additionally, research goes into enabling residues to be better geared to their next application. Compared to 1997, the percentage of recycled residues increased by 1 percentage point.

Sector pro-actively addresses dehydration and excessive ground water levels

Both dehydration and excessive groundwater levels are subjects for which the drinking water sector is pro-actively seeking solutions, and is implementing them. For dehydration this is possible by moving groundwater production to locations that are not prone to dehydration, or by extracting surface water instead of groundwater. In areas with excessive groundwater water companies can help by extracting extra groundwater.

Dehydration

When groundwater is extracted near nature areas which are highly dependent on the groundwater level or the supply of groundwater via the soil, dehydration can occur locally. As do industry and the agricultural sector for example, water companies extract water from the ground. The policy objective for the drinking water sector according to the Fourth National Policy Document on Water Management required no increase in extraction of ground water beyond the levels measured in 2000.

This objective has been achieved. Groundwater extraction for drinking water supply fluctuates somewhere around the level achieved in 1990. Furthermore, the environmental impact of groundwater extraction is minimised because companies move their water collection to less dehydration-sensitive areas or the water extraction is compensated by infiltration of surface water. Put differently, the dehydration in a dehydration-sensitive area can decrease while the total extraction flow remains the same.

Several practical examples illustrate the proactive attitude of water companies in these areas: Waternet together with the provinces of North Holland and South Holland and the Rijnland District Water Control Board has drafted an Environmental Impact Report on the optimisation of nature and water extraction in the Amsterdam dunes. On that basis anti-dehydration measures were carried out in the winter of 2006, as a result of which a level increase can be achieved in September 2007 as part of the ‘Project De Zilk’. Brabant Water has given up a total of 10 million m^3 of permit capacity for three dehydration-prone locations and initiated relocation projects for two other dehydration-prone locations. DZH has started a regeneration project in the dune area around the extraction location Meijendel.

In 2006 the Dehydration Taskforce issued an advice on how dehydration can best be addressed, on the basis of visits to thirteen projects. The drinking water sector was also represented on this Taskforce. The recommendations issued, such as concentrating on the TOP areas (the most strongly dehydrated areas) and better cooperation by the parties concerned, enjoy broad support in the drinking water sector.

Excessive ground water levels

Next to dehydration, a high groundwater level is increasingly the focus of attention. This occurs if the groundwater level in an urban area is continually high, causing difficulties in the current designated use of the area concerned. Water extraction can play a role here (outside fenlands) by using more groundwater for the drinking water supply in situations with excessive groundwater levels.

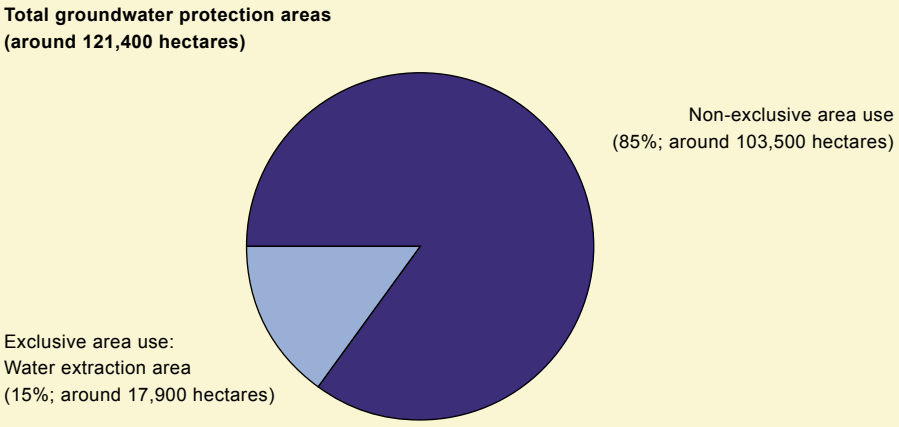
To that end PWN is, in tandem with municipalities and the province, examining the effects of water extraction on seepage and has prepared a vision for the future of water extraction in the Gooi area. The company has also set up a warning system enabling flooding resulting from rainfall to be predicted. Brabant Water has deliberately not discontinued water extraction at a number of locations to prevent excessive groundwater problems in those areas. As part of the 'Project De Zilk' the provinces North Holland and South Holland, the Rijnland District Water Control Board and Waternet jointly have set up a monitoring procedure that can be consulted online by those concerned in the region.

Water companies manage around 20,100 hectares of nature area in the Netherlands

In addition to their efforts to ensure maximum recycling of residues and optimal water extraction, water companies contribute to the environment through the management of nature areas.

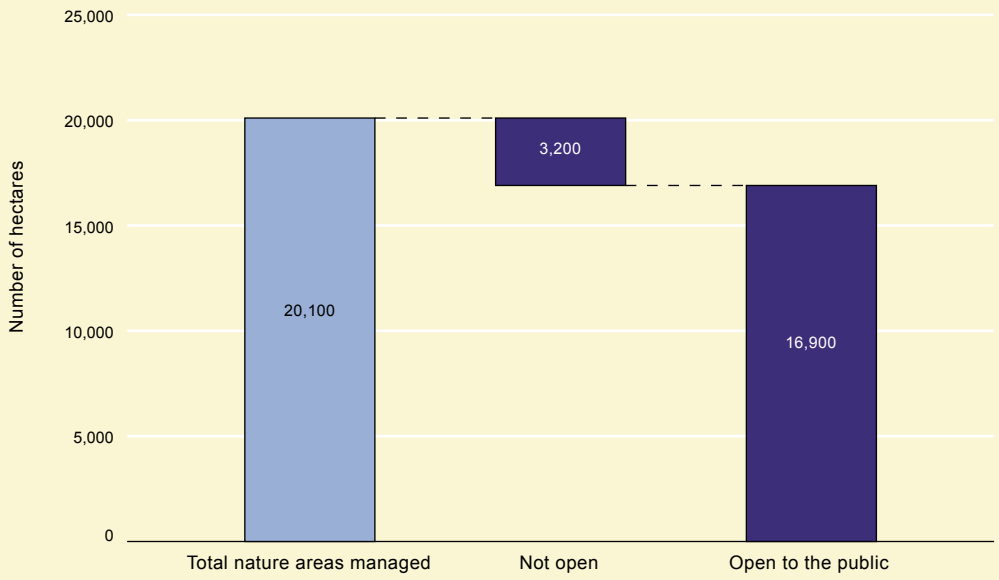
Drinking water companies operate in groundwater protection areas and nature areas. Of the total of 121,400 hectares groundwater protection area, 85% also has other uses besides water extraction. The other 15% is exclusively designated for water extraction.

Figure 21 *85% of the groundwater protection areas of water companies has other uses besides water extraction.*



In addition to groundwater protection areas the drinking water companies manage nature areas with a surface of around 20,100 hectares. This corresponds to around 40,000 football fields, or 0.5% of the total surface of the Netherlands. By way of comparison: The Dutch Forestry Commission (Staatsbosbeheer) manages around 249,000 hectares of nature area and Nature Reserves (Natuurmonumenten) 97,090 hectares[16]. Of the total nature area managed by the drinking water companies, 84% is open to the public.

Figure 22 *84% of the total nature areas managed by the water companies is open to the public.*



Three drinking water companies (Brabant Water, PWN and DZH) were awarded the certificate 'Sustainable Area Management Gold' by Stichting Milieukeur[17], and the former Hydron Midden-Nederland (now Vitens) has virtually completed the certification process. This certificate focuses on "The activities, both in policy and applied technical terms, that are necessary to maintain the intended functions of a defined area sustainably (over time)"[18]. This considers criteria such as the use of crop protection agents, liquid-proofing of roads and parking areas and the degree of manuring. The certificate can be obtained by all area managers, such as municipalities, sports clubs and (drinking water) companies.

5 Finance & Efficiency: increase in costs is below inflation

This chapter compares the financial performances of the water companies using a closed model based on their financial statements. This comparison is performed in two steps:

- **Company level.** At this level, the drinking water tariffs are compared and the costs of drinking water are examined. These costs are subdivided into four cost categories.

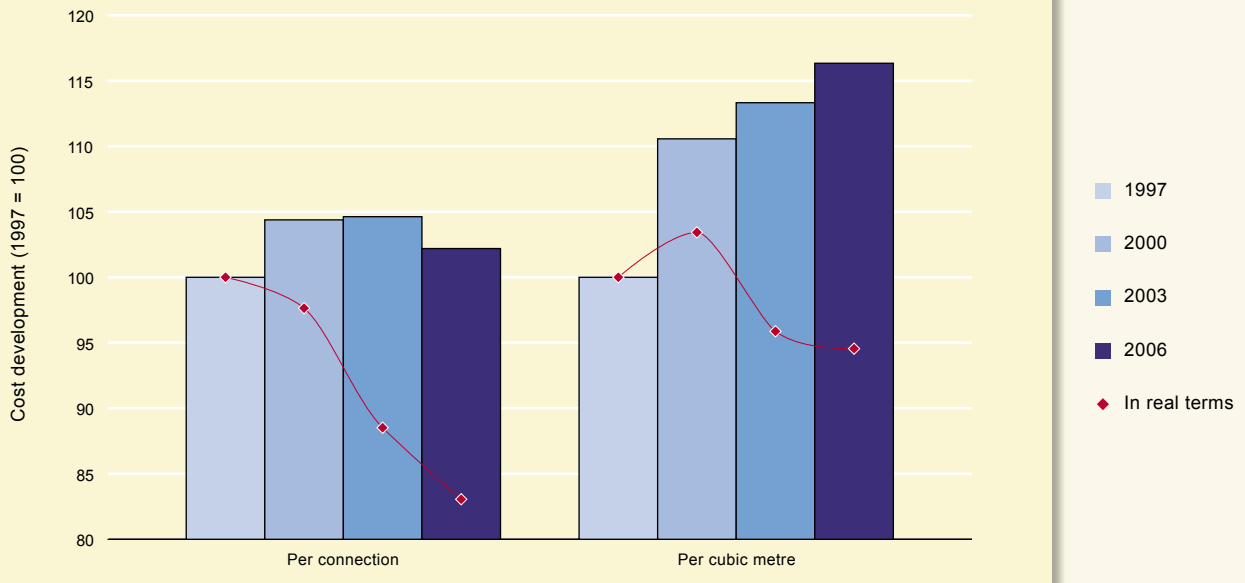
- **Process level.** Operational costs form one of the cost categories at company level. Because water companies have the most control over this category in the short term, a cost transfer process occurs: operational costs are allocated to different processes, enabling them to be compared at the process level.

To make the costs between large and small companies comparable, the costs are expressed per administrative connection and per supplied m^3 of drinking water. Figure 44 (appendix A) shows the number of administrative connections and the number of supplied m^3 of drinking water per water company. Where the Benchmark mentions 'costs per connection', this means costs per administrative connection[19]. Where it says 'costs per m^3', this means cost per m^3 of drinking water supplied to end users.

Cost increase of drinking water is below inflation

The costs per connection and per m^3 have increased by 2.2% and 16.3% respectively since 1997. Figure 23 shows that this increase is lower than the inflation of 23.0% since 1997. After adjusting for inflation, there is a real cost decrease of 16.9% per connection or 5.4% per m^3.

Figure 23 *The costs per connection and per m^3 increased by respectively 2.2% and 16.3% since 1997. However, after adjusting for inflation, costs declined by 16.9% and 5.4% respectively.*



Source: CBS, drinking water companies, Accenture analysis.

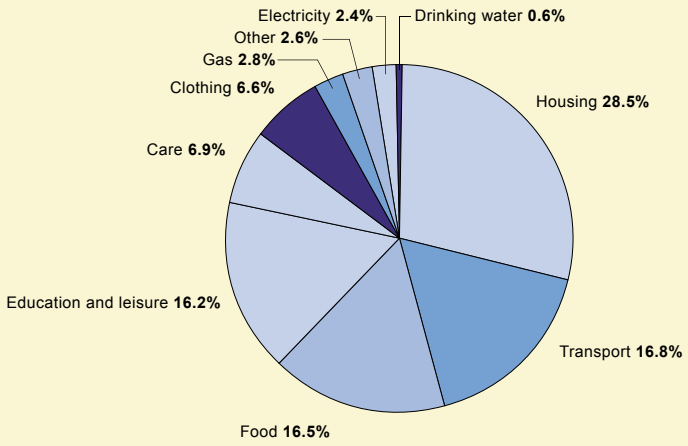
Causative factors for this trend include the increasing process automation and the decrease in labour intensity. The use of mobile technology such as PDAs allows the fitters and maintenance staff to plan and perform their work much more efficiently by making their own (on site) decisions.

