VEWIN

ASSOCIATION OF DUTCH WATER COMPANIES

Reflections on Performance 2003

Benchmarking in the Dutch Drinking Water Industry

accenture

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Benchmarking in the Dutch Drinking Water Industry

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Foreword

Staying on track with 'A View of Water'

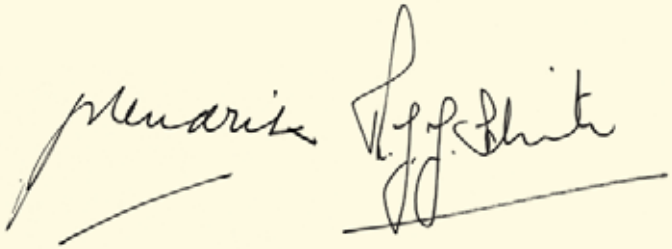
'Reflections on Performance 2003' is the third benchmark study of the Dutch drinking water industry undertaken by Accenture on the instruction of the Association of Dutch Water Companies (VEWIN). The study was aimed at evaluating and making transparent the performance of water companies in their main areas of responsibility - water quality, service, the environment and finance & efficiency. The performance of participating water companies was thus compared as objectively as possible to help shareholders, supervisory commissioners, the State and customer' representatives to better understand the companies and their work. This is today all the more important as Dutch water companies are to remain government-owned.

Besides making transparent the performance of water companies, the study also aims at offering water companies instruments to help them improve their business processes. Since the introduction of benchmarking in 1997 water quality has continued to improve, good service to be maintained, and real costs to decline. Benchmarking has clearly born fruit in the drinking water industry.

This positive image was once again emphasized by research carried out by the Erasmus University of Rotterdam (Ocfeb), according to which the water industry achieved a 9% efficiency improvement since the year 1997 - about the highest possible according to researchers. The government's intention to add an obligatory benchmark investigation to the Water Supply Act is supported enthusiastically by the industry.

Benchmarking is about learning, also during the set-up and implementation of research. Based on reactions from earlier benchmark studies (1997 and 2000) the method has been refined. For instance, measuring and presenting performance data regarding the quality of the water in cooperation with the National Institute of Public Health and the Environment (RIVM) were further upgraded. Information is also now available that tells us how customers feel about their drinking water supply.

The study involved ten water companies. In terms of numbers of connections these ten participants represented 81% of the industry, which means 'A View of Water' provides a responsibly representative image of the Dutch drinking water industry.



J.A.M. Hendrikx
Chairman VEWIN

Th.J.J. Schmitz
President VEWIN

November 2004

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Figure 1 – The Water Quality Index has improved, from 0.07 to 0.05. Spread declining (highest possible score = 0.00; legal minimum = 1.00).

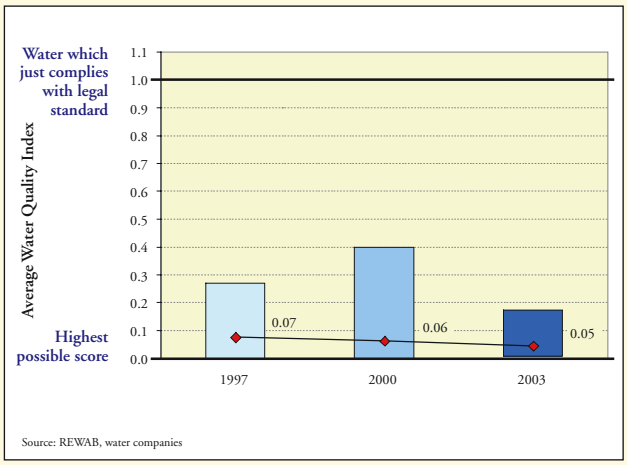


Figure 2 – Customers remain positive about water companies' service.

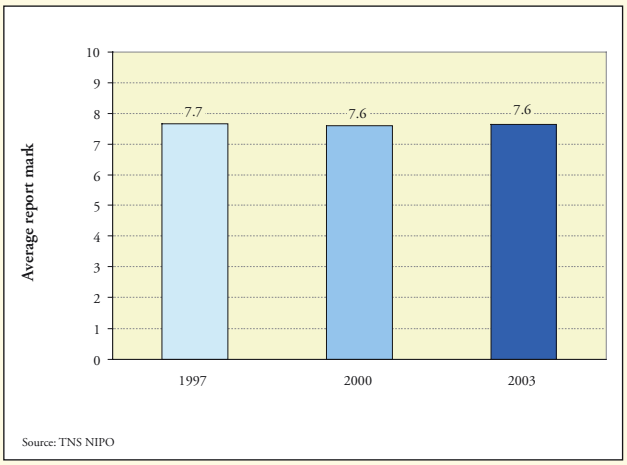


Figure 3 – Since 1997 connection costs increased nominally by 4.6%, in real terms dropped by 11.5%.

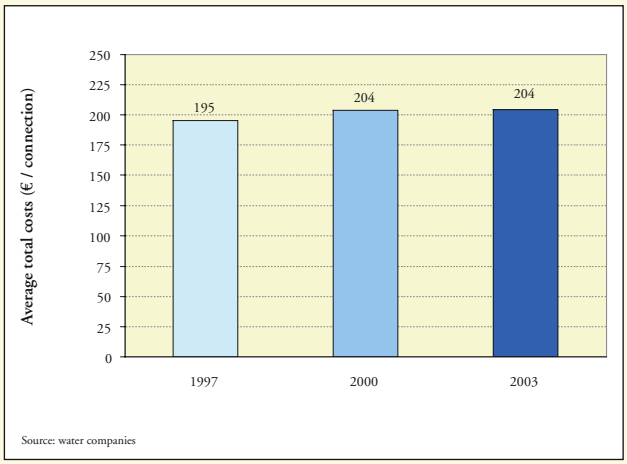
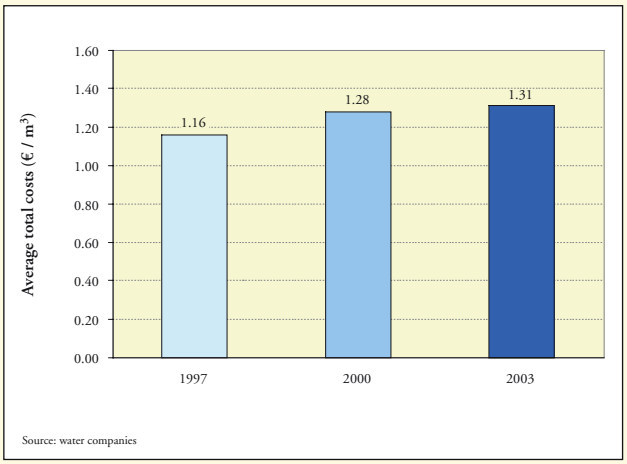


Figure 4 – Since 1997 costs per cubic metre increased nominally by 13.3%, in real terms dropped by 4.1%.



Summary: water quality improved, good service maintained, real costs declined

Reflections on performance 2003 is a benchmarking study carried out within the Dutch drinking water industry. The study aims at increasing efficiency and transparency of the industry. The study has already carried out twice, in 1997 and 2000, allowing comparison of results to previous years. The benchmark study is based on four themes.

Water Quality: further improved since 1997

Measurement of the water quality uses the Water Quality Index (WQI) that 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 which just meets minimum standards receives a score of '1'. Water companies comply generously with these standards at an average Water Quality Index of 0.05. Compared to 1997 and 2000 this is an improvement.

Customers appreciate the water quality: 94% of the customers are happy with the price-quality ratio of drinking water. On average customers give water companies a report mark of 7.7 of a perfect 10 for water quality. Customers feel differently about the water hardness: 38% is willing to pay more for softer water.

Service: on average customers give water companies a 7.6

Customers' average report mark is a 7.6 of a perfect 10 for service, compared to 7.7 in 1997. The sector thus scores better compared to a number of reference sectors. The difference between the water company with the highest report mark and the lowest report mark was 0.3.

Availability by telephone within the drinking water industry shows a substantial spread. A common indicator has been used to determine this: the percentage of calls answered within 20 seconds at the water companies. This percentage varies between 18% up to 83%.

As for future benchmarks a national registration system is being developed for interruptions to supply. So for this benchmark we measured customers' perceptions as to the continuity of drinking water supply: 11% of customers believed they had experienced interruption to supply in the first half of 2004.

Environment: sustainable energy reduces environmental impact

Since 1997, the total energy use per m^3 of drinking water produced increased by 7%, partly due to the softening process. In the same period sustainable energy use went up from 5% to 25%.

In 2003 94% of the residues of the drinking water production process were reused; an increase compared to the previous benchmark studies. The industry proactively attacks both dehydration and flooding problems. Data for a quantitative indicator for these two subjects are not yet available and will be collected by provincial authorities in the years to come.

Finance & Efficiency: cost increases below inflation

Since 1997 connection costs declined by 11.5% after correction for inflation. Since 1997 costs per m^3 declined by 4.1% after correction for inflation. The difference in these trends is related to the declining drinking water consumption per connection.

In costs, the spread between water companies amounts to € 64 per connection, equivalent to € 0.70 per m^3. Nevertheless, water companies' total costs are not directly related to efficiency, as other factors too might play a significant role.

Figure 5 – Further to the previous benchmarks and in view of the coming obligatory benchmark study, the four themes were evaluated and improved in discussion with parties interested.

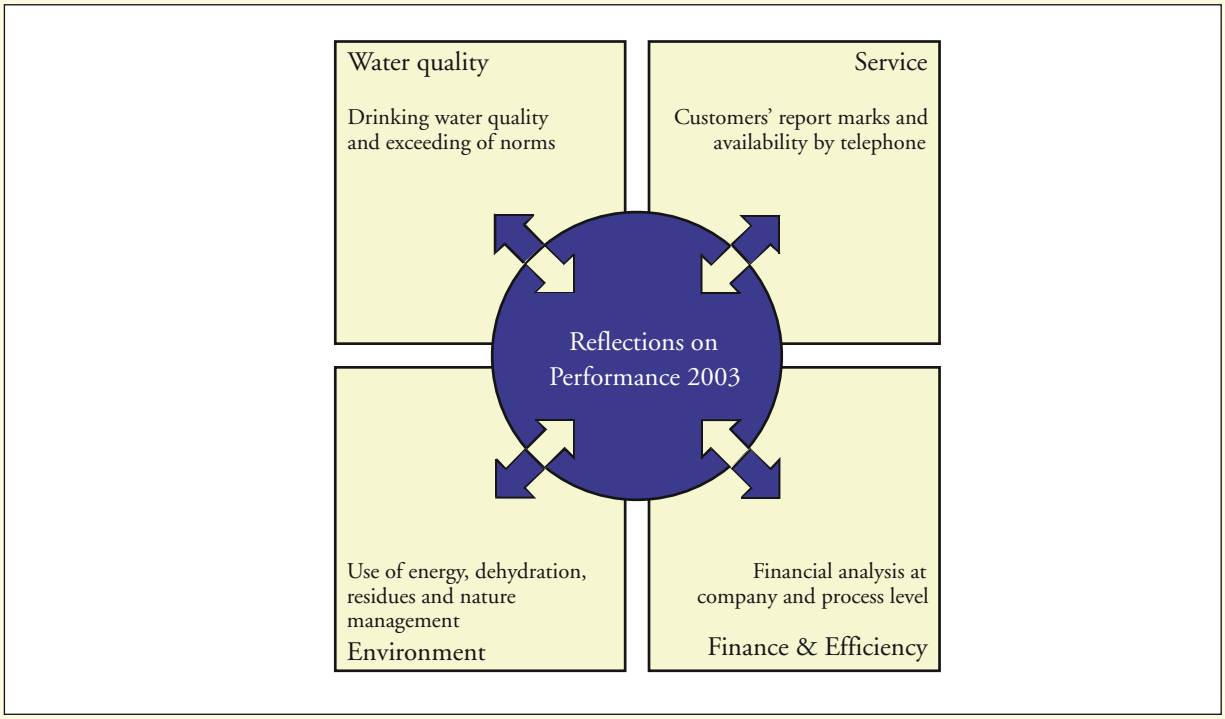
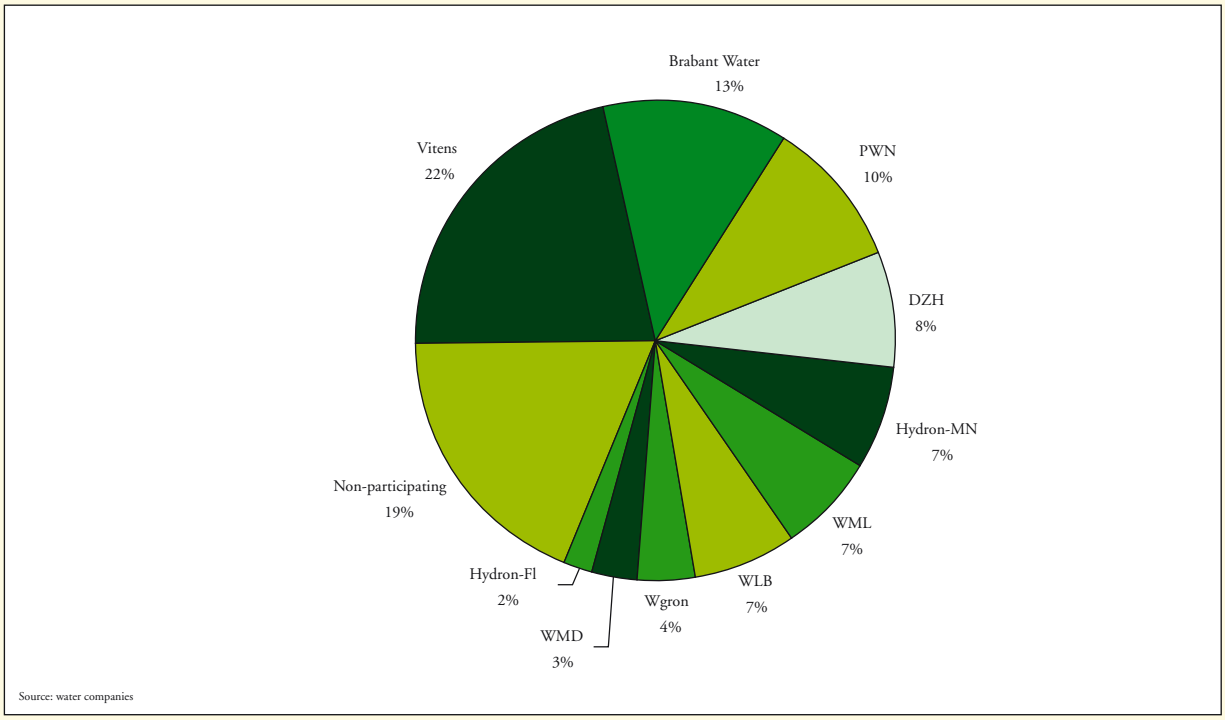