Over the period 1997-2000 the costs per connection increased by 4.4% in absolute terms. The costs per m^3 increased by 10.6% over the same period. Over the period 2000-2003 the costs per connection and per m^3 increased by 0.2% per connection and 2.8% per m^3. Costs per connection in the period 2003-2006 declined by 2.4% while costs per m^3 rose by 3.0%.

After adjusting for inflation, costs per connection declined by 2.4% in the period 1997-2000 and costs per m^3 rose by 3.4%. Between 2000 and 2003 costs per connection declined by 9.1% and per m^3 by 7.6%. In the period from 2003 to 2006 costs per connection declined further, by 5.5%, while costs per m^3 decreased by 1.3%.

Customers' drinking water costs are also low in relation to the average household budget: the share of the average household budget[20] that is spent on drinking water amounts to 0.6% (Figure 24).

Figure 24 *0.6% of the average household budget is spent on drinking water.*



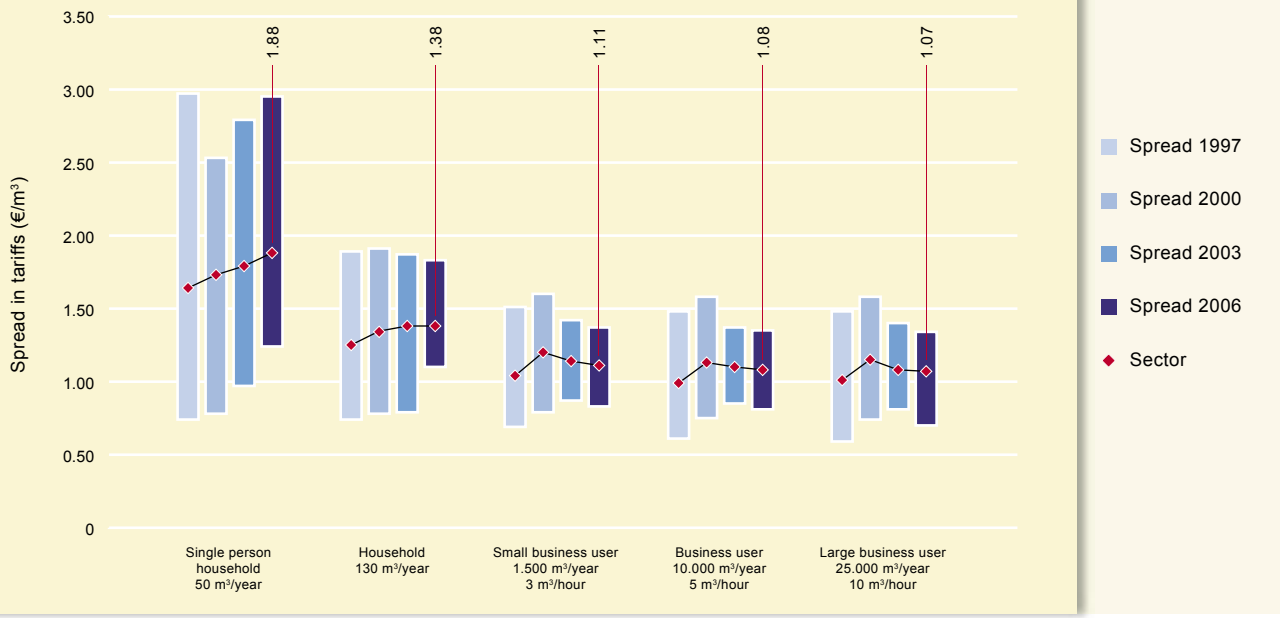
Source: CBS, Accenture analysis.

Increase in drinking water tariffs is below inflation

Drinking water tariffs are compared on the basis of five consumer categories (Figure 25). These are integral tariffs made up of a fixed and a variable component. The consumer categories differ in terms of annual drinking water consumption and the throughput capacity of the water meter. Appendix D shows the drinking water tariffs per supply area.

The average drinking water tariff for a household with consumption of 130 m^3 per year is € 1.38 per m^3. In 1997, 2000 and 2003 this was € 1.25, € 1.34 and € 1.38 respectively. After adjusting for inflation, the drinking water tariff for this consumer category decreased by 10.1% over the period 1997-2006.

Figure 25 *The drinking water tariff for the household consumer category increased by 10.6% and for business users by 9.6% since 1997. After adjusting for inflation, the drinking water tariff for the household consumer category declined by 10.1% and for business users by 10.9%.*



The average drinking water tariff for a business user with consumption of 10,000 m³ per year (and a capacity of 5 m³ per hour) is € 1.08 per m³. In 1997, 2000 and 2003 this amounted to € 0.99, € 1.13 and € 1.10 respectively. After adjusting for inflation, the drinking water tariff for this consumer category dropped by 10.9% over the period 1997-2006.

There is a substantial spread in tariffs between the different water companies. The spread for a household for example amounts to € 0.73 per m³. Since 1997 the spread has decreased for all consumer categories.

Spread between water companies amounts to € 78 per connection or € 0.66 per m³

Differences in drinking water tariffs between water companies can be made easier to understand with the help of background cost categories. The total costs per connection and per m³ are therefore divided into these cost categories. The extent to which the corresponding costs are controllable differs per water company:

- **Taxes.** The amount of taxes is primarily dependent on the type of water extracted by a water company. The tax costs can be reduced by extracting less groundwater and using more surface water. However - especially in the short term - this is not easy for a water company to control.

- **Cost of capital.** These costs are related to a water company's financial structure. Costs of capital arise from interest-bearing debt capital and the financial result. These costs can be changed by adjusting the financial structure or by changing the tariffs.

- **Depreciation.** The depreciation costs result from investment decisions - mainly made in the past - and the depreciation periods applied. These costs are not easy to control in the short term, except by adjusting these depreciation periods.

- **Operational costs.** These costs are controlled among others through the efficiency of the operational management. In the short term the management has greater control over the operational costs in comparison with other cost categories.

Methodology for Finance & Efficiency

The methodology for Finance & Efficiency assumes a closed model (revenues = costs), based on the financial statements of each water company. The focus lies on the supply of drinking water to customers. The revenues and costs of non-drinking water activities are not included.

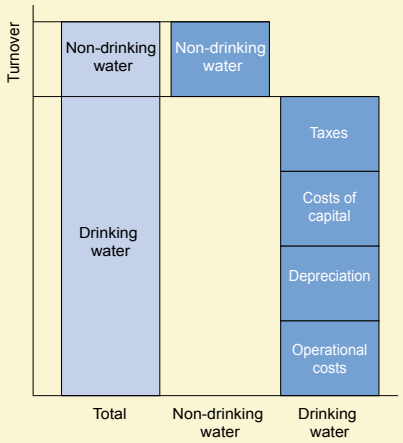
The costs of drinking water are allocated between four cost categories: taxes, cost of capital, depreciation and operational costs.

Taxes. This cost category includes taxes and dues that are a direct result of the drinking water provision, such as groundwater tax, piping and concession compensation (precario for example). VAT and Tap Water Tax are not included in this Benchmark, because water companies only function as intermediary in this respect.

Costs of capital. Costs of capital in this respect include the costs of both debt capital and shareholder equity. In order to keep the financial model closed, the financial result has also been indicated as costs of capital. This enables the methodology to abstract from the companies' financial methods.

Depreciation. All depreciation of tangible assets, intangible assets (for example goodwill) and financial fixed assets (for example participations) are included and valued at historical cost.

Operational costs. These are related to the daily operations of water companies and are divided into cost types such as personnel, materials and services provided by third parties. These costs are subsequently assigned to five processes.



The average costs per connection amount to € 200. The costs of the individual companies vary from € 167 to € 245 per connection. Spanning a difference of € 88, the spread in 2006 is narrower than in 1997, when it was € 104.

The average costs per m^3 amount to € 1.34, with a spread of € 0.66 per m^3. Because the average consumption per connection differs between water companies, the ranking on costs per m^3 differs from that on costs per connection.

As Figure 26 and Figure 27 show, the ranking order on an overarching level is not simply applicable to the underlying cost categories. However, since 1997 there have been almost no shifts in the relations between cost categories: the total costs are made up of around 10% taxes, 20% costs of capital and 20% depreciation. The operational costs amount to around 50% of the total costs.

Figure 26 *The total costs per connection amount to an average of € 200, with a spread between water companies of € 78 per connection. The total costs are divided into four cost categories.*

	Total costs (€/connection)	Taxes (€/connection)	Costs of capital (€/connection)	Depreciation (€/connection)	Operational costs (€/connection)
WBGR	167	29	11	20	107
Brabant Water	178	34	33	27	83
WMD	187	29	32	31	95
Vitens	187	31	34	33	89
Waternet	208	6	21	47	134
WML	211	24	62	40	85
DZH	213	19	49	49	95
PWN	219	4	33	50	132
Evides	219	10	87	47	76
Oasen	245	28	32	67	118
Sector	200	23	42	39	96

Note: In the figures 26 and 27 for each category, darker blues reflect higher costs. The total costs of a drinking water company in these figures are not related on a one-to-one basis to the efficiency of that company, as explanatory factors can also play a significant part.

Explanatory factors

Cost differences between water companies are partially explainable by a number of factors. For the company level the following factors can be identified based on regression analysis. A summary of cost categories with associated causative factors is shown in Figure 28. A diagram is included for each explanatory factor in Appendix E, in which the associated data are presented per drinking water company.

Figure 27 *The average costs amount to € 1.34 per m³, with a spread of € 0.66 per m³. Because average consumption per connection varies between drinking water companies, the figures for a number of companies differ compared to costs per connection.*

	Total costs (€/m³)	Taxes (€/m³)	Costs of capital (€/m³)	Depreciation (€/m³)	Operational costs (€/m³)
WBGR	1.06	0.18	0.07	0.13	0.68
Brabant Water	1.10	0.21	0.21	0.16	0.51
WMD	1.23	0.19	0.21	0.21	0.63
Evides	1.26	0.06	0.50	0.27	0.44
Vitens	1.31	0.22	0.24	0.23	0.62
Waternet	1.48	0.04	0.15	0.34	0.96
WML	1.49	0.17	0.43	0.28	0.61
PWN	1.54	0.03	0.23	0.35	0.93
Oasen	1.68	0.19	0.22	0.46	0.81
DZH	1.72	0.15	0.40	0.40	0.77
Sector	1.34	0.15	0.28	0.26	0.65

The factors affecting costs are:

- **Production type.** Water companies can be typified based on the type of water they extract[21]. Surface water companies generally have higher total costs per m³ than groundwater companies, because they use a more extensive water treatment process. These higher costs are mainly reflected in the operational costs.

  However surface water companies pay less groundwater tax per m³ drinking water produced. Some surface water companies infiltrate surface water before extracting it as groundwater. They do consequently have to pay groundwater tax, but receive an infiltration discount for the infiltrated quantity. The other surface water companies directly use surface water for the production of drinking water and no groundwater tax is applicable.

- **Consumption per connection.** Companies with a lower average consumption per connection have higher costs as a rule, especially in terms of depreciation and operational costs. Average consumption has declined by 12% since 1997, especially due to water-saving measures.

- **Network complexity.** Network complexity is defined as the number of administrative connections per kilometre of network length. Operational costs as a rule will rise with increasing numbers of connections per kilometre. This is connected with subsurface ‘connection density’, which makes it harder to reach pipes and easier to damage them. On the other hand a very low network complexity can also lead to higher total costs because more kilometres of pipe are required per connection.

Figure 28 *A number of explanatory factors has been identified on the basis of regression analysis.*

The total costs per m³ of supplied drinking water are higher with:

- Lower consumption per connection
- Use of surface water

Taxes per m³ are higher with:	Costs of capital per m³ are higher with:	Depreciation per m³ is higher with:	Operational costs per m³ are higher with:
• More use of groundwater		• Lower consumption per connection • Less use of groundwater	• Use of surface water • Lower use per connection • Higher network complexity

Spread between largest cost increaser and decreaser is € 53 per connection

Figure 29 and Figure 30 show the change in costs per water company since 1997.

Since 1997 the total costs per connection increased by an average of € 5. The spread between the largest cost increaser (€ 33) and decreaser (- € 20) amounts to € 53 per connection.

Since 1997 the total costs per m³ increased by an average of € 0.18. The spread between the largest cost increaser (€ 0.37) and decreaser (- € 0.04) amounts to € 0.41 per m³.

Figure 29 *The spread between the biggest cost increaser and decreaser amounts to € 53 per connection. The total costs per connection increased by an average of € 5 since 1997.*

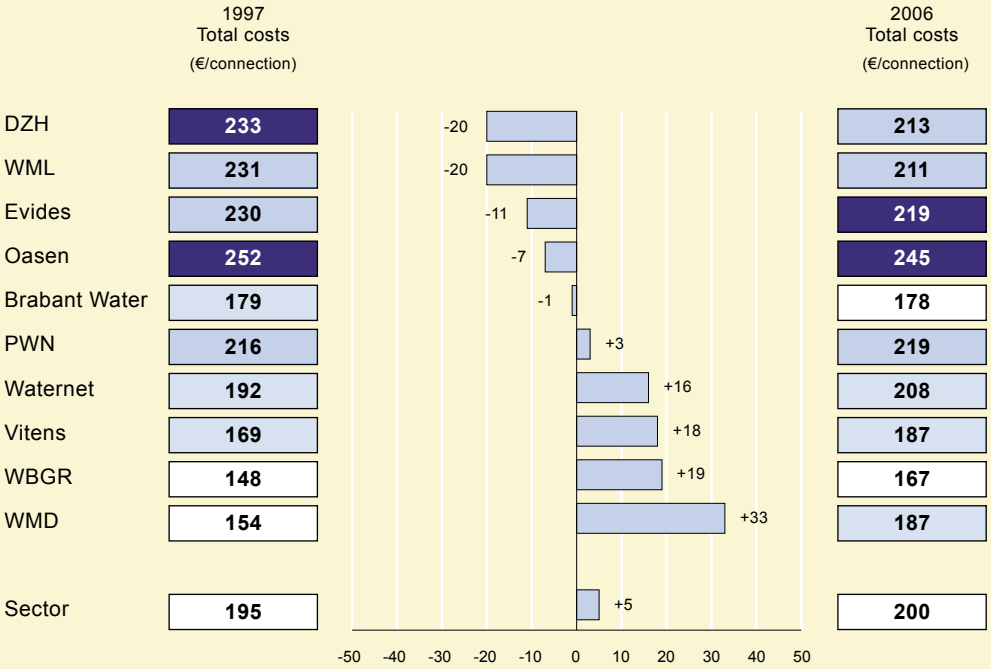
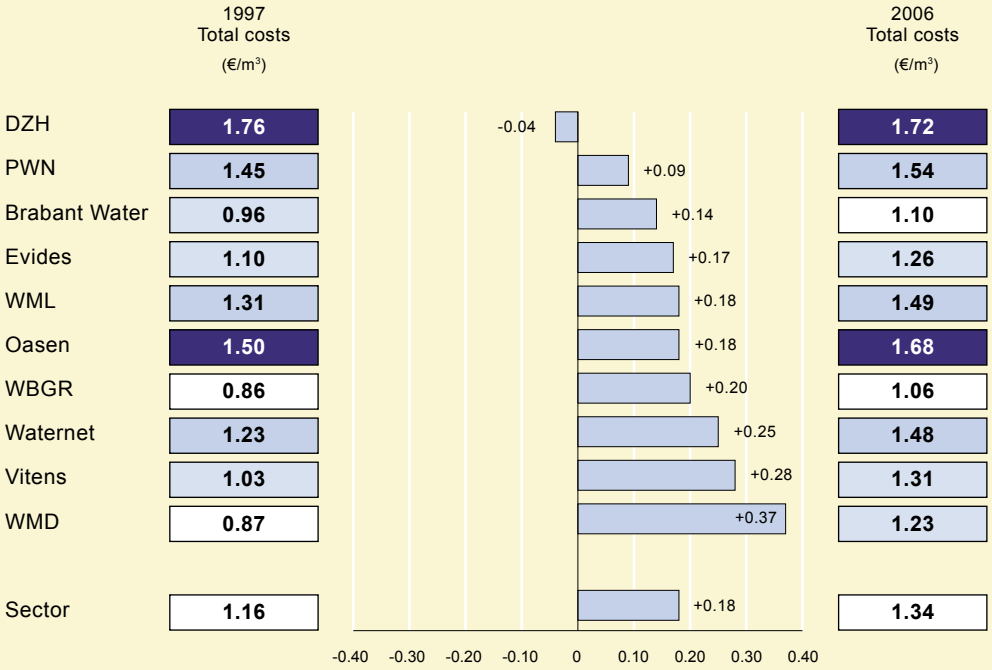


Figure 30 *The spread between the biggest cost increaser and decreaser amounts to € 0.41 per m³. The total costs per m³ have increased by an average of € 0.18. Because the average consumption per connection differs between water companies, the picture deviates with regard to costs per connection.*



Difference in taxes is mainly dependent on the production type

Water companies are faced with various cost-increasing taxes. Of these taxes the groundwater tax has the greatest effect on total tax costs. In addition the companies are faced with provincial ground water levies and precario. Precario levies consist of piping and concession compensation and are levied by several municipalities.

The cost-increasing taxes on average amount to € 23 per connection. A substantial spread exists between water companies with regard to the amount of taxes. Figure 31 shows that the tax component of the three companies with the lowest taxes amounts to an average of € 7 per connection, while the tax component of the three companies with the highest taxes averages € 32 per connection. This difference can in part be explained because surface water companies pay less groundwater tax.

The Tap Water Tax - introduced in 2000 - and VAT are not included in the Benchmark because water companies here are only transferring others' charges on. They are therefore only included in Figure 32, for the sake of completeness. This Figure shows that for an average small-scale user the tax component amounts to 24% of the average integral drinking water price, or € 0.40 per m³. In 1997 this component amounted to 15% of the average integral drinking water price.

Figure 31 *The spread of taxes (between the highest and the lowest three) amounts to a factor 4.5. This is mainly because water companies that extract less groundwater also pay less groundwater tax.*

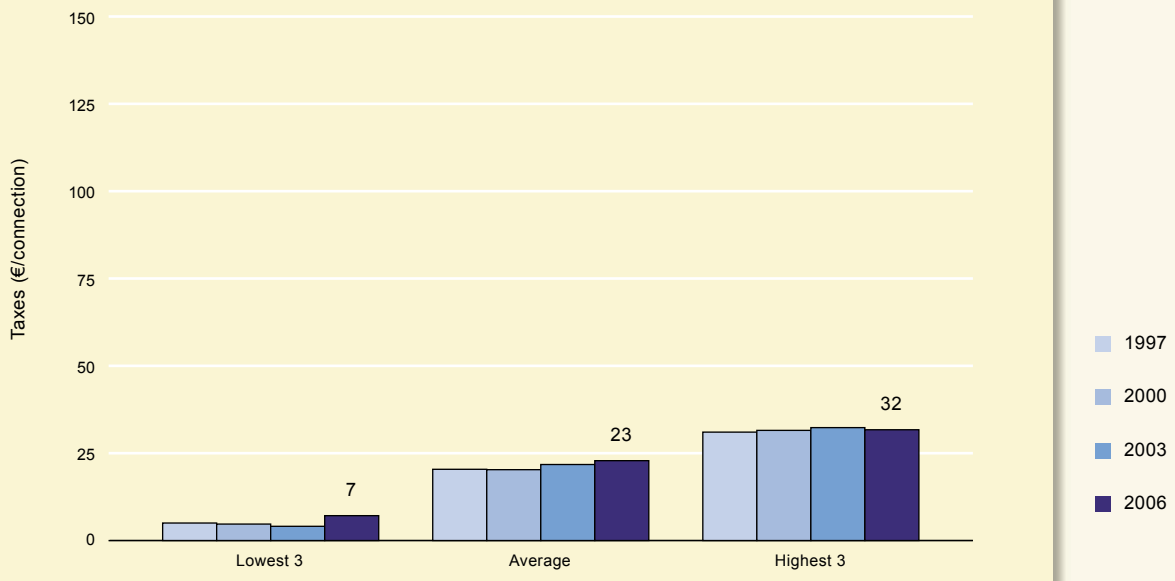
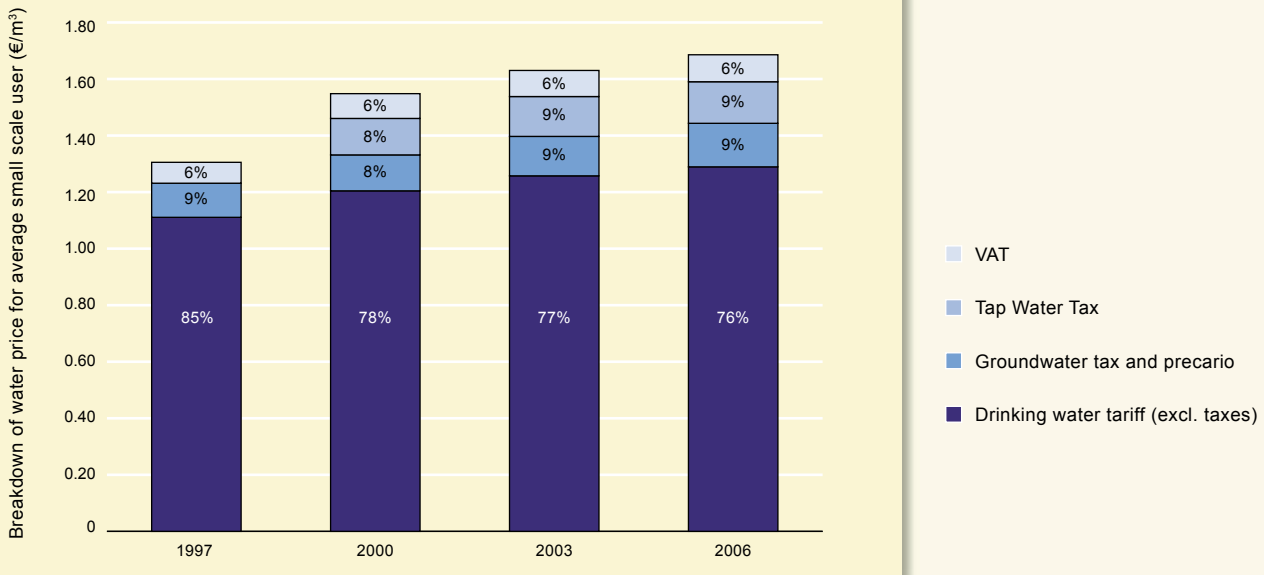


Figure 32 *If the average integral water price per m³ of supplied drinking water is considered for an average small-scale user, then the tax component has increased from 15% to 24% since 1997*

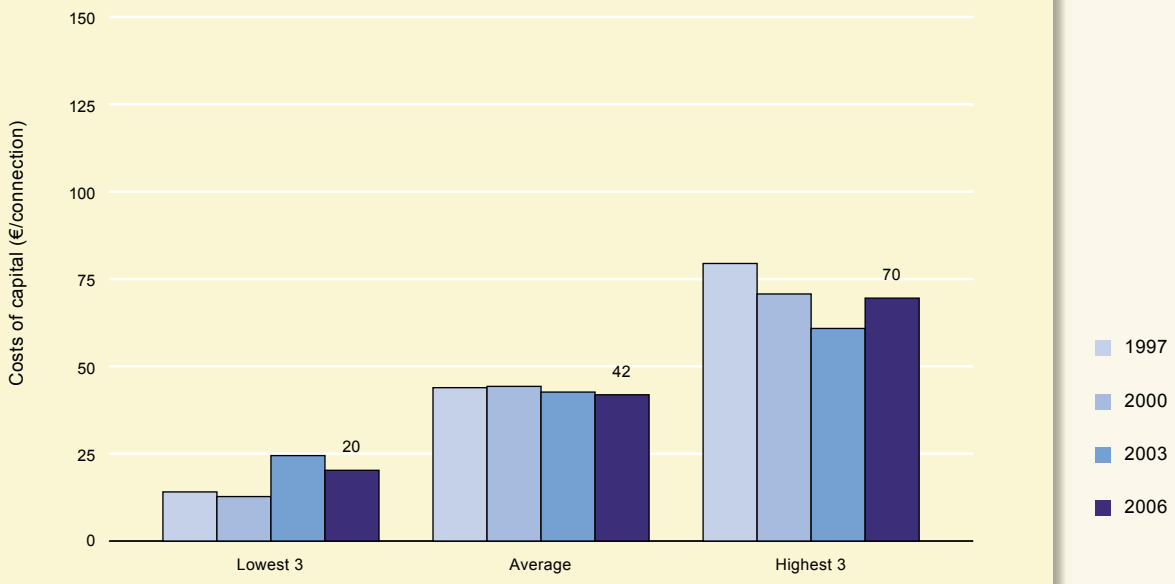


Since 1997 the spread in costs of capital has decreased by 24%

Costs of capital consist of costs for debt capital (for example interest) and costs of shareholder equity.