Figure 6 – By number of connections, 81% of the drinking water industry participated in this benchmark study compared to 85% and 90% respectively in 1997 and 2000. Companies that did not participate in Benchmark 2003 are: WBE, Hydron Zuid-Holland, Delta, TWM and Doorn.



Introduction

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

The benchmark study had the following objectives:

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

~ *Transparency of performance* - aims at better explaining things to interested parties including commissioners and shareholders.

Themes refined compared to previous Benchmarks

The themes dovetail with Benchmark's two main objectives. Further to evaluation discussions with parties interested within and outside the industry all themes were refined compared to Reflections on Performance 2000:

~ *Water Quality.* Clean drinking water is essential to customers' health. The government has thus drawn up legal standards indicating the amount of substances to be allowed in drinking water. Benchmark applies the Water Quality Index using one figure to indicate the extent to which drinking water quality complies with these legal standards. In addition, as of Benchmark 2003 exceeding standards will be shown clearly outside the Water Quality Index; the way customers feel about the drinking water quality too will be studied.

~ *Service.* Costumers can deal with their water companies in different ways. For instance to read meters or in case they move house. To compare water companies' services an extensive questionnaire was held among 5,694 customers. Supplementary to Benchmark 2000, availability by telephone and the continuity of water supply too were studied in the current study. As to the latter customers were asked to state whether they had experienced interruption to supply.

~ *Environment.* Water companies extract, purify and distribute water. These processes affect the environment. The environmental impact is caused by three factors in particular: use of energy, produced residues and land dehydration. Benchmark 2000 included these factors in one environmental impact index. Benchmark 2003, however, went further by mentioning these factors separately: in this dehydration is described qualitatively. Except for environmental impact the contributions of the drinking water industry to nature management too were mapped.

~ *Finance & Efficiency.* Drinking water tariffs and related costs are different for each water company. Benchmark covers these tariffs. Subsequently, the underlying costs are compared using a closed model on the basis of water companies' annual accounts[1] . Costs are compared both at company and process level. Compared to Benchmark 2000, Benchmark 2003 extensively discusses the factors that might explain the differences between water companies' performances. Also, more attention is paid to financial results and water companies' solvency.

Reflections on performance 2003 focuses on several activities which run from 'managing the raw water source' to 'supply of drinking water to the end user.' 'Other water' (including industrial and household water[2] as well as other non-drinking water activities[3]) fall outside the scope of this research.

81% of the drinking water industry participated

Ten water companies participated[4] in Benchmark 2003. In terms of the number of connections the participating companies represented 81% of the drinking water industry, which meant 5.9 million connections in the Netherlands. Non-participating companies included WBE, Hydron Zuid-Holland, Delta, TWM and Doorn. 'Water companies' in this report are taken to mean participating water companies. Participation percentages amounted to 85% and 90% respectively in 1997 and 2000.

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

Besides water companies, the central government, customers, supervisory commissioners and shareholders too use of the benchmark more intensively in their evaluation and steering processes. Furthermore, the current voluntary benchmark will serve as foundation for the planned Obligatory Benchmark. It is part of the new Water Supply Act which is expected to become effective in 2007. In short, benchmarking has obtained a central position within the drinking water industry.

Central government:

- The central government aspires to an Obligatory Benchmark based on VEWIN's voluntary Benchmark.
- In advance of the Obligatory Benchmark, several aspects of the four subject areas covered in the benchmark 2003 were refined in discussion with inter alia the Ministry of Housing, Planning and the Environment (VROM) and RIVM.
- Revision of the old Water Supply Act, which is currently being developed in cooperation with VEWIN.

Customers:

- To interest 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.

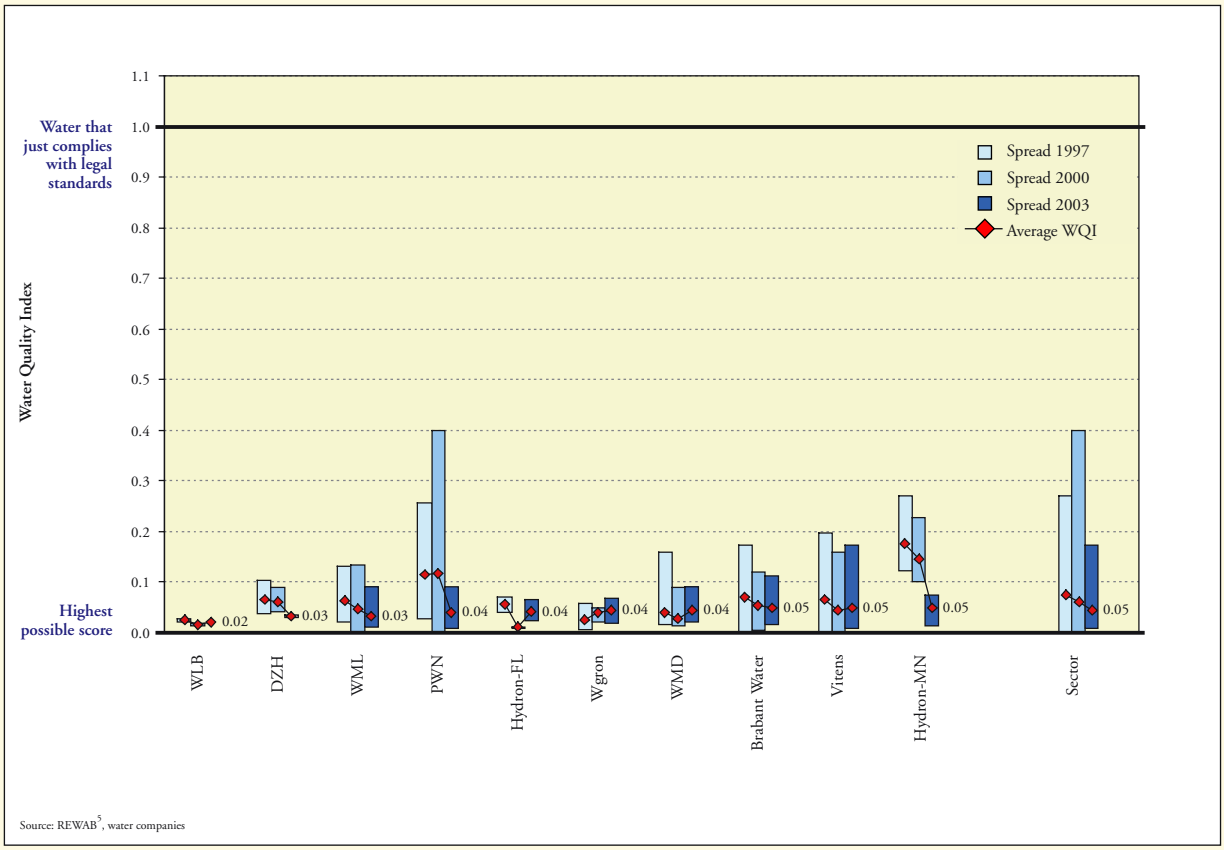
Commissioners and shareholders:

- Use benchmarking to supervise efficiency of water companies' operational management.
- Consider benchmarking to be a proactive communication for current supervision.
- Ocfeb, the economic research consultants of the Erasmus University of Rotterdam, see no reason for adapting the current supervisory model, in which shareholders and the benchmarking study have a significant role.

Water companies:

- Benchmarking helps management teams continue to improve operational management.
- Business administration is tuned ever better to the Benchmark model.
- The possibility of an international Benchmark study is being studied.

Figure 7 – The average water quality of all water companies complies generously with the standards as shown in the Water Supply Degree. The average Water Quality Index improved compared to 1997; the spread between measuring points declined.



Source: REWAB[5], water companies

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 Water Quality Index (WQI) to indicate in a single figure the degree to which drinking water quality complies with these legal standards[6,7]. This index has been developed in close cooperation with the industry and RIVM[8]. In addition, the exceeding of norms is discussed and a study is carried out to assess how customers feel about drinking water quality.

Water qualities complies generously with legal standards

Figure 7 shows the Water Quality Index (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 minimum standard receives a score of '1'.

Water companies comply generously with the standards earning an average Water Quality Index of 0.05. That is an improvement compared to 1997 and 2000, and is mainly due the ongoing softening process.

For several reasons the average Water Quality Index 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; which is why the treatment process has been designed to convert the worst quality water into reliable drinking water. Thirdly, the precision of the purification process is not entirely adapted to the law. In treating water, more substances are removed than is strictly legally necessary. This is intrinsic to the common water purifying techniques.

Water Quality Index methodology

In view of the Obligatory Benchmark in the new Water Supply Act, the water quality methodology has been revised with regard to Reflections on Performance 2000 and in consultation with the water industry and RIVM. The Water Quality Index now even better dovetails with the government policy. The Water Quality Index 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 Degree, 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 outweigh other parameters.

2. Introduce measured values. Water companies are legally obliged to regularly carry out measurements and report to inspectorates via the so-called REWAB (Registration Report for Water Distribution Companies) system[5]. Benchmark uses the REWAB system data as the basis for the Water Quality Index.

3. Calculate the Water Quality Index. Water quality is expressed in a Water Quality Index (WQI). The calculation is based on the following formula: determine for each parameter the average ratio between the measuring value and the corresponding standard stated in the Water Supply Degree. These ratios are 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 Water Quality Index, the spread between the various measuring points is stated for each company.

Figure 8 – Since 1997 the main improvements have been realised in the customer-oriented parameters.