Since 1997 the average costs of capital of € 42 per connection have practically remained the same. The spread between the water companies with the lowest and highest costs of capital has shown a decrease since 1997 by 24% (or € 16 per connection).

Figure 33 *The average costs of capital have remained virtually the same since 1997.*

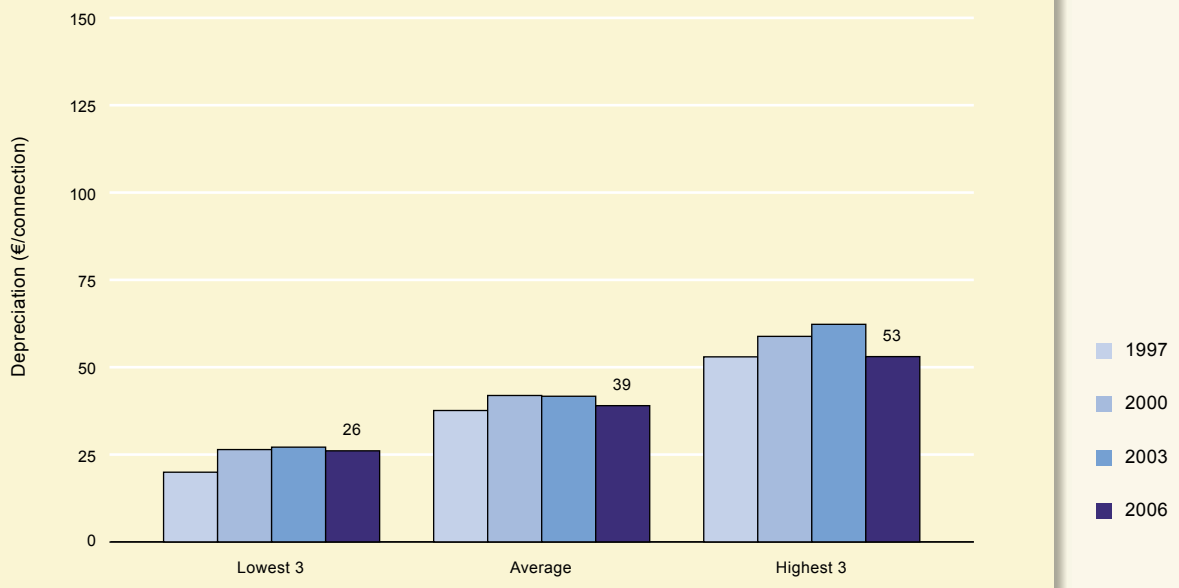


Depreciation remains stable

Depreciation is dependent on the assets of water companies and the depreciation periods applied.

In 2006 the average depreciation was € 39 per connection. This is an increase of 4% compared to 1997. The spread between water companies amounts to a factor of over two.

Figure 34 *Depreciation has been virtually stable since 1997: the average fluctuates around € 40 per connection while the spread amounts to a factor of over two.*

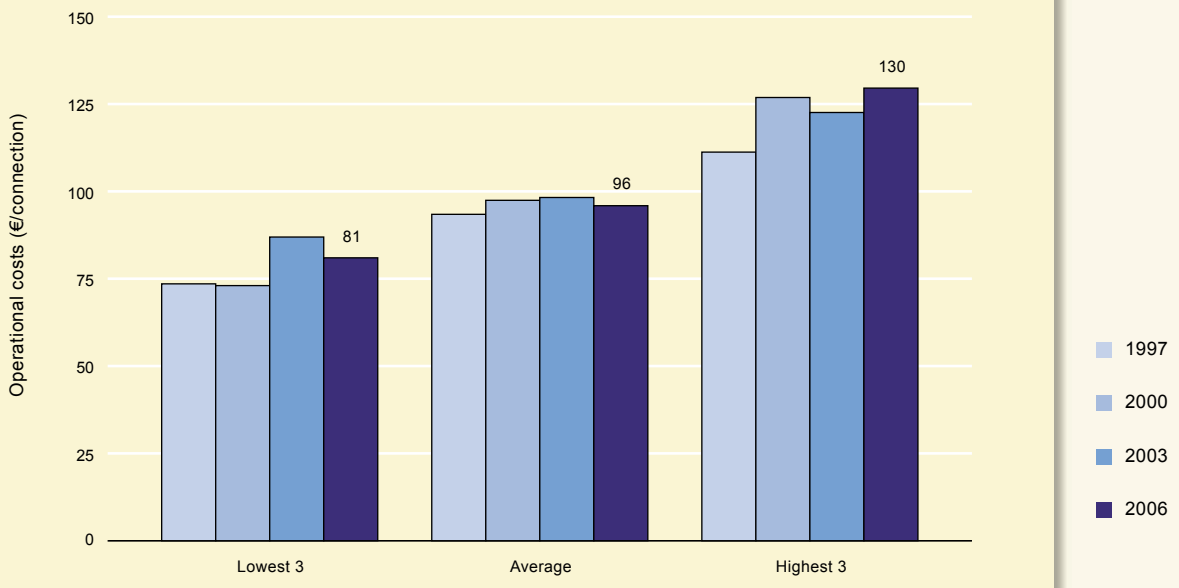


Since 1997 the operational costs per connection have shown a nominal increase of 3% and a real reduction of 17%

The operational costs amount to about half of total costs. These costs are affected among others by the efficiency of the operational management.

The average operational costs amount to € 96 per connection. After adjusting for inflation, the operational costs have fallen by 17% since 1997.

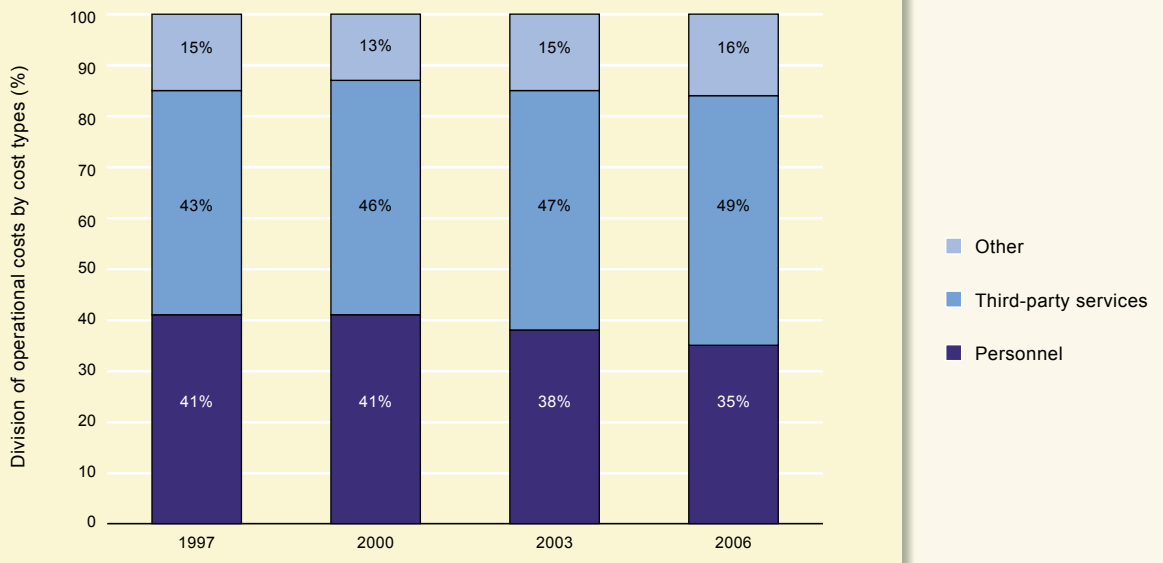
Figure 35 *Average operational costs have remained stable since 1997. The spread between the three drinking water companies with the lowest and highest operational costs has increased by 29% compared to 1997.*



Since 1997 the spread between water companies has increased by 29%, or € 11 per connection.

Personnel costs and services by third parties respectively account for 35% and 49% of operational costs. The share of services by third parties in operational costs has risen by 6 percentage points since 1997 (Figure 36).

Figure 36 *The share of services by third parties in operational costs has increased continually since 1997.*



Share of distribution costs compared to other operational processes has fallen since 1997

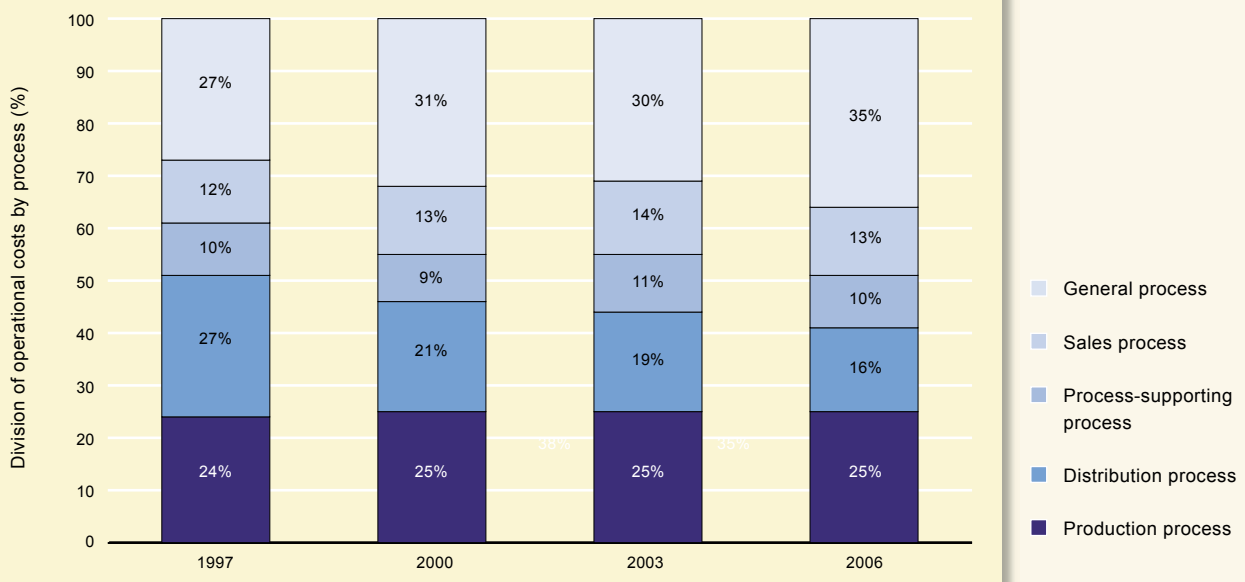
To make water companies' operational costs comparable on a more detailed level, these are assigned to five processes. Because water companies apply different accounting methods, the operational costs are first adjusted on a number of aspects[22]. Applying the adjustments improves the comparability of the operational costs of water companies.

In the Benchmark the production process, distribution process, process-supporting process, sales and general process combined make up the operating processes. These costs are compared with each other at the level of the operational costs.

Figure 37 shows that the share of the distribution process compared to all operating processes has decreased by 11 percentage points since 1997.

The increase in the share of the general process in the total operational processes is in part attributable to the increased merger activities in the drinking water sector and the increase in (internal) reorganisation costs.

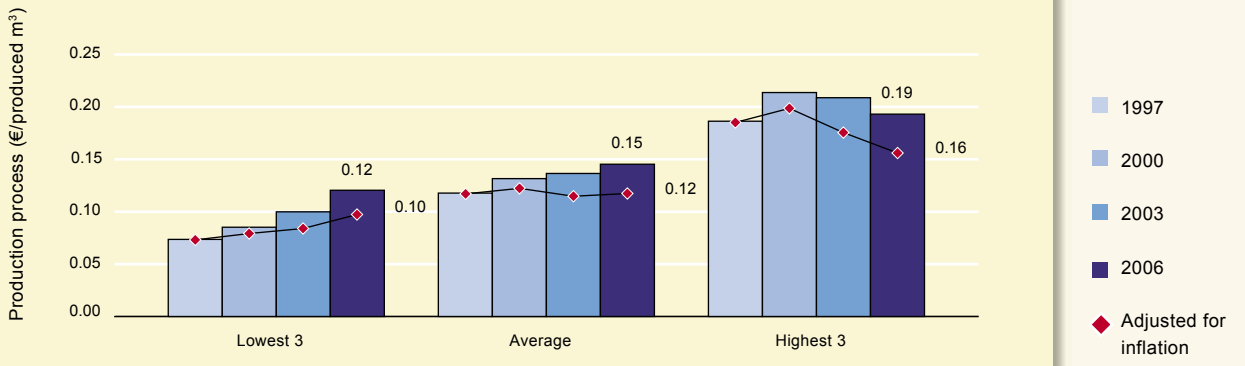
Figure 37 *Since 1997 the share of the distribution process in total operating costs has decreased. The share of the other processes has increased.*



The following aspects deserve extra attention per operating process:

- **Production process.** This process comprises all activities related to operating and maintaining production facilities.

Figure 38 *Production costs have increased since 1997 by 23% to € 0.15 per m³ drinking water produced. After adjusting for inflation the costs have remained virtually stable, despite sharply increased energy prices, the increased share of sustainable energy and the increased water treatment efforts*



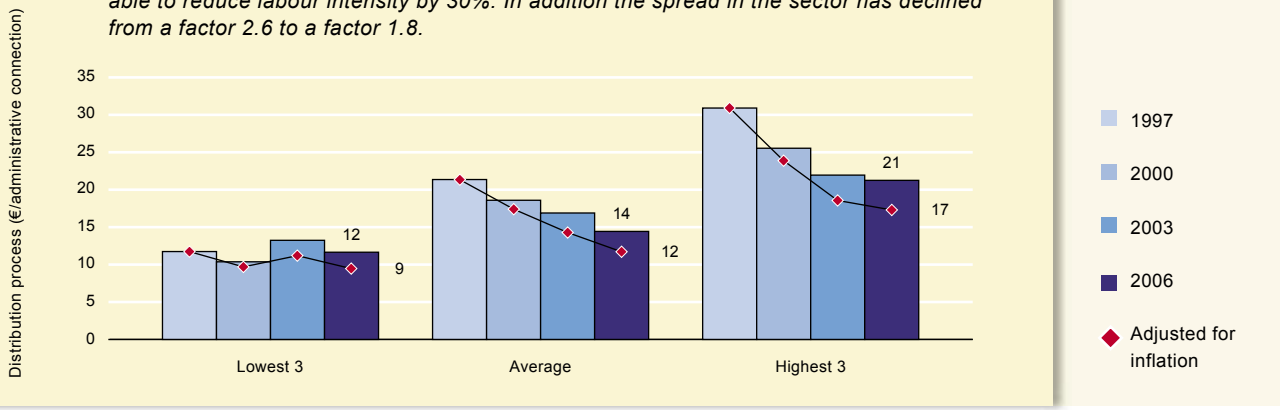
The production costs of a water company amount to an average of € 0.15 per m³ produced. That means these costs have increased by 23% since 1997. Despite the sharply increased energy prices, cost increases are thus in line with inflation.

The spread between the three lowest and three highest companies per m³ produced is a factor of 1.6. The spread has been decreasing since 2000. This is due in part to the fact that groundwater companies, which as a rule have low water treatment costs, are faced with a declining groundwater quality.

In addition, a growing degree of process automation is ensuring that extraction and treatment processes are becoming increasingly efficient.

- **Distribution process.**[23] This process comprises all activities related to the maintenance of mains, service connections and replacement of water meters.

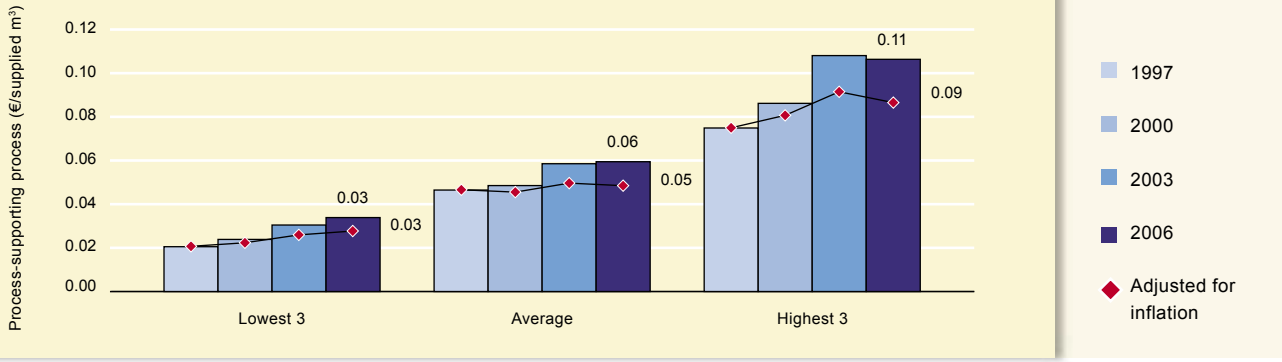
Figure 39 *The average costs of the distribution process have declined since 1997 by 32%. After adjusting for inflation the decline is 45%. By working more efficiently, the sector has been able to reduce labour intensity by 30%. In addition the spread in the sector has declined from a factor 2.6 to a factor 1.8.*



Since 1997[24] the average distribution costs have decreased by 32%, and by as much as 45% after adjusting for inflation, to € 17 per administrative connection.
Partly owing to developments in the field of automation (such as PDAs and planning software) the companies are increasingly able to manage their fitters and maintenance staff efficiently and to let them take decisions themselves. This has resulted in a significant decrease in labour intensity for this process. In addition, companies are managing assets with increasing efficiency; investment and maintenance decisions are increasingly often linked to the real need for the investment or the maintenance.

- **Process-supporting process.** This process consists of managing the water-extraction and water-protection areas, controlling the water quality and performing the statutory inspection duty on water quality in buildings.

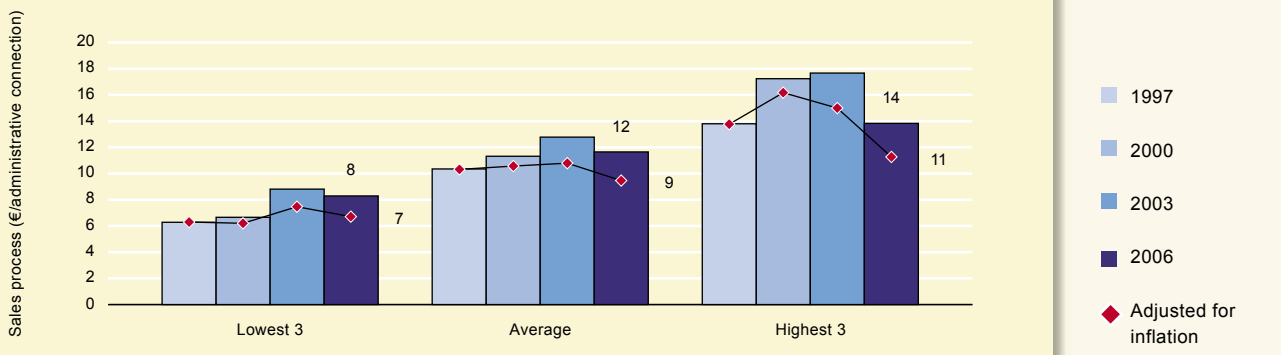
Figure 40 *The costs for the process-supporting process have increased by 30% since 1997. After adjusting for inflation this is an increase of 4%. This increase is connected with the addition of statutory inspection duties to this process.*



The average costs of the process-supporting process amount to € 0.06 per supplied m³. That is a 28% increase compared to 1997 or 4% after adjusting for inflation. The cost increase is partly caused by the statutory inspection duty performed by the drinking water companies, a task added since the preceding Benchmark.
Factors including laboratory automation have meant that the increase in the costs of this process has been very limited. A typical example is the fully automated laboratory of Vitens in Friesland where no human is involved any more from the time when the water samples arrive to the time when the results are known.

- **Sales process.** This process consists of all service-providing activities in which the relationship with the customer takes centre stage.

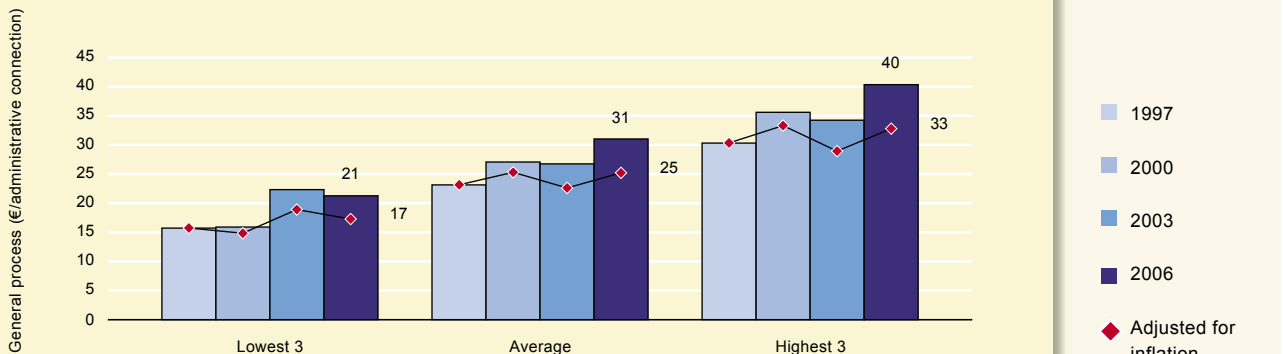
Figure 41 *The costs of the sales process in 2006 have increased by 13% since 1997. After adjusting for inflation the costs have decreased by 9%. Compared with 2003 the costs have decreased by 9%, and by 13% after adjusting for inflation.*



The sales costs of an average drinking water company amount to € 12 per administrative connection. These costs are up 13% in 2006 from 1997. After adjusting for inflation, they are down 8% however. Customers who are able to submit more questions via the internet, more flexible handling (and predicting) of calls and being able to carry out debt collection more effectively by means of improved collection procedures are a few examples of the various initiatives launched in the sector to achieve the cost decrease in real terms in this process.

- **General process.** This process consists of activities with a company-wide supporting function. These are for instance activities such as managing finances and staff management and developing (corporate) strategy. With effect from 2004 the costs of reorganisation provisions (e.g. severance schemes) are allocated to this process.

Figure 42 *The average costs of the general process have increased by 34% since 1997, after adjusting for inflation this is an increase of 9%. This increase is partly the result of temporary effects from preparations for mergers and internal reorganisations.*



The costs of the general process on average amount to € 31 per administrative connection and have risen by 34% since 1997 (after adjusting for inflation this is 9%).
Temporary effects of (preparations for) mergers and reorganisations, where costs precede revenues, are one of the factors that have caused this increase in costs. These are partially set off by reductions in labour intensity and improvements in inventory management that temper the cost increase.

Appendix A - Overview of drinking water companies

Figure 43 *Water companies' supply areas in the Netherlands.*

Figure 44 *Overview of all water companies stating several characteristics (annual averages) in the reference year 2006.*

Company name (abbreviation)	Company name (in full)	Administrative connections (x1,000)	Drinking water supplied (million m³)	Drinking water turnover (million €)	Employees in service ** (FTE)
Brabant Water	Brabant Water N.V.	1,047	169	186	760
Doorn*	N.V. Bronwaterleiding Doorn	4	1	1	2
DZH	N.V. Duinwaterbedrijf Zuid-Holland	583	72	124	474
Evides	Evides N.V.	932	162	204	462
Oasen	Oasen N.V.	321	47	79	219
PWN	N.V. PWN Waterleidingbedrijf Noord-Holland	719	102	157	422
Vitens	Vitens N.V.	2,339	334	437	1,186
Waternet	Stichting Waternet	479	67	100	528
WBGR	N.V. Waterbedrijf Groningen	274	43	46	185
WMD	N.V. Waterleidingmaatschappij Drenthe	191	29	36	139
WML	N.V. Waterleiding Maatschappij Limburg	519	73	109	433
Total		**7,407**	**1,100**	**1,479**	**4,811**

* This company did not participate in the Benchmark. These are estimated.

** Includes only employees involved in drinking water activities, including sickness and pregnancy, excluding external staff.