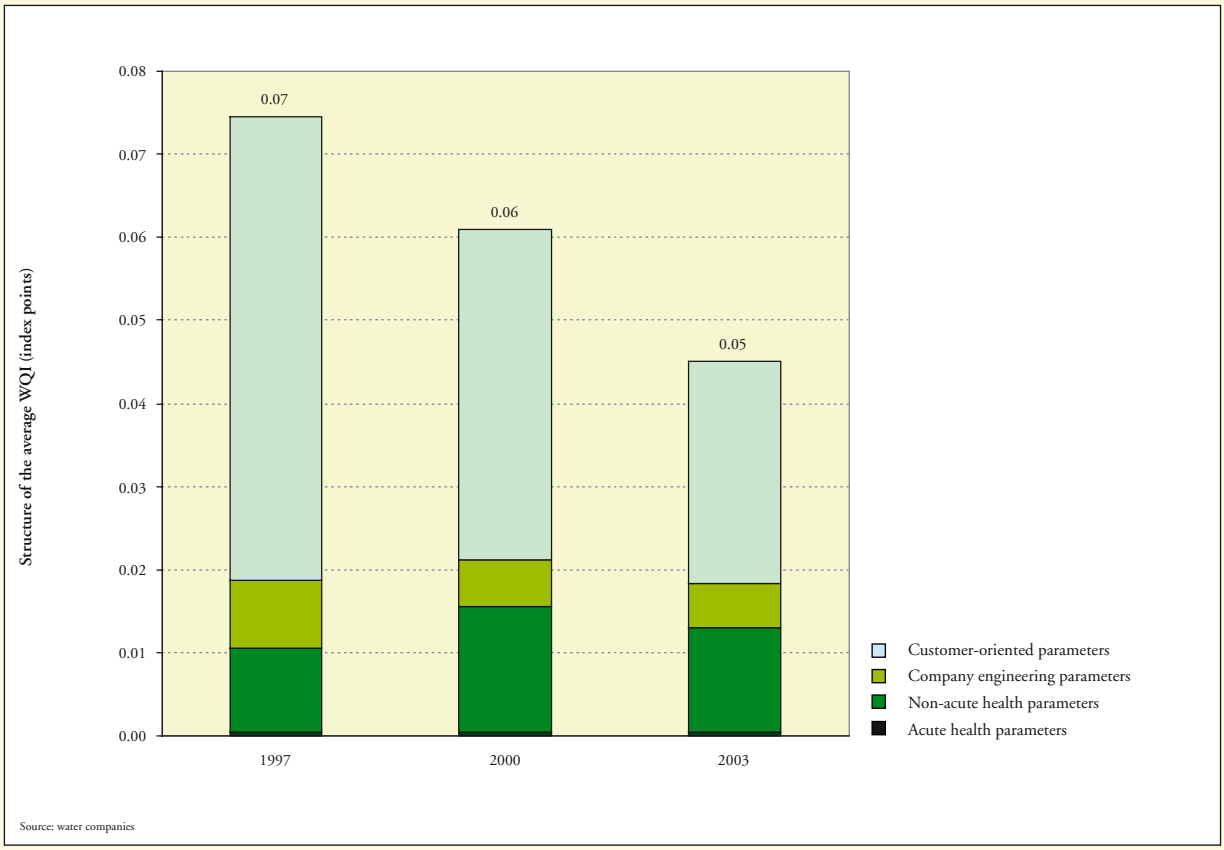
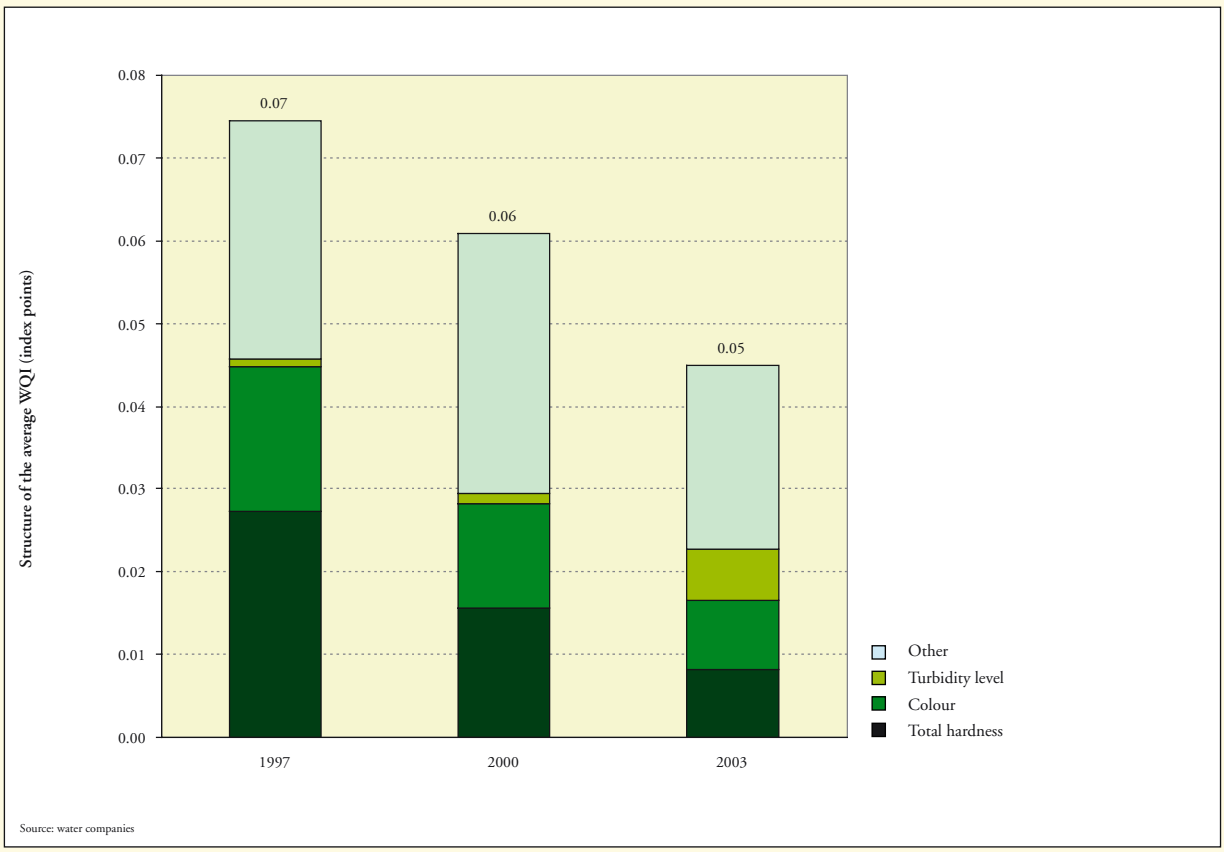


Figure 9 – A significant part of the improvements since 1997 are due to the ongoing softening process. The increase in the turbidity level in 2003 was due to stricter standards.



The following aspects deserve extra attention per company:

~ WLB and DZH, with two production companies of similar quality experience limited spread. Other companies have more measuring points. By comparison: Vitens has 82 production locations spread across the country.

~ Hydron Midden-Nederland's improved Water Quality Index is mainly the result of the disappearance of colour and odour parameters in the methodology. This is because no quantitative standard was set for these parameters in the 2001 Water Supply Degree.

~ PWN's peak in 2000 was caused by an incident involving thermo-tolerant coli bacteria.

The main improvements were achieved in customer-oriented parameters

Although the water quality of all water companies complies adequately with the legal standards, insight in the structure of the Water Quality Index helps to show the areas that still require improvement. The parameters are divided into parameter groups (see Appendix B). Below each parameter group are the parameters with the greatest impact on the Water Quality Index in daily practice:

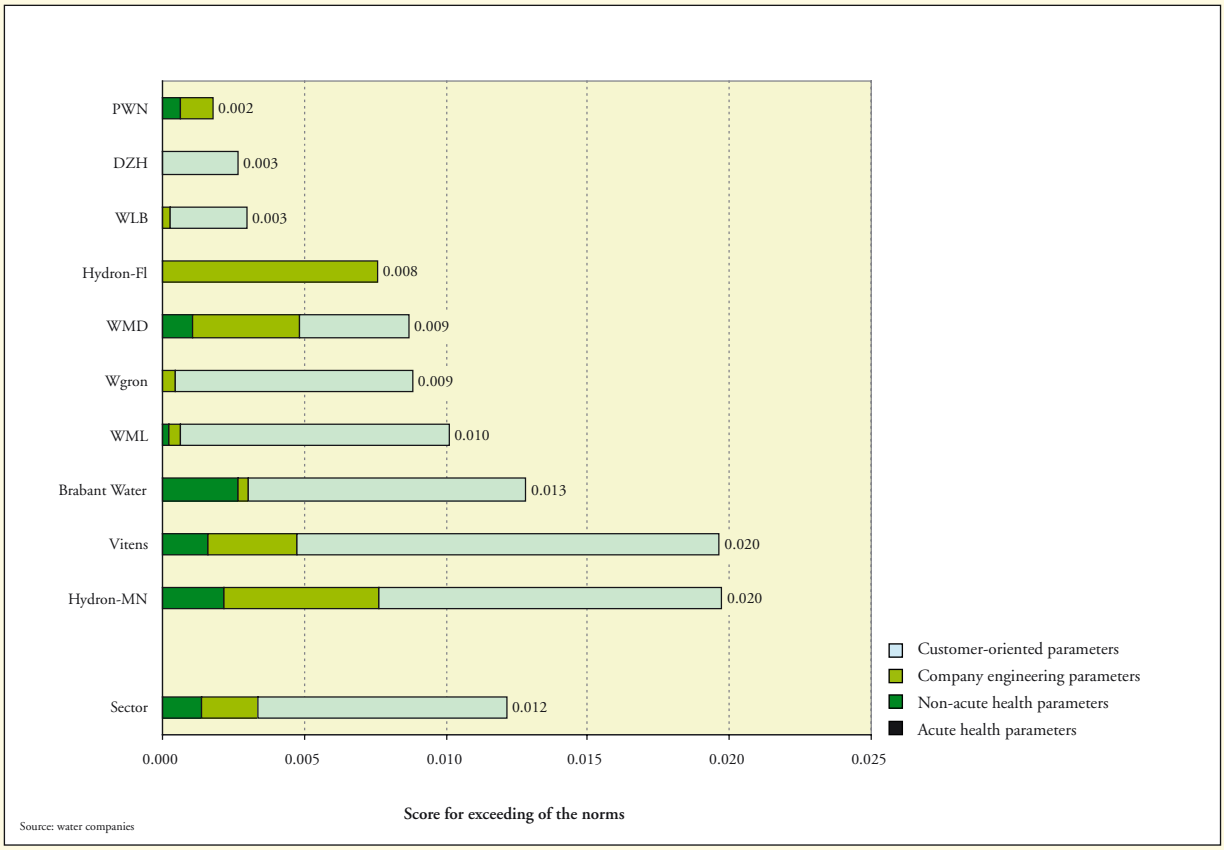
~ *Acute health parameters.* These are bacteria and viruses which can form a direct threat to public health. As in 1997 and 2000, these are hardly found in drinking water.

~ *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 2003 the copper carrying capacity and fungicide had the greatest impact on the Water Quality Index.

~ *Technical parameters.* Water companies use these parameters during the purification process to ensure good operational management and optimal drinking water quality. They are not directly related to the health of the public. In 2003 the saturation index[9] parameter had the most impact on the Water Quality Index 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 uncalled for in drinking water. Customer-oriented parameters are not directly related to public health. Improvements introduced by water companies over past years mainly relate to this parameter group, as seen in Figure 8. Especially total hardness[10] increased due to the intensifying softening process (Figure 9). The main advantage of this is the reduced level of water scale in the mains and household equipment. The colour parameter also improved compared to past reference years. The impact of the turbidity level parameter increased due to stricter standards.

Figure 10 – On average 11% the score of the exceeding of the norms is determined by non-acute health parameters. The norms were not exceeded for acute health parameters.



Spread of scores for exceeding of the norm between water companies is a factor 11

Besides the Water Quality Index, which indicates the regular quality of drinking water, the exceeding of norms have been mapped. This score is determined by taking the number of times the norm is exceeded, weighing each exceeding of 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. On average 11% of this score is determined by health parameters.

At six out of ten participating water companies the score for exceeding of the norm is partly determined by structural exceeding of the norms. The most common ones are structural exceeding of norms for the saturation index and total hardness. The other parameters involving structural exceeding of the norms are copper carrying capacity, hydrogen carbonate and turbidity level.

Incidentally, the Water Quality Index and the score for exceeding of the norms are closely related: water companies with a low WQI also have a low score for exceeding of the norms.