Source: Drinking water companies

Appendix B - Parameters included in Water Quality Index

Figure 45 *Overview of all parameters included in the WQI for the reference year 2006 based on the Water Supply Decree.*

Acute health parameters	Non-acute health parameters	Company technical parameters	Customer-oriented parameters
Escherichia coli	Arsenic	Aeromonas at 30°C	Aluminium
Enterococcen	Boron	Ammonium	Hardness
Legionella	Bromate	Bacteria of the coli group	Colour
	1,2 Dichloroethane	Chloride	Iron
	Fluoride	Clostridium perfringens	Manganese
	Nickel	Saturation Index	Sodium
	Nitrate	Temperature	Sulfate
	Nitrite	Hydrogen carbonate	Degree of turbidity
	PACs	pH value	
	Crop protection agents/ pesticides	Oxygen	
	Tetra and trichloroethylene		
	Trihalomethanes		

Appendix C - Costs per company in 1997, 2000 and 2003

Overview of costs per connection and per m³ as assesed in the benchmark studies 1997, 2000 and 2003. Drinking water companies that have merged since 1997 have also been integrated in the figures and thereby included in the comparison.

Note: In the figures 46 - 51 for each category, darker blues reflect higher costs. The total costs of a drinking water company in these figures are not related on a one-to-one basis to the efficiency of that company, as explanatory factors can also play a significant part (see explanatory factors in appendix E).

Figure 46 *Costs per connection in 1997.*

	Total costs (€/connection)	Taxes (€/connection)	Costs of capital (€/connection)	Depreciation (€/connection)	Operational costs (€/connection)
WBGR	148	27	13	16	92
WMD	154	28	29	23	76
Vitens	169	28	24	31	86
Brabant Water	179	31	31	27	90
Waternet	192	4	43	42	102
PWN	216	6	46	52	112
Evides	230	4	76	57	93
WML	231	28	79	37	86
DZH	233	10	84	44	95
Oasen	252	27	57	46	123
Sector	195	20	44	38	93

Figure 47 *Costs per m³ in 1997.*

	Total costs (€/m³)	Taxes (€/m³)	Costs of capital (€/m³)	Depreciation (€/m³)	Operational costs (€/m³)
WBGR	0.86	0.15	0.07	0.09	0.54
WMD	0.87	0.15	0.16	0.13	0.42
Brabant Water	0.96	0.17	0.17	0.14	0.48
Vitens	1.03	0.17	0.14	0.19	0.52
Evides	1.10	0.02	0.36	0.27	0.44
Waternet	1.23	0.03	0.27	0.27	0.66
WML	1.31	0.16	0.45	0.21	0.49
PWN	1.45	0.04	0.31	0.35	0.75
Oasen	1.50	0.16	0.34	0.27	0.73
DZH	1.76	0.08	0.64	0.33	0.72
Sector	1.16	0.12	0.26	0.22	0.55

Figure 48 *Costs per connection in 2000.*

	Total costs (€/connection)	Taxes (€/connection)	Costs of capital (€/connection)	Depreciation (€/connection)	Operational costs (€/connection)
WBGR	147	26	6	26	88
WMD	165	26	25	26	87
Vitens	181	28	32	33	89
Waternet	198	6	40	42	110
Brabant Water	204	32	44	48	80
Evides	218	7	55	57	100
WML	221	26	59	38	98
DZH	229	11	81	40	96
PWN	241	5	53	57	126
Oasen	258	28	48	43	139
Sector	204	20	44	42	97

Figure 49 *Costs per m³ in 2000.*

	Total costs (€/m³)	Taxes (€/m³)	Costs of capital (€/m³)	Depreciation (€/m³)	Operational costs (€/m³)
WBGR	0.90	0.16	0.04	0.16	0.54
WMD	1.06	0.17	0.16	0.17	0.56
Vitens	1.15	0.18	0.20	0.21	0.56
Evides	1.18	0.04	0.30	0.31	0.54
Brabant Water	1.19	0.19	0.26	0.28	0.47
Waternet	1.30	0.04	0.26	0.28	0.73
WML	1.44	0.17	0.38	0.25	0.64
PWN	1.59	0.03	0.35	0.37	0.83
Oasen	1.66	0.18	0.31	0.27	0.89
DZH	1.78	0.08	0.63	0.32	0.75
Sector	1.28	0.13	0.28	0.26	0.61

Figure 50 *Costs per connection in 2003.*

	Total costs (€/connection)	Taxes (€/connection)	Costs of capital (€/connection)	Depreciation (€/connection)	Operational costs (€/connection)
WBGR	165	31	13	27	94
Brabant Water	180	34	28	26	92
WMD	184	29	35	29	91
Vitens	191	31	40	31	90
Waternet	196	6	24	43	122
DZH	210	12	46	53	100
WML	215	25	51	52	87
PWN	229	3	55	49	122
Evides	231	8	68	61	94
Oasen	264	29	43	68	124
Sector	204	22	43	42	98

Figure 51 *Costs per m^3 in 2003.*

	Total costs (€/m^3)	Taxes (€/m^3)	Costs of capital (€/m^3)	Depreciation (€/m^3)	Operational costs (€/m^3)
WBGR	0.99	0.18	0.08	0.16	0.57
Brabant Water	1.07	0.20	0.16	0.16	0.54
WMD	1.18	0.19	0.22	0.19	0.58
Vitens	1.24	0.20	0.26	0.20	0.58
Evides	1.26	0.04	0.37	0.34	0.51
Waternet	1.34	0.04	0.17	0.30	0.83
WML	1.46	0.17	0.35	0.35	0.59
PWN	1.57	0.02	0.37	0.34	0.84
DZH	1.69	0.09	0.37	0.43	0.81
Oasen	1.75	0.19	0.29	0.45	0.82
Sector	1.31	0.14	0.27	0.27	0.63

Appendix D - Integral drinking water tariffs per consumer category

Overview of the integral drinking water tariffs at the end of 2006 which the water companies apply in the different tariff areas. 'Integral' tariffs means that any fixed components are discounted in a variable tariff. These tariffs are shown on the basis of five standard consumer categories in terms of annual drinking water consumption and throughput capacity of the water meter.

Figure 52 *Consumer category of a single person household (consumption 50 m³/year).*

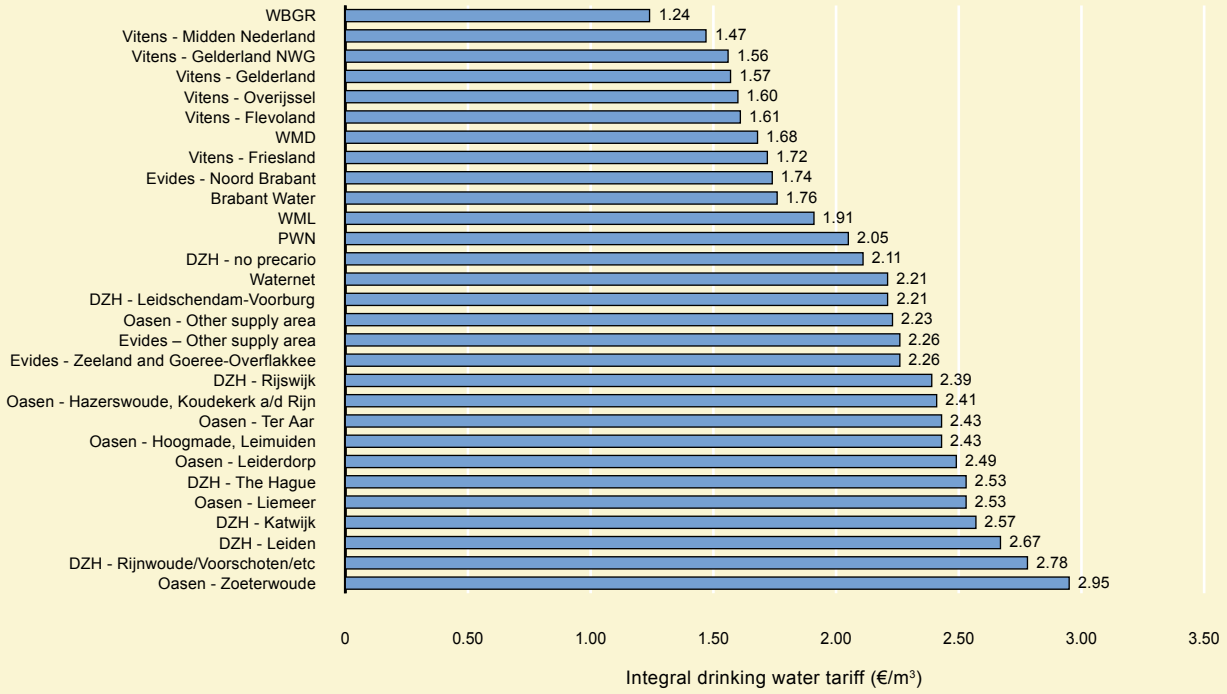


Figure 53 *Consumer category of a household (consumption 105 m³/year).*

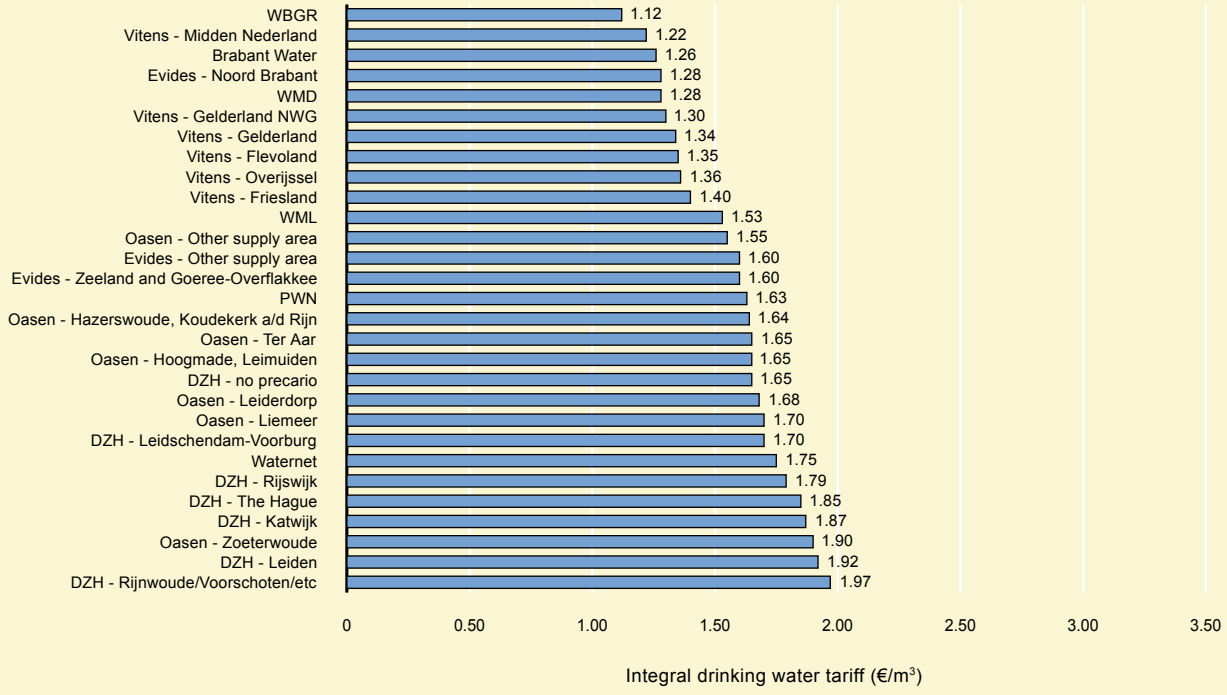


Figure 54 *Consumer category of a household (consumption 130 m³/year).*

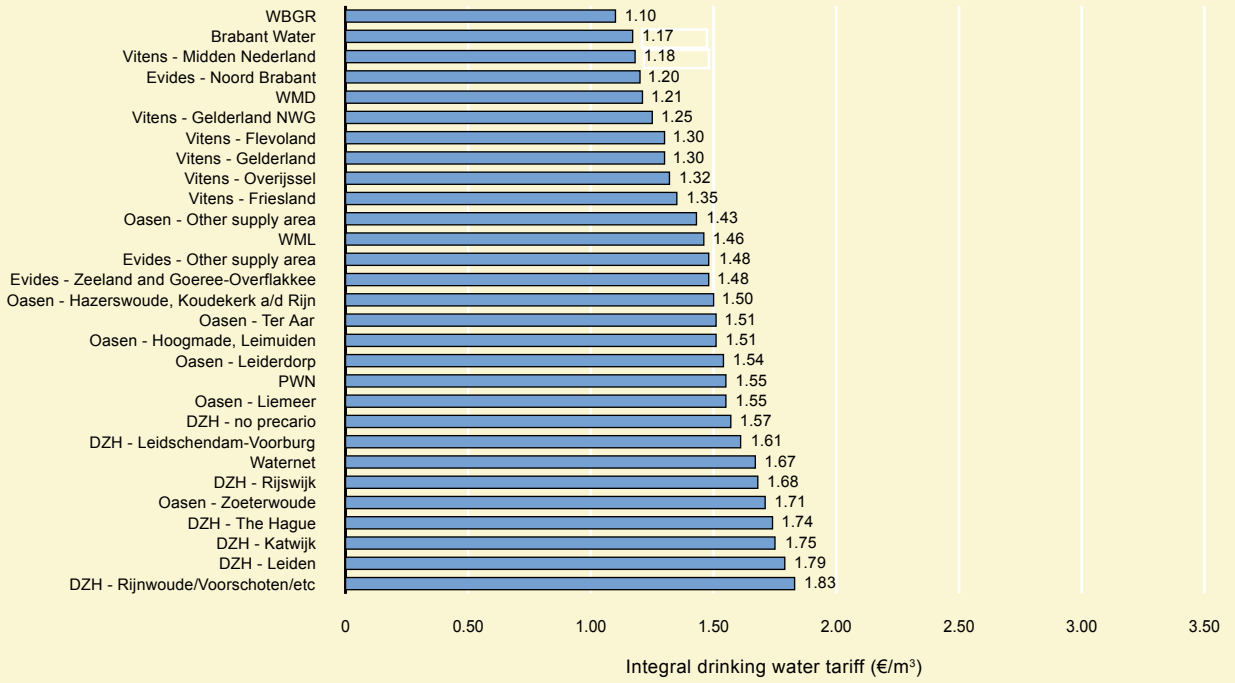


Figure 55 *Consumer category small business user (consumption 1,500 m³/year, water meter capacity 3 m³/hour).*

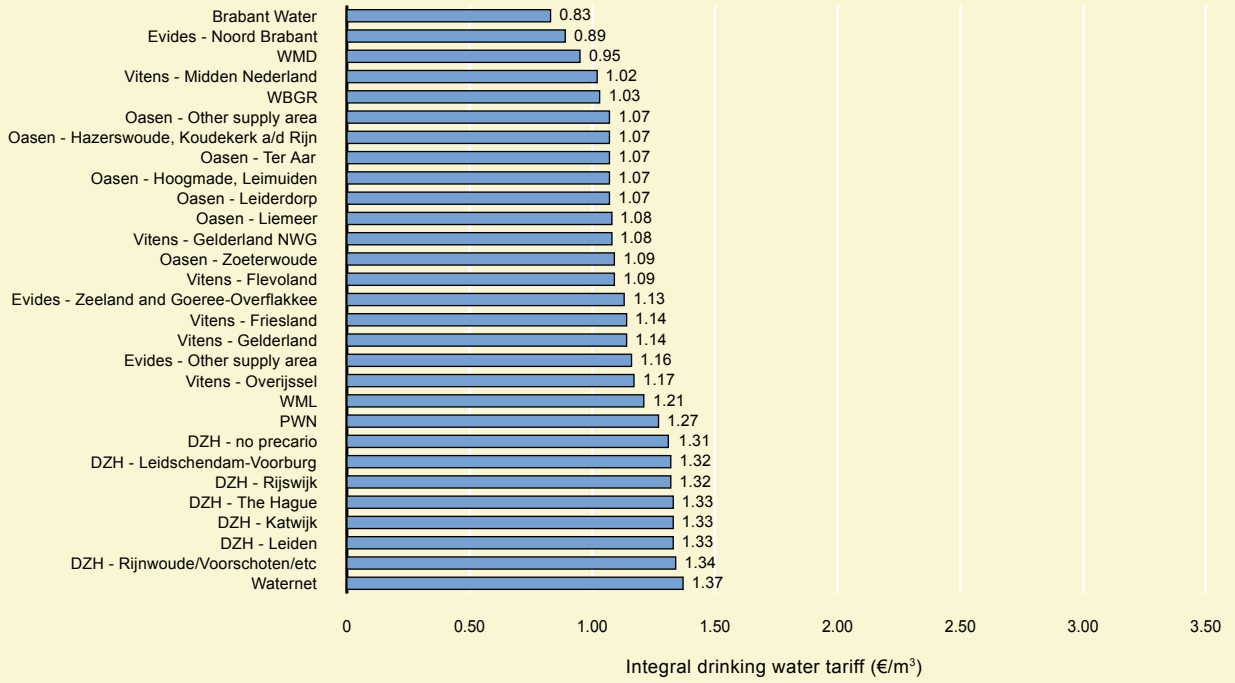


Figure 56 *Consumer category business user (consumption 10,000 m³/year, water meter capacity 5 m³/hour).*

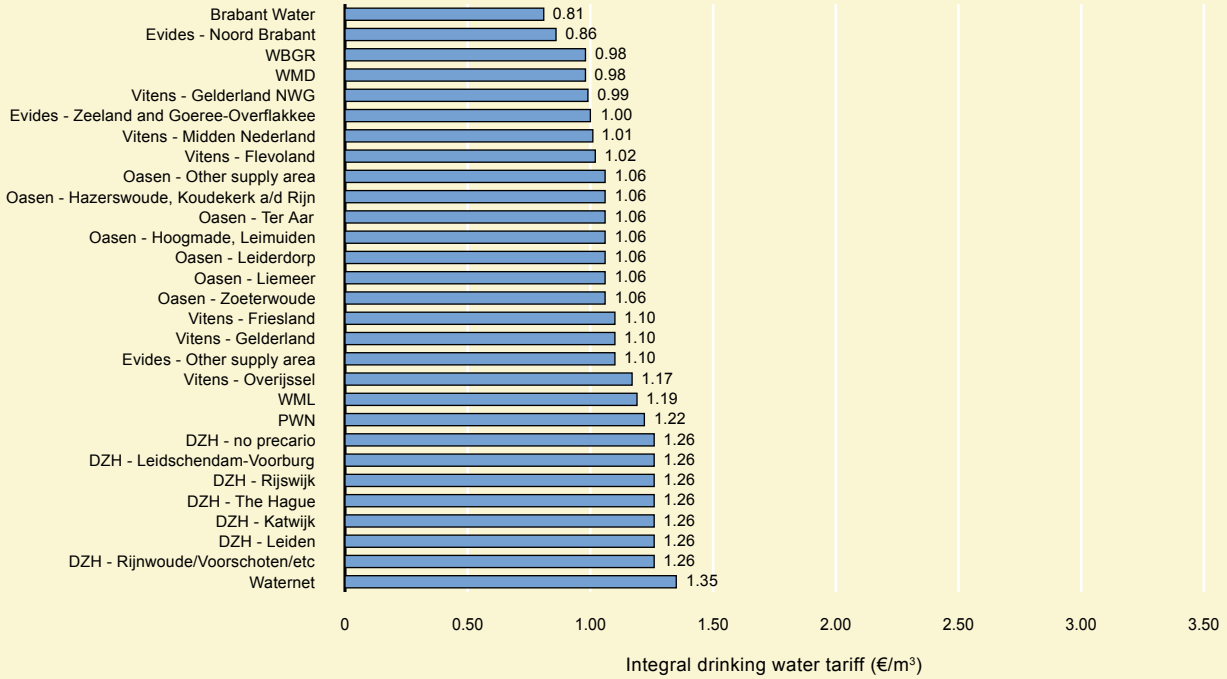
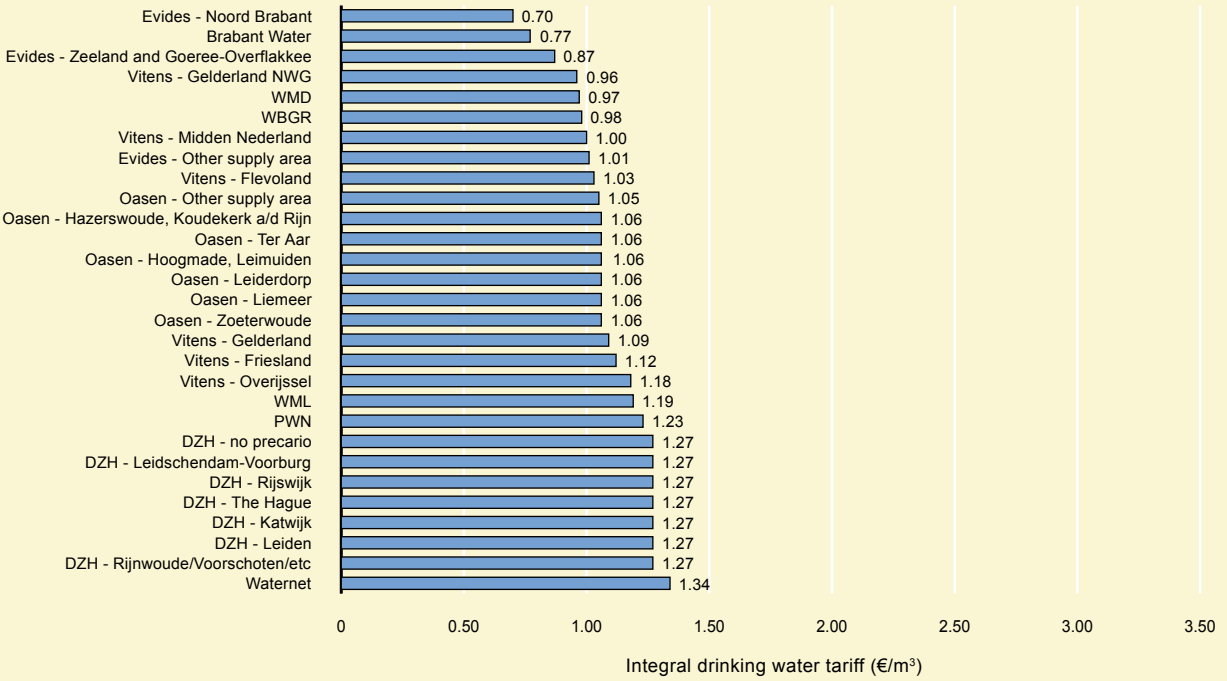


Figure 57 *Consumer category large business user (consumption 25,000 m³/year, water meter capacity 10 m³/hour).*



Appendix E - Explanatory factors

Overview of explanatory factors for the cost categories.

Figure 58 *Explanatory factor production type: - Groundwater companies as a rule face higher taxes and lower depreciation. Surface water companies have higher operational costs.*

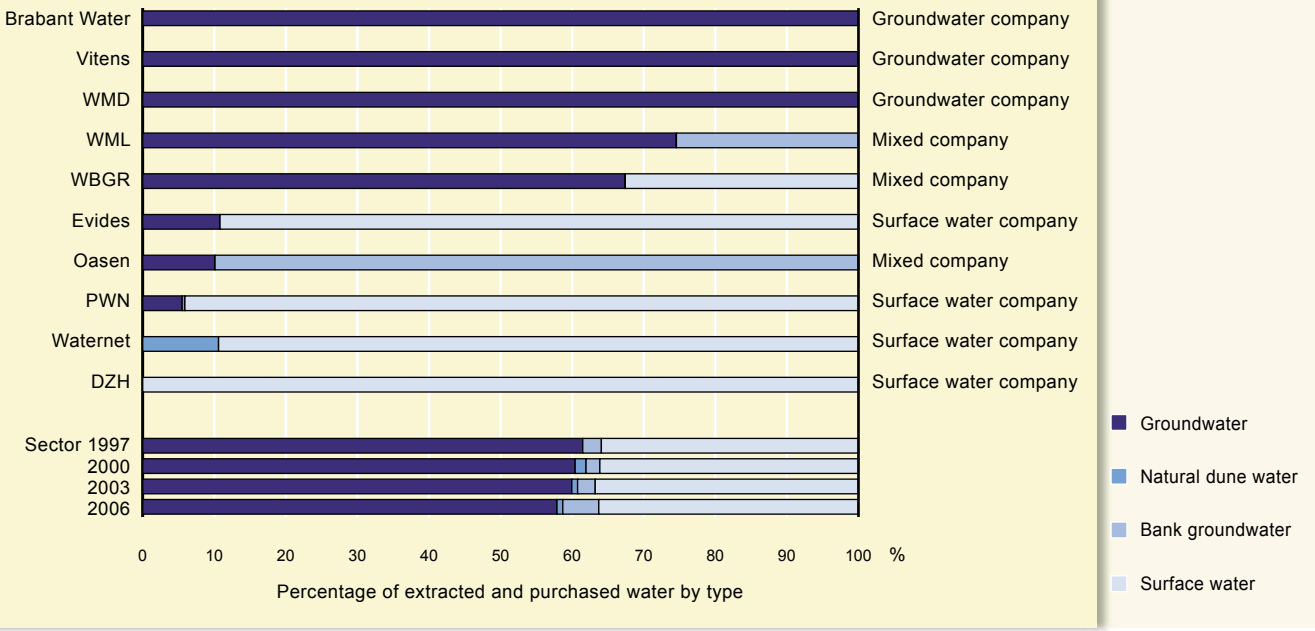


Figure 59 *Explanatory factor consumption per connection: - Companies with lower average consumption per connection as a rule incur higher operational costs per m³. Average consumption has decreased by 12% since 1997.*