Methodology for the score for exceeding of the norms

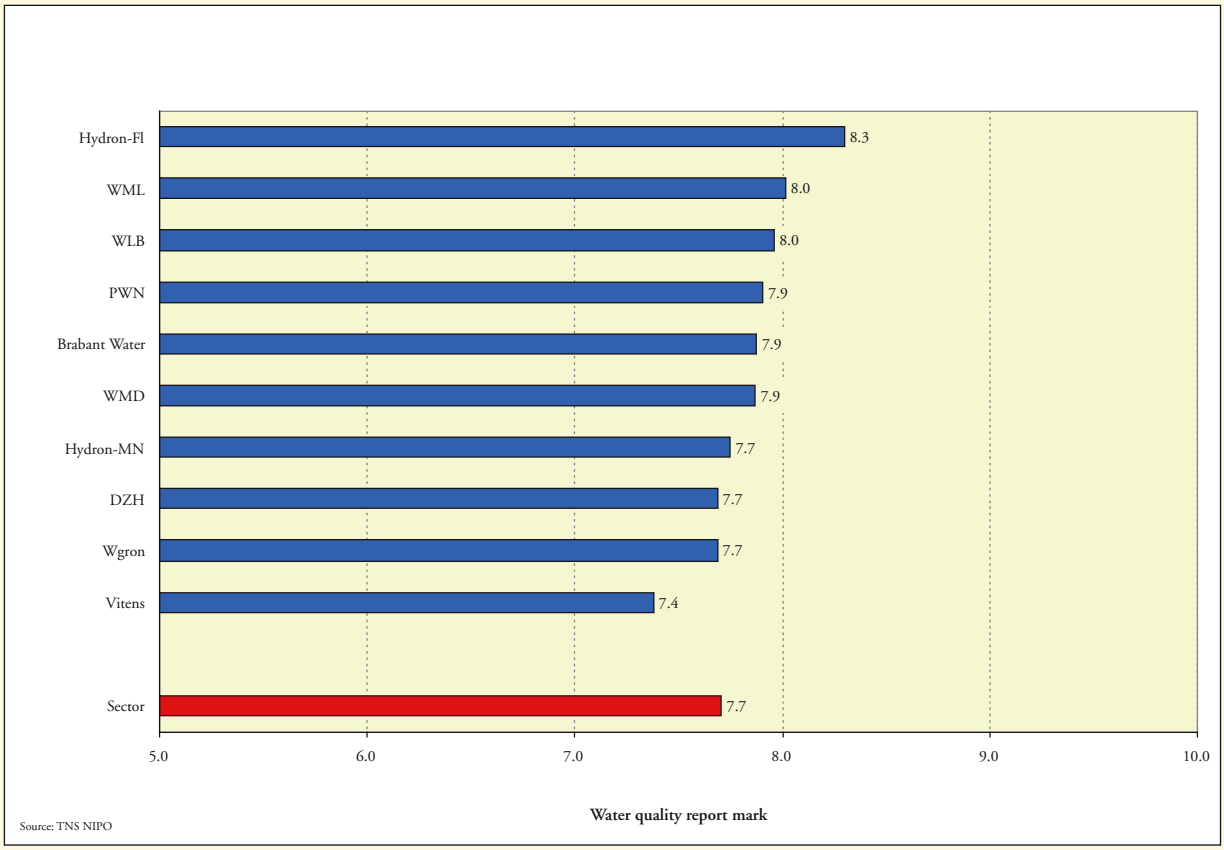
In addition to the Water Quality Index (indicating the regular quality of drinking water) as of the Benchmark 2003 the score for exceeding of the norms will also be made transparent; this score maps the incidental and structural exceeding of norms:

The score for exceeding of the norms is determined by taking the number of times the norm is exceeded[11], weighing 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 exceeding of the norms is based on the same parameters which are used to determine the Water Quality Index. Exceeding of norms is counted and weighed on the basis of the relevant parameter group. Water companies carrying out more measurements than the minimum stated in the Water Supply Degree do not receive extra 'punishment' on calculating the score.

To increase water companies' data reliability and unequivocal character REWAB data are used to calculate the score for exceeding of the norms and the Water Quality Index. The number of customers afflicted and the duration of the exceeding of the norms are not registered and therefore cannot be included in the score for exceeding of the norms.

Figure 11 – Customers give all water companies a clear satisfactory assessment for water quality; sector average is 7.7 of a perfect 10.



94% of customers consider the price-quality ratio of drinking water to be good

For the benchmark, TNS NIPO surveyed around 850 customers to find out how they felt about drinking water quality. Their average report mark was a 7.7 of a perfect 10. (Figure 11).

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

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

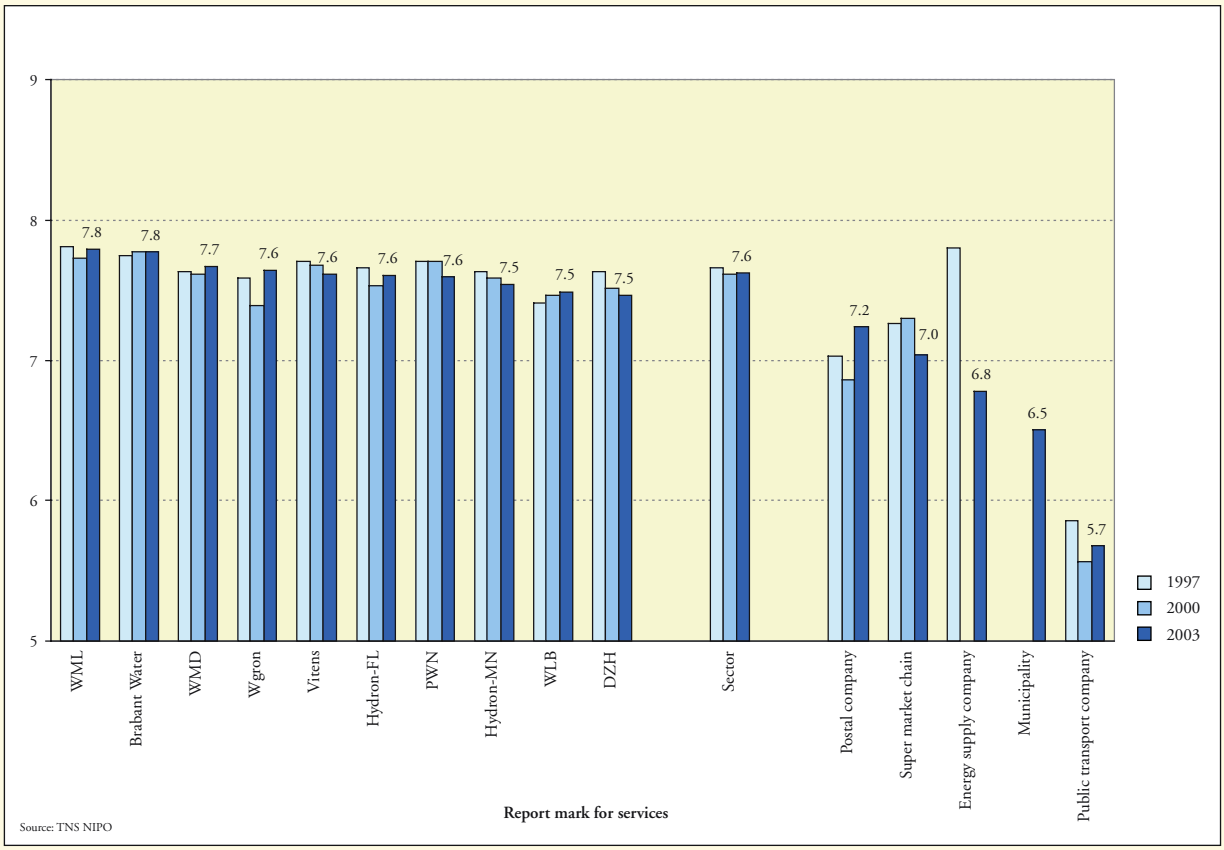
A minor group of customers would like some adjustment to the quality or price of water:

- 21% would be willing to pay more for better-quality drinking water.
- 6% were willing to settle for lower quality at a lower price.

Customers feel differently about water hardness:

- 63% of customers were happy with the water hardness level.
- 38% would be willing to pay more for softer water.

Figure 12 – Customers remain satisfied with the services offered by the drinking water industry giving an average mark of 7.6. This assessment exceeded the assessment given to a number of other national organisations also providing basic needs. The figures show a small spread only across the various water companies.



Service: customers give water companies an average mark of 7.6

Consumers can deal with their water companies in different ways. For instance to read water meters or in case a consumer has to move house. To be able to compare water companies' services, an extensive questionnaire was sent to 5,694 customers. The study included availability by telephone and water companies' continuity of supply.

Customers were positive about water companies' service

The questionnaire was filled out by customers who had recently contacted their water companies. They were asked to give a report mark for service.

The average report mark was a 7.6 of a perfect 10 for service; the average mark has thus remained similar compared to 2000. In 1997 the average report mark was a 7.7.

As in previous years, the spread between water companies remained limited: the difference between companies with a highest and the lowest report mark in 2003 was 0.3 (see Figure 12).

The report marks for service provided by water companies were also compared to other national organisations too providing various basic needs[12]. These are the results in order of the report marks for 2003:

- Postal company: 7.2;
- Super market chain: 7.0;
- Energy company: 6.8;
- Municipality: 6.5;
- Public transport company: 5.7.

Water companies thus scored better than these reference sectors.

Customer questionnaire methodology

Service quality was extensively studied using TNS NIPO's telephone questionnaire. The questionnaire was completed by 5,694 customers who had recently contacted their water companies:

The quality of service is defined as the level by 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, or passed on by customers by telephone or in writing. Finally, so-called 'dimensions'[13] are taken into account on calculating the level of satisfaction. The dimensions reflect the way customers feel about water companies' service; for instance whether the meter reader looked presentable.

Figure 13 – Generally speaking customers are happy with the activities carried out by water companies. The spread between water companies is smaller compared to 1997, especially in terms of 'invoicing' and 'change of address'.

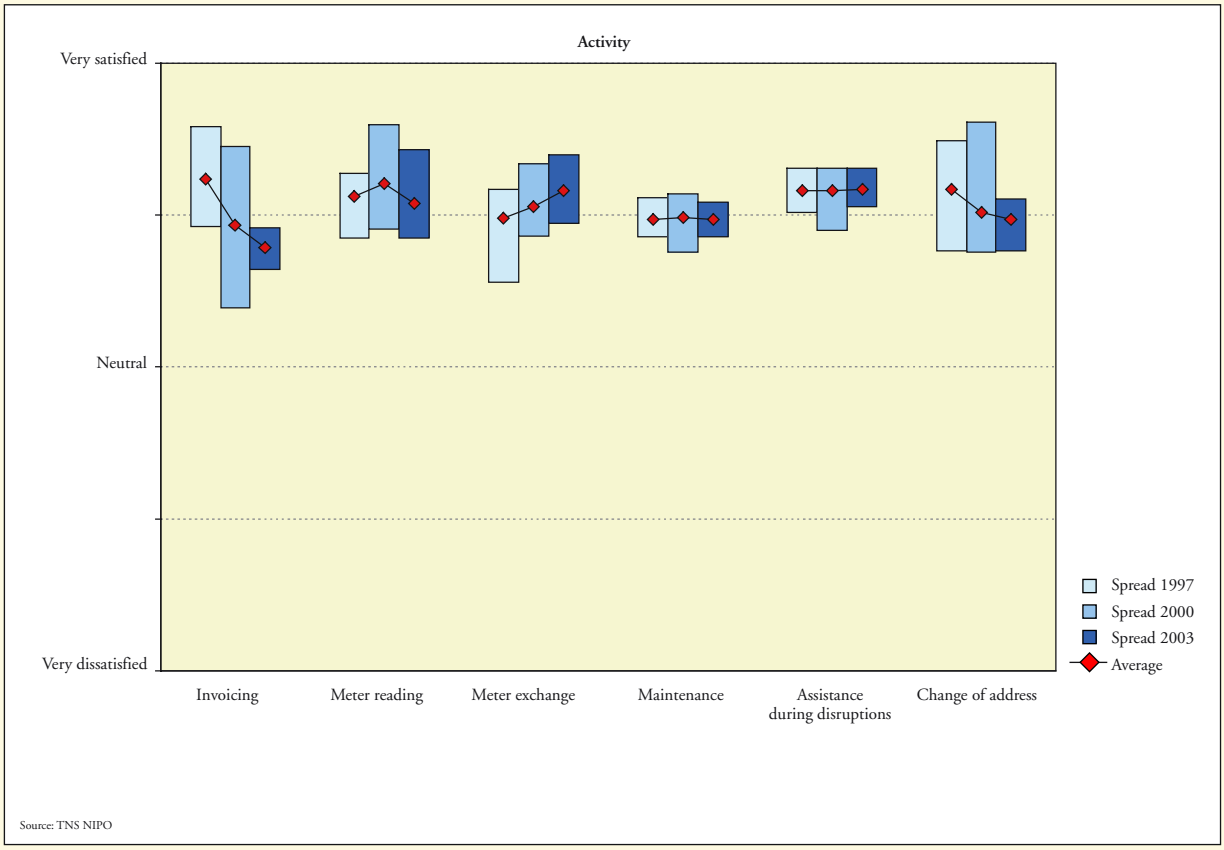
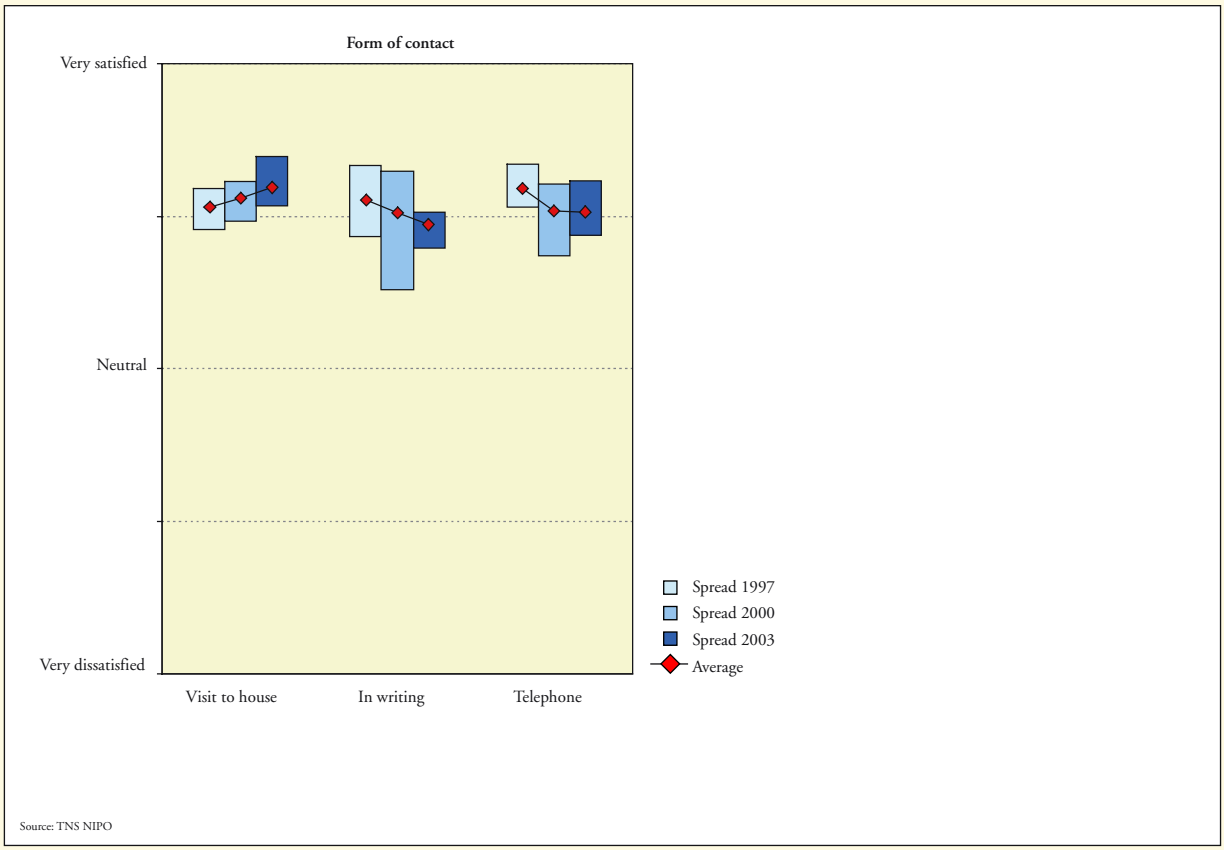


Figure 14 – With regard to written contact, spread between water companies also decreased compared to 1997.



Customers are satisfied with service aspects

Satisfaction

Customers were asked specific questions about water companies' six activities. Study also regarded water companies' performance in terms of form of contact and dimensions[13].

~ *Activities.* Since 1997 customers have become increasingly satisfied with regard to the exchange of meters, yet less happy with regard to invoicing, meter reading and change of address (Figure 13). Spread between water companies has diminished, except for meter reading.

~ *Forms of contact.* Since 1997 customers have become more satisfied with contact 'to the house' (Figure 14). Customers are less satisfied with written and telephone contact. Written contact includes e-mail messages; with regard to this point the spread has decreased within the sector.

~ *Dimensions.* According to customers water companies' external characteristics and their ability to show understanding have improved since 1997 (Figure 15). The satisfaction rate regarding reliability, responsiveness and care has declined.

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:

~ Change of address (from 7% to 9%);
~ Telephone contact (from 6% to 8%);
~ Responsiveness (from 6% to 8%).

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

~ Meter exchange (from 12% to 6%);
~ Contact at home (from 11% to 6%).

Figure 15 – In general customers are satisfied with the way in which water companies interpret dimensions.

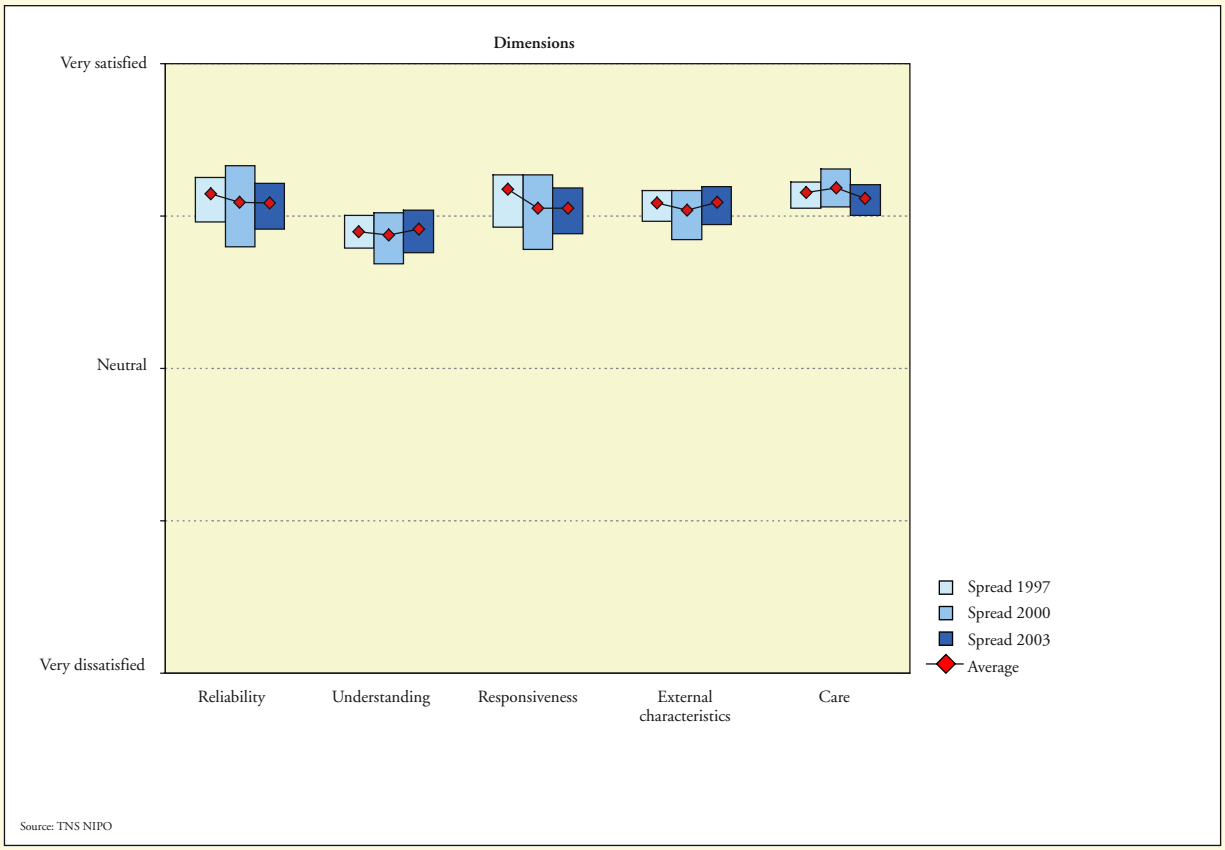


Figure 16 – The percentage of telephone calls answered within 20 seconds (excluding time spent in a menu) shows major spread, with a 51% sector average.

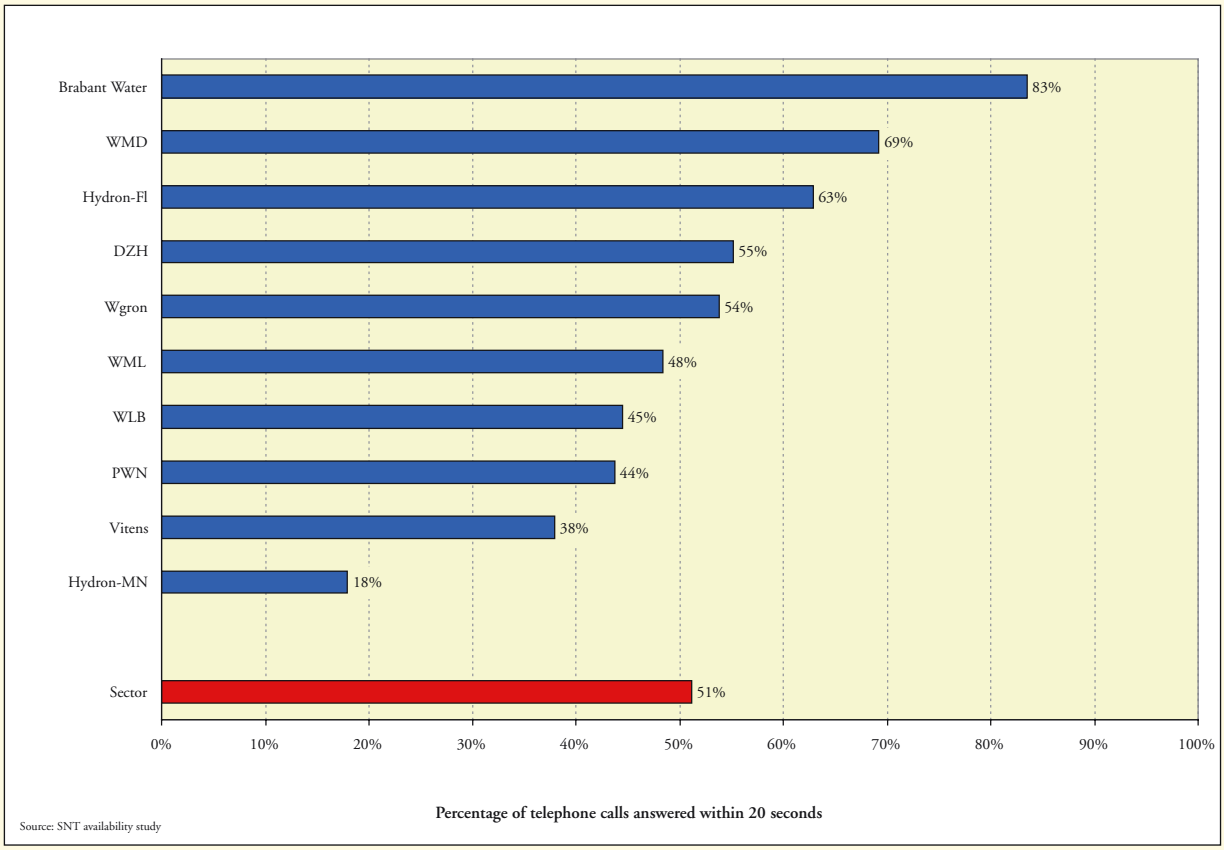
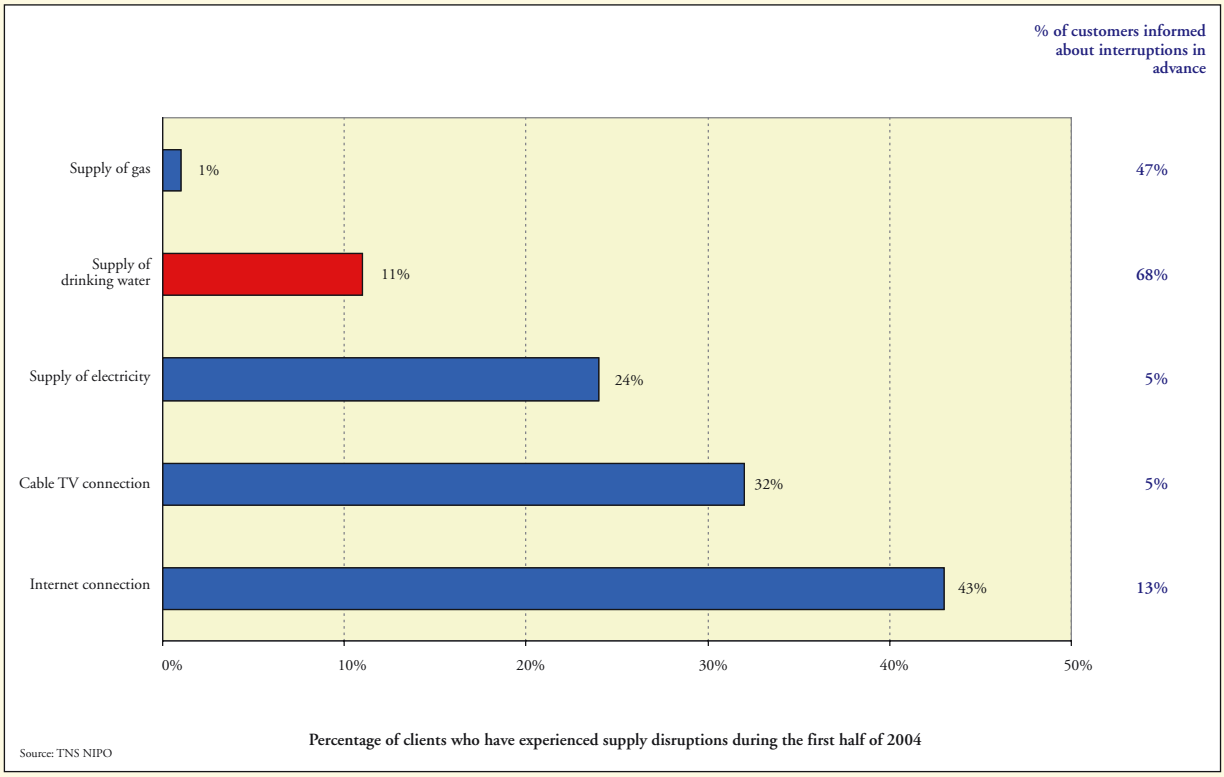


Figure 17 – Compared to other network services and in terms of continued supply, supply of drinking water occupies second place according to customers' perception. According to customers 68% of interruptions to supply are reported in advance; which is better compared to other network services.