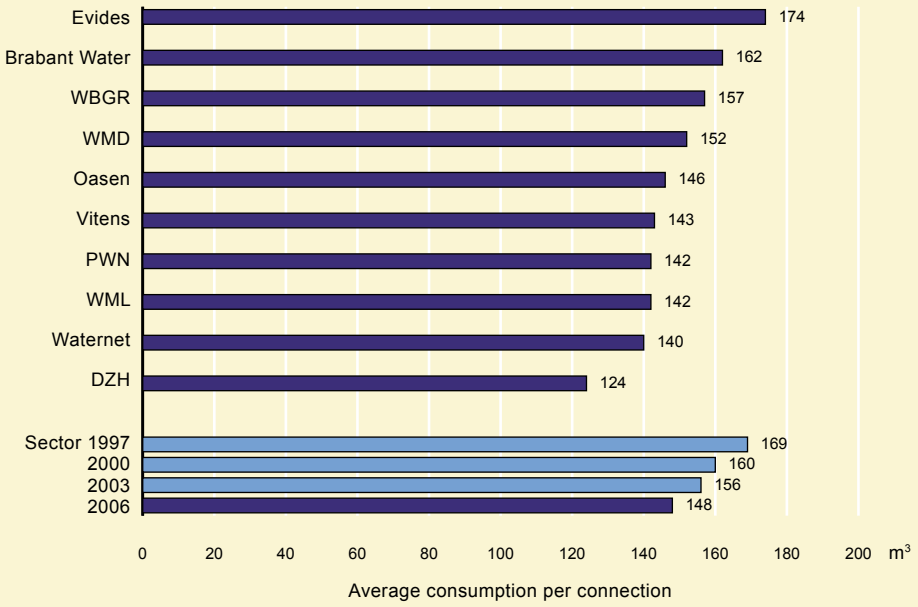
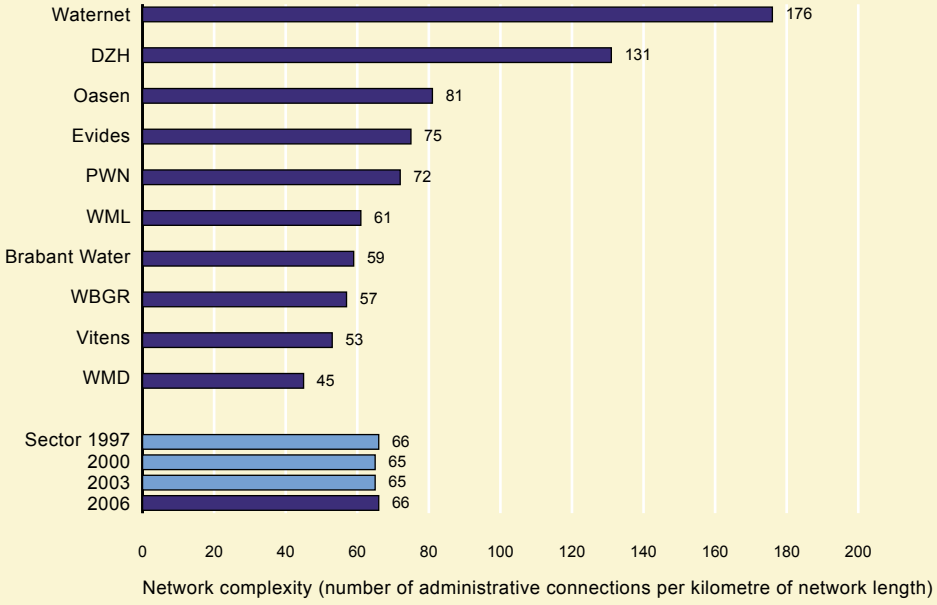


Figure 60 *Explanatory factor network complexity: Companies with higher network complexity as a rule incur higher operational costs.*



Notes

The totals mentioned in this report may not equal the sum of the components; this is due to rounding differences. The totals stated are correct.

The companies participating in 2006 have served as a basis for all stated figures and charts. Preceding years have been calculated by aggregating the numbers for the underlying companies and recalculating them. As a result, charts featuring ‘lowest 3’ and ‘highest 3’ categories may differ from charts presented in preceding years.

1 Water companies are required by law to supply the inspection authorities of the Ministry of Housing, Spatial Planning and the Environment with data on the quality of the drinking water. For registration and processing of the data by the Inspectors and the water companies the REWAB module (this stands for REgistration tool for WAter distribution companies) was developed. In this Benchmark study the REWAB data were used to provide for the measured values of the drinking water quality parameters.

2 The Benchmark examines for each water company what the revenues from drinking water operations are. This is done on the basis of a water company’s financial statement. As a next step, the costs corresponding to these revenues are calculated (closed model). Because the customer also has to pay for the financial result attained by the water companies, the financial result is also included in the costs.

3 ’Other water’ is understood to mean: water that is not of drinking water quality. This includes water of inferior/lower quality (for example non- and semi-filtered surface water) and superior/better quality (for example distilled and demineralised water) compared to drinking water.

4 Revenues from non-drinking water activities consist of among others the supply of other water, laboratory activities on behalf of third parties, invoicing for third parties, management of nature and recreational areas, subsidies, incidental income, wholesale supplies, capitalised operating expenses and contributions by third parties to operating costs of tangible fixed assets. Activities which are carried out by separate BVs (private limited liability companies) of water companies, are not included in the Benchmark.

5 Of water companies that have merged since 1997, the data has been generated by calculating the weighted averages. The following water companies have merged since 1997: Waterbedrijf Groningen was created in 1998 from the merger of Groningen’s provincial and municipal water companies; Vitens was created in 2002 from NUON Water Gelderland and NUON Water Fryslân, Waterbedrijf Gelderland and Waterleiding Maatschappij Overijssel, joined in 2006 by Hydron Flevoland and Hydron Midden-Nederland; Brabant Water was created in 2002 from the merger between Waterleiding Maatschappij Noord-West Brabant and Waterleiding Maatschappij Oost-Brabant; in 2004 Delta and Waterbedrijf Europoort merged to become Evides.

6 In the Water Quality Index (WQI) the legal standards used are those that apply in the year for which the WQI was calculated. The Benchmarks 1997 and 2000 are linked to the requirements as laid down in the Water Supply Degree 1984, including revisions. Supplementary to this, in 1997 and 2000 the VEWIN recommendations and the Inspection Guideline (Inspection guideline for reporting exceeding of norms of drinking water quality, VROM Inspection 2000) were used for the customer-oriented parameters and the parameters not included in the Water Supply Decree 1984.
In 2003 the VEWIN recommendations were cancelled. For the standardisation of the WQI in the Benchmarks 2003 and 2006 the standards set down in the Water Supply Decree 2001 were applied, including the revisions (e.g. of 2004).

7 In the event of continual exceeding of the norms, the inspection authority can issue the water company an exemption. An exemption can only be issued if it will not constitute a danger to public health and if it is not possible to reasonably continue another method of supplying water in the area in question. However, with regard to comparability between water companies and the customer's interest, the performance comparison does not take exemptions into account. This means that analyses carried out during the exemption period do form part of the calculations.

8 This relates to the parameters BAM, AMPA and Dikegulac sodium from the pesticide category and in addition the copper-resolving capacity. The pesticides referred to above are considered by the RIVM and the VROM inspectorate as toxicologically non-relevant. Copper-resolving capacity has been eliminated because there is no longer an unambiguous metering obligation for that parameter.

9 The saturation index parameter shows the ratio between chalk and carbon dioxide in water. If water has a saturation index which is smaller than '0', then the water will have chalk-extracting effect.
A saturation index higher than '0' means the water will have a chalk-depositing effect.

10 The standard for the total hardness from the Water Supply Decree applies when softening is applied. In this Benchmark, however, this standard has been applied to all water companies with regard to comparability between water companies and the customer's interest.

11 For microbiological parameters the standard is only exceeded if these are repeatedly encountered.

12 The report mark per company as shown in Figure 11 is based on an average sample of 75 respondents per company and presents a reliability margin of plus or minus 9% (at 95% reliability).

13 The reference sectors used are: a nationally operating postal company, a nationally operating supermarket chain, the electricity company that supplies the surveyed customer, the municipality where the surveyed customer lives and a nationally operating public transport company.

14 In the period from 11 September to 3 November 2006, except during weekends, Interview NSS called each drinking water company 120 times.

15 As published in the 2006 annual report of the Residues Union. The total reported for iron sludge in the Benchmark differs from that in the annual report of the Residues Union. This is because it is based on the total of dry matter, while the Residues Union reports total volume including water.

16 By way of comparison, the total surface area of the Netherlands is 4,152,796 hectares (2003, most recent available data), source: www.cbs.nl (consulted in May 2007). Surfaces for Staatbosbeheer and Natuurmonumenten from their respective 2006 annual reports.

17 The certificate ‘Sustainable Area Management’ (‘Duurzaam Terreinbeheer’) focuses on the management of all types of areas, not just nature areas. It is issued on behalf of the Environment Assessment foundation (‘stichting Milieukeur’) and certification is effected by Kiwa.

18 From: ‘Criteria Schedule Barometer for Sustainable Area Management’ (‘Criteriaschema Barometer Duurzaam Terreinbeheer’), April 2007.

19 An administrative connection is a plot (or apartment or subscription) linked to the technical connection. One administrative connection corresponds to one consumer address. A technical connection is a service connection between the drinking water network and a building, company or institution. A collective technical connection (e.g. block of flats) comprises several administrative connections.

20 The figures for the household budget relate to 2004, as these are the most recent data. The budget for water relates only to tap water. Mineral water is classified under foods in the classification applied by CBS Statistics Netherlands.

21 A ‘groundwater company’ uses at least 85% groundwater; a ‘surface water company’ uses at least 85% surface water. The other water companies are categorised as ‘mixed company’.

22 Operational costs are made comparable before allocation to the processes. To make the costs comparable the following adjustments are made:
Capitalised costs of water meters, office automation and operational IT maintenance have been added to operational costs. Purchasing costs of treated water are not benchmarked at a process level. Only 50% (the operational cost portion) of purchasing costs of raw water are allocated to processes. In addition, the portion of the rental and lease amounts intended for compensating the costs of capital (the non operational portion) is also eliminated from the total operational costs.
This eliminates the effect of whether or not certain assets are company-owned. Further non-recurrent accounting-related costs (resulting for instance from changes in accounting standards) are disregarded in the Benchmark. For capitalised operating expenses (the operational costs of assets produced by the companies themselves) no adjustment is made; these expenses are allocated to the investment process and not benchmarked at a process level.

23 As from 2006, the costs of the distribution process are expressed in terms of costs per administrative connection. The results of preceding Benchmarks (costs expressed in terms of costs per technical connection) have therefore been recalculated on the basis of the number of administrative connections in those years.

24 The process model for distribution was refined after 1997. To make the figures of the four years comparable, the figures for 1997 have been estimated.

Colophon

For more information:

Vewin (Vereniging van waterbedrijven in Nederland
- Association of Dutch Water Companies)
P.J.J.G. Geudens
www.vewin.nl

Accenture
M.J.J. van Beek
www.accenture.com

Cover image:
From top left to bottom right:
Truus van Gog, Hollandse Hoogte
Duinwaterbedrijf Zuid-Holland
Linda Gerrits, Voorschoten
Chris Pennarts, Hollandse Hoogte

Design and pre-press:
De Branding, Utrecht

Printed by:
Den Haag media groep, Rijswijk

Vewin no. 2007/80/6292