Telephone accessibility shows huge differences between water companies

It has been investigated how accessible the water companies' call centres are. A common indicator has been used for this, namely the percentage of telephone calls which are answered by an employee within 20 seconds. This is excluding time spent in a menu.

51% of the telephone calls are answered within 20 seconds. This percentage differs substantially between the water companies. For example: at Brabant Water 83% of the telephone calls are answered within 20 seconds, while this is 18% at Hydron Midden-Nederland.

The average telephone waiting time (excluding time spent in a menu) also shows a high spread which lies between 16 and 233 seconds. The average waiting time in the sector is 60 seconds.

Supply disruptions are measured by a few water companies, national registration system is being developed

The drinking water sector is currently developing a national registration system to measure supply disruptions. No objective figures are available because this system has not been completed yet. To give an indication of the continuity of the supply, a survey was held among around 1,000 Dutch people. The client's perception can differ from reality, for example because a disruption in the electricity supply is also noticeable when the person is not at home during the disruption (freezer or electrical clock for example).

11% of all the clients experienced a supply disruption of the drinking water during the first half of 2004. Compared to other network services, this puts the drinking water sector in the second place with regard to continuity and supply (Figure 17).

Of the clients who faced a supply disruption, 68% were notified in advance. This is higher than with other network services.

Figure 18 – Compared to other public utilities, the environmental impact of the drinking water consumption, as determined in View of Water 2000, is extremely limited.

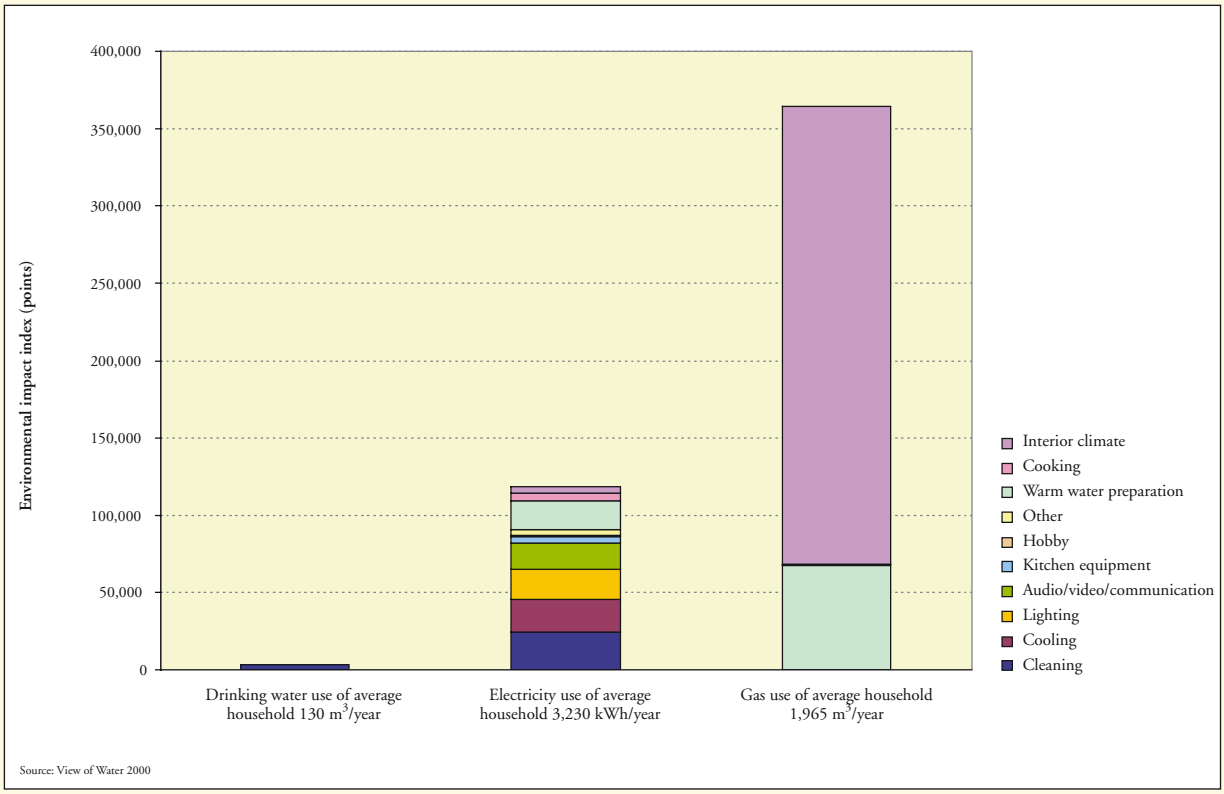
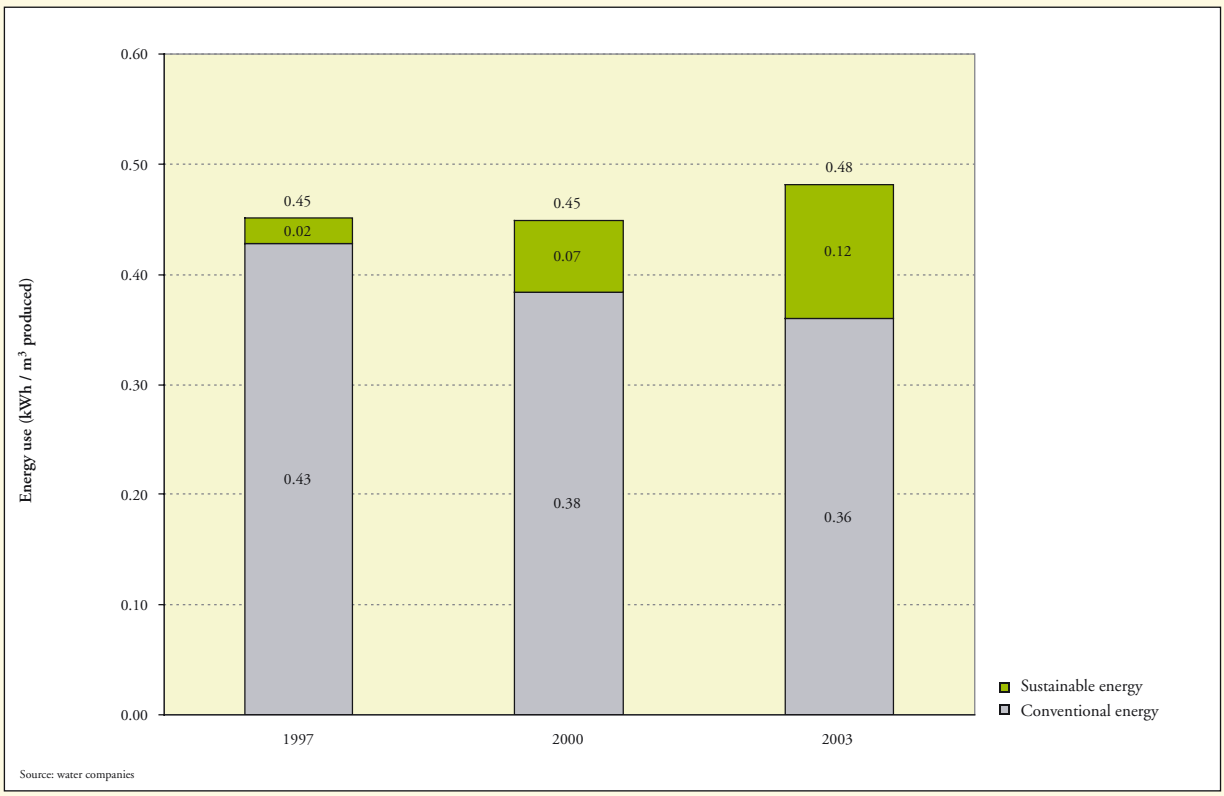


Figure 19 – The total energy use per m³ of produced drinking water has increased 7% since 1997, this is partly due to softening. In the same period the share of sustainable energy use increased from 5% to 25%.



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

Water companies extract, purify and distribute water. These processes have an impact on the environment. Water companies aim to achieve a sustainable balance between water collection, environmental management and nature management. This chapter outlines both the environmental impact and the environmental contributions.

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 a View of Water 1997. This was refined and once again presented in a View of Water 2000. The 2000 results, for the second time, show 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 the environmental impact of drinking water consumption in 2000 was for 93% determined by three factors: energy use, (72%), dehydration (20%) and residues (1%).

This year the decision was made to quantify these three factors separately, to further increase the transparency of these subjects. Dehydration forms an exception herein: this subject is handled from a qualitative viewpoint, because the data for a quantitative indicator will be gathered over the coming years.

Energy use has increased, just as the share of sustainable energy

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

The total energy use per produced m^3 of drinking water increased by 7%. This is among others because several water companies have expanded their production process with a softening process. This so-called 'central softening' reduces water scale in water pipes. Customers can use less or no softeners; next to a cost reduction for customers this means lower environmental impact by customers.

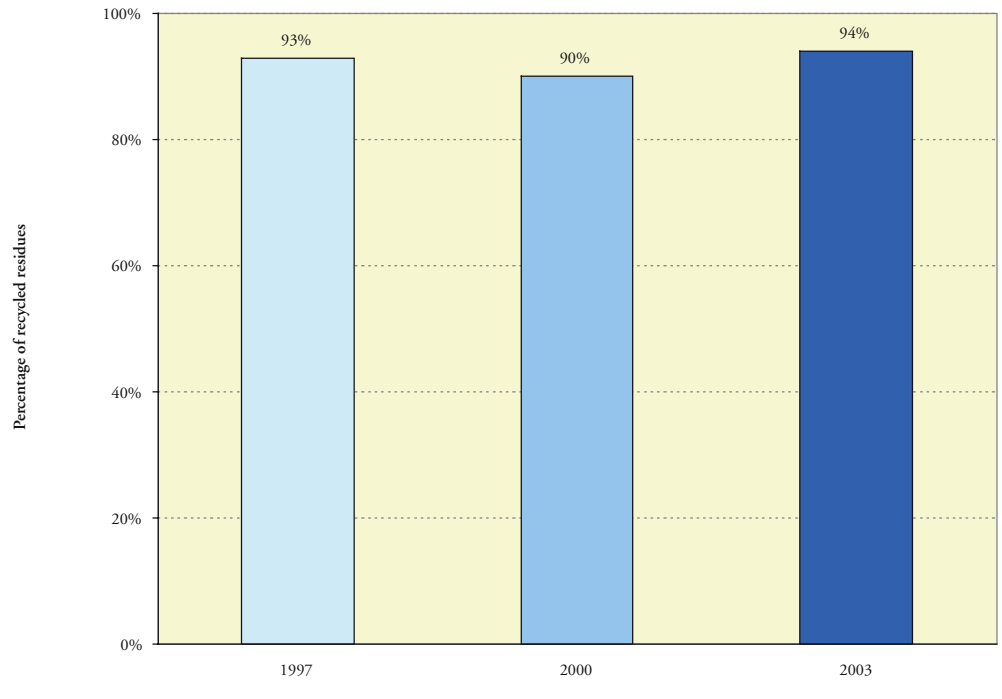
The share of sustainable energy use at sector level has increased from 5% to 25%. Since 1997 the number of water companies that use sustainably-generated energy has grown from 1 to 8.

Figure 20 – In 2003, 94% of the residues was recycled[14].

Type of residue	Production	Recycled	Stored	Destined use after recycling (among others)
Iron sludge groundwater	4,850 ton	63%	37%	Noise barriers, brick industry (colour and clay replacement)
Iron sludge surface water	9,400 ton	74%	26%	Noise barriers, brick industry (colour and clay replacement)
Aluminium sludge	1,540 ton	88%	12%	Noise barriers
Chalk/iron sludge groundwater	2,840 ton	100%	0%	Noise barriers, brick industry (clay substitute)
Chalk sludge from softener	1,470 ton	100%	0%	Agricultural manure, road foundation
Powder coal and coal sludge	1,350 ton	15%	85%	Noise barriers, brick industry (interior wall stones)
Filter material	10,000 ton	100%	0%	Noise barriers, concrete products
Chalk granules	58,700 ton	100%	0%	Steel industry, coal gasification, chalk industry, ground insulation, cattle feed
Total	**90,150 ton**	**94%**	**6%**	

Source: Residues Union, water companies

Figure 21 – The percentage of recycled residues has increased by 1% point compared with 1997.



Source: Residues Union, water companies

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 destinations 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 shareholder in the Residues Union.

Currently, 94% of the residues are recycled (Figure 20). Sludge containing iron, which is created after the rapid filters are rinsed, are 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 that they can be used as raw material, they are used as building material. One such example is the application as filler in a noise barrier, such as along the A15 motorway at Barendrecht.

Raw and building materials must comply with strict environmental protection quality requirements. The Residues Union assesses 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 tackles dehydration and flooding

Both dehydration and flooding are subjects for which the drinking water sector is pro-actively seeking solutions, and is implementing them. This is possible by moving water production locations that are prone to dehydration, or by extracting extra groundwater in excessively flooded areas.

Dehydration

When groundwater is extracted near nature areas which are highly dependent on the groundwater level or the supply of groundwater via the soil, this means dehydration can occur locally.

Next to among others industry and the agricultural sector, water companies also extract water from the ground. The policy objective for the drinking water sector according to the Fourth Policy Document on Spatial Planning means that the growth of extraction of groundwater must be terminated after 2000.

This objective has been achieved. Groundwater extraction on behalf of the drinking water supply fluctuates somewhere around level of 1990. Furthermore, a water company's total groundwater extraction is not related one to one to dehydration because companies move their water collection to less dehydration-sensitive areas and the water supply is compensated. Put differently, the dehydration in a dehydration-sensitive area can decrease while the total extraction flow remains the same.

Several practical examples illustrate the pro-active attitude of water companies with regard to this matter: Brabant Water, for example, has given up 11 million m^3 of permit capacity per year. Vitens and Hydron Midden-Nederland have collectively moved 9 million m^3 production capacity from the Veluwe and Utrechtse Heuvelrug to Flevoland, after previously having moved 5 million m^3 production capacity from the Gooi (Laren) to Eemdijk. With the commencement of operations of the production location at Heel, WML has partly switched from groundwater to surface water; the production location has a capacity of 20 million m^3 per year. PWN has reduced the production of groundwater in the dunes and in the Gooi area by a total of 25 million m^3 annually. A cluster of recovery projects will be executed to speed up the nature restoration, this includes the removal of sods in dune valleys in order to return to the original nutrient low situation (currently some 85 hectares).

For the time being there is no accurate indicator to better map the development of dehydration. During the evaluation of the national dehydration map 2000, it was established that it may be possible to link up to the GGORs (Desired Ground and Surface Water Regime). This is drawn up by the provinces and water boards. It has been agreed in the National Administrative Agreement on Water that these GGORs will be drawn up in the period 2005-2010.

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

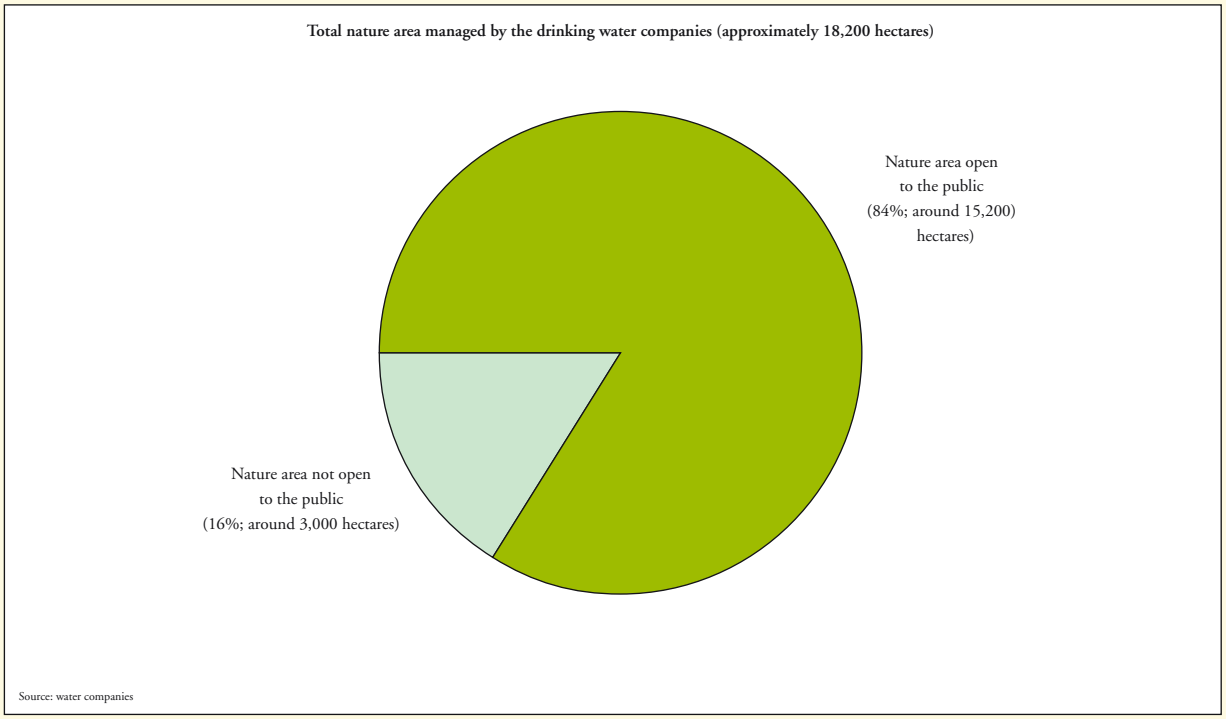
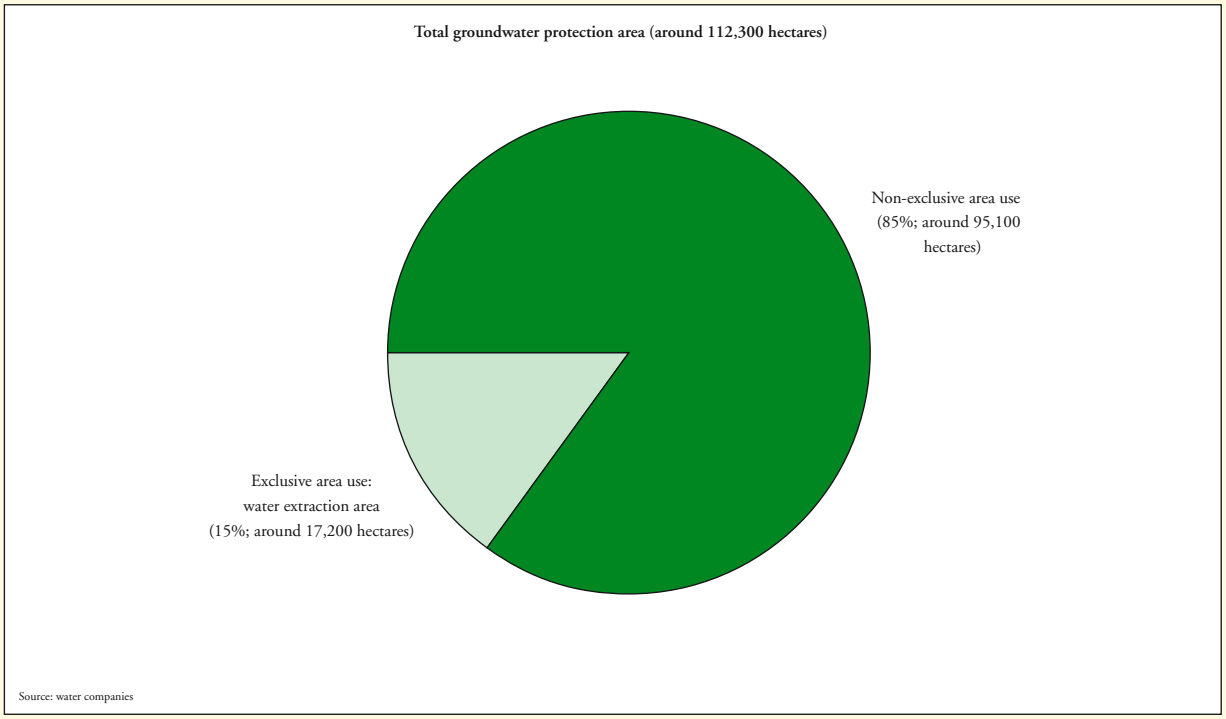


Figure 23 – 85% of the groundwater protection areas of water companies are used for other purposes than water production.



Flooding

Next to dehydration, a high groundwater level is increasingly the focus of attention. This occurs the groundwater level in an urban area is structurally high causing difficulties in current designated use. Water extraction can also play a role here in tackling flooding; by using more groundwater for the drinking water supply in situations with too high groundwater levels.

Brabant Water is investigating the possibilities of extracting more shallow groundwater in Eindhoven during the winter season, to limit the rise in groundwater levels. In Hengelo Vitens is contributing to solving the high groundwater problem by extracting groundwater as a temporary measure when the level becomes too high. As part of the joint initiative, Water Pact Twente, Vitens (together with the Hengelo municipality, Regge and Dinkel water board, and the Province of Overijssel) is seeking more sustainable solutions for high groundwater.

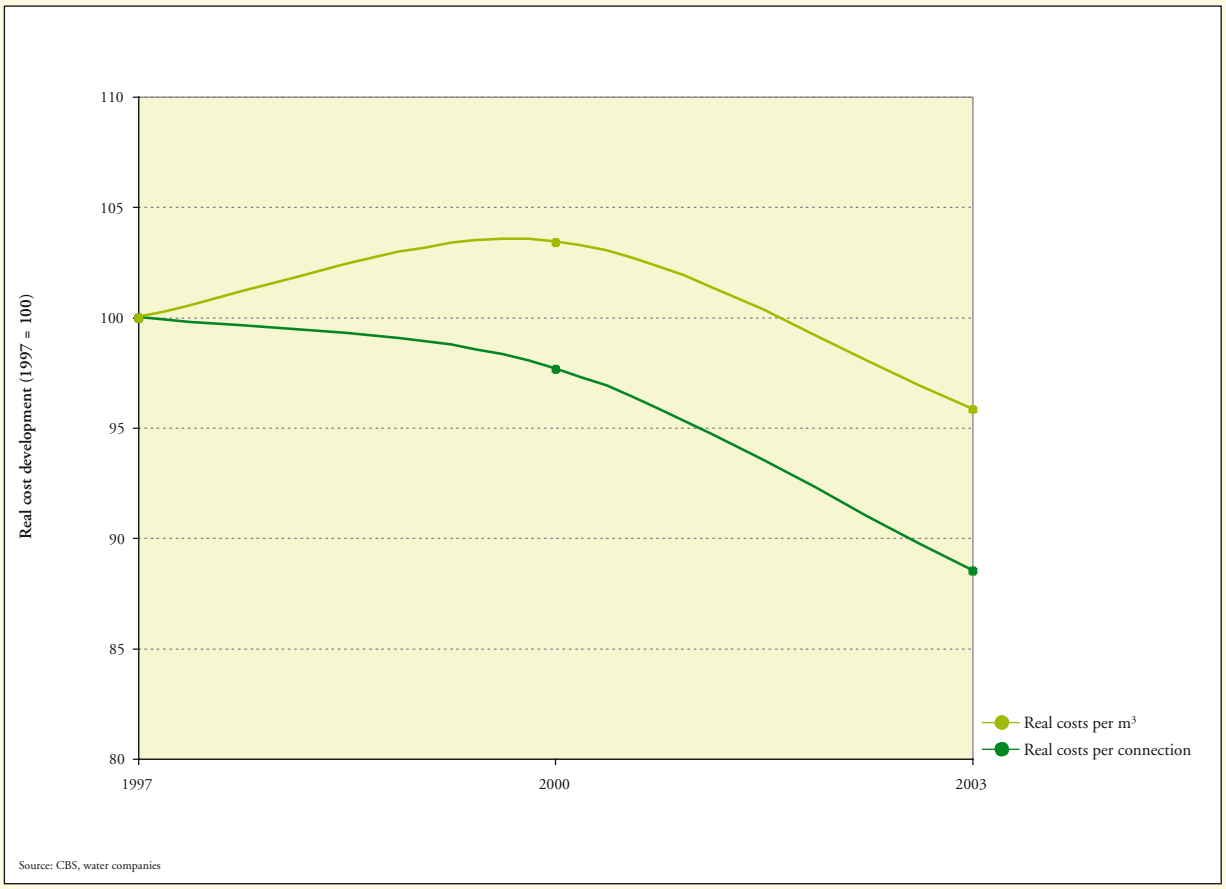
Water companies manage around 18,200 hectares of nature areas in the Netherlands

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.

The total nature area managed by the water companies is around 18,200 hectares. Some 84% of the total nature area managed by the sector is open to the public.

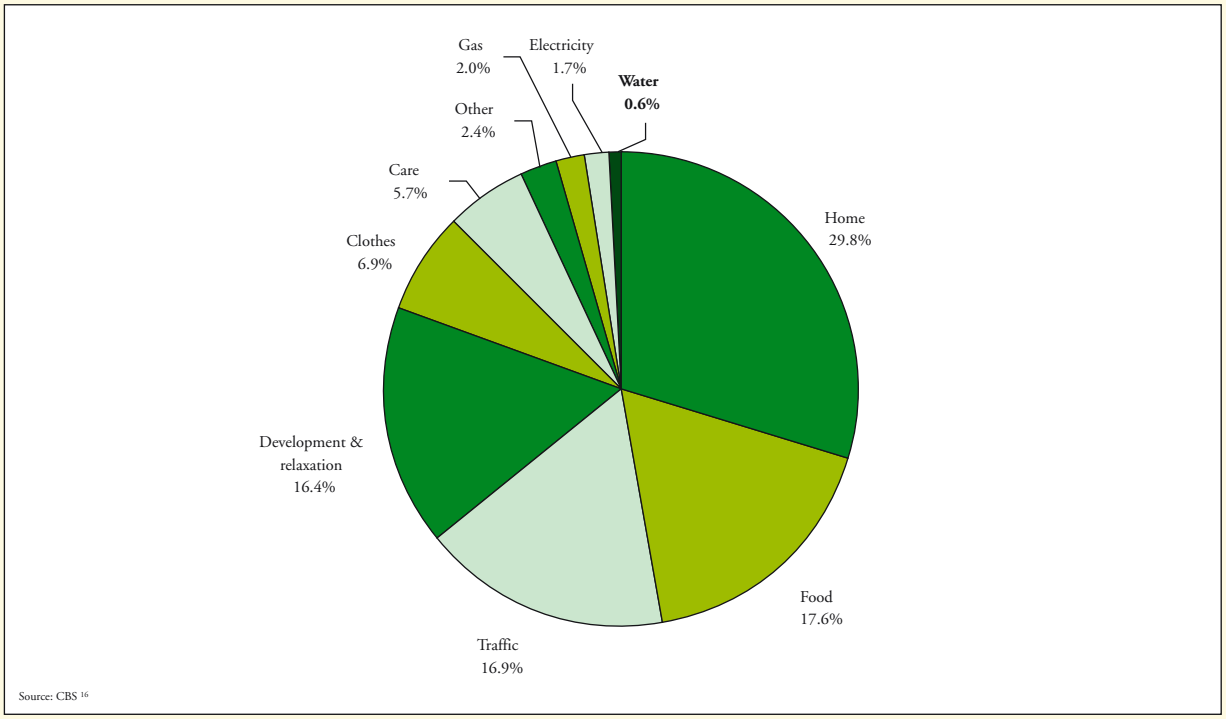
Next to nature areas, water companies work with the much larger groundwater protection areas[15], 85% of which are not exclusively used on behalf of water extraction.

Figure 24 – The costs per connection and per m³ increased by respectively 4.6% and 13.3% since 1997. However, taking into account the inflation correction of 18.2% since 1997, means a realistic reduction in costs on both accounts. After inflation correction the costs have namely dropped by respectively 11.5% and 4.1%.



Source: CBS, water companies

Figure 25 – 0.6% of the average household budget is spent on water.



Source: CBS [16]

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 annual accounts. This comparison is done in two steps:

~ *Company level.* On 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 on this category in the short term, a cost transfer process occurs here: operational costs are allocated to different processes, so that this can be compared at process level.

To make the costs between large and small companies comparable, the costs are expressed per administrative connection[17] and per m^3 of drinking water. 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. Where it says 'costs per m^3', this means cost per supplied m^3 of drinking water.

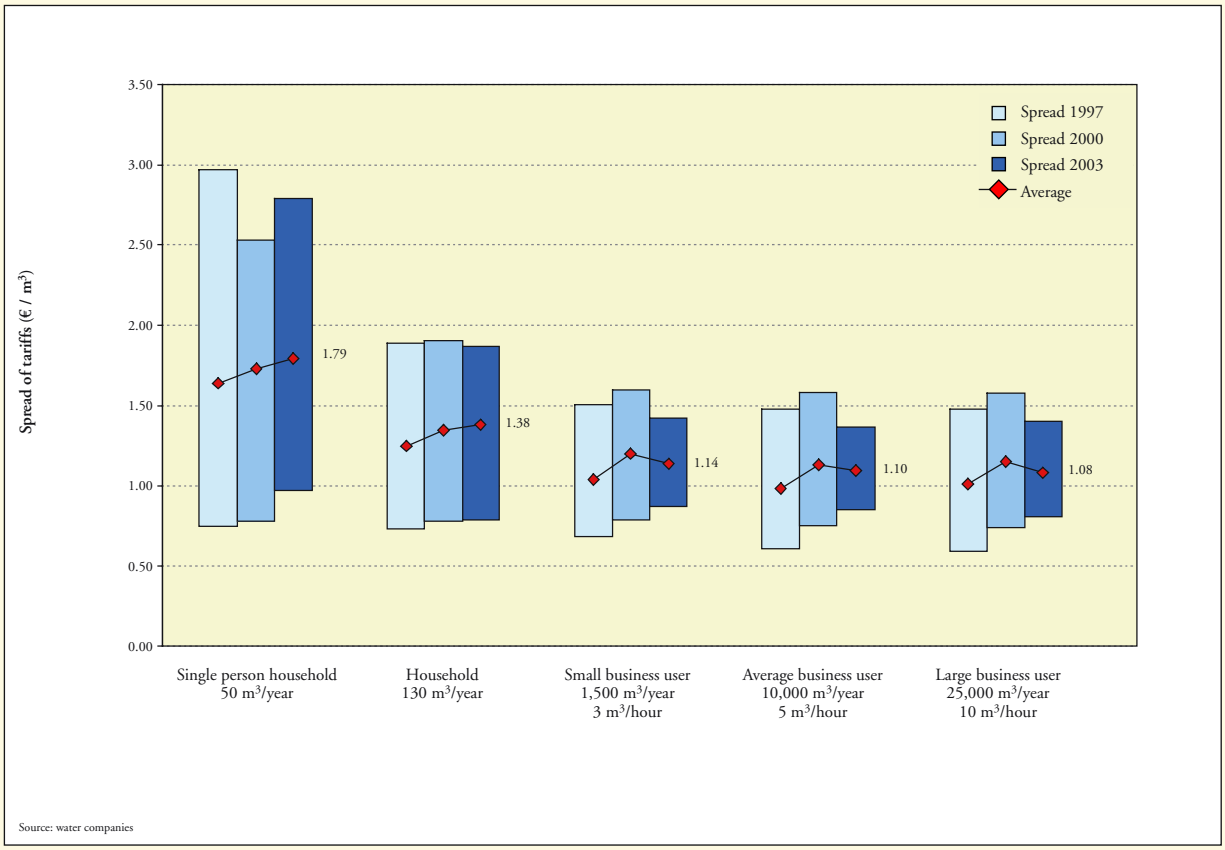
Cost increase of drinking water is below inflation

The costs per connection and per m^3 have respectively increased by 4.6% and 13.3% since 1997. This increase is lower than the inflation of 18.2% since 1997. After inflation correction, there is a real cost decrease of 11.5% per connection or 4.1% per m^3 (Figure 24).

Over the period 1997-2000 the costs per connection increased by 4.4%. 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 less strongly, namely 0.2% per connection and 2.5% per m^3.

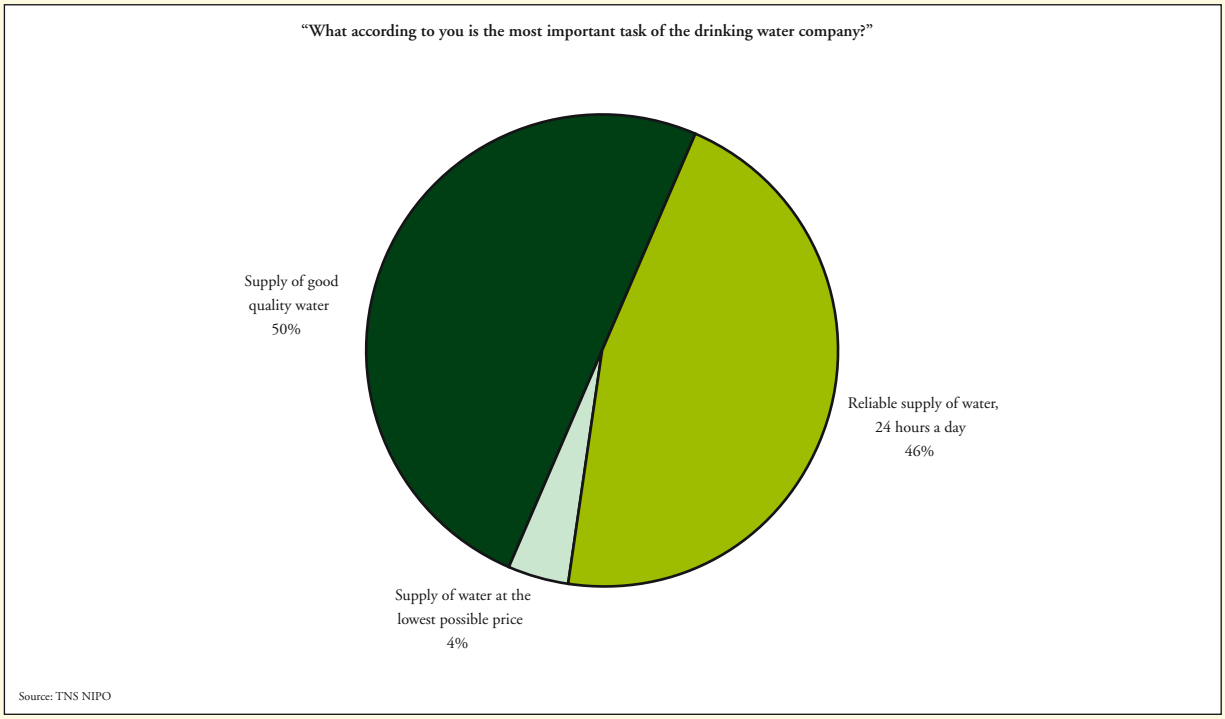
Next to the fact that the increase in costs is lower than inflation, customers' water costs are also low in relation to the average household budget: the share of the average household budget that is spent on water amounts to 0.6% (Figure 25).

Figure 26 – The integral tariffs per m³ are shown in five standard consumer categories. If inflation correction is applied, then the drinking water tariff for the household consumer category (130 m³ per year) dropped by 6.7% and for business users (10,000 m³ per year, or 5 m³ per hour) it dropped by 5.8%. Additionally the spread between water companies decreased with regard to 1997.



Source: water companies

Figure 27 – Customers find water quality and guaranteed supply more important than a low drinking water tariff.



Source: TNS NIPO

Compared to 2000 the drinking water tariffs increased for households and decreased for business users

The drinking water tariffs are compared on the basis of five consumer categories (Figure 26). These are integral tariffs made up of a fixed and a variable component. The consumer categories distinguish themselves on the basis of the annual drinking water use and the throughput capacity of the water. See Appendix D for the drinking water tariffs[18] per supply area.

The average drinking water tariff for a household with usage of 130 m^3 per year is € 1.38. In 1997 and 2000 this respectively amounted to € 1.25 and € 1.34. After inflation correction, the drinking water tariff for this consumer category decreased by 6.7% over the period 1997-2003.

The average drinking water tariff for a business user with a usage of 10,000 m^3 per year (or a capacity of 5 m^3 per hour) is € 1.10. In 1997 and 2000 this respectively amounted to € 0.99 and € 1.13. After inflation correction, the drinking water tariff for this consumer category dropped by 5.8% over the period 1997-2003.

There is a substantial spread in tariffs between the different water companies. The spread for a household for example amounts to € 1.08 per m^3. Since 1997 the spread has decreased for all consumer categories.

Customers consider good quality water and reliable supply the most important

Four percent of the customers consider the supply of water at the lowest possible price, as the water company's most important task (Figure 27). This

Methodology for Finance & Efficiency

The methodology for Finance & Efficiency assumes a closed model, based on the annual accounts of each water company[1]. The focus lies on the supply of drinking water to customers. The revenues and costs of non-drinking water activities[3] are not included.

After the non-drinking water activities have been removed, the turnover is divided over four cost categories: taxes, costs 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 drinking water tax are not included in this benchmark, because water companies only function as intermediary in this respect.*

Cost of capital. *Costs of capital in this respect include reimbursements of debt capital and shareholder equity. In order to keep the financial model closed, the financial result has also been indicated as (negative) costs of capital. In this way the methodology can be abstracted from the financial methods of companies.*

Depreciation. *All depreciation of tangible assets, intangible assets (for example goodwill) and financial fixed assets (for example participation) are included and valued against the historic cost price.*

Operational costs. *These are related to the operational costs of water companies and are divided into cost types such as personnel, materials and temporary workers. These costs are subsequently assigned to six processes (see Figure 41).*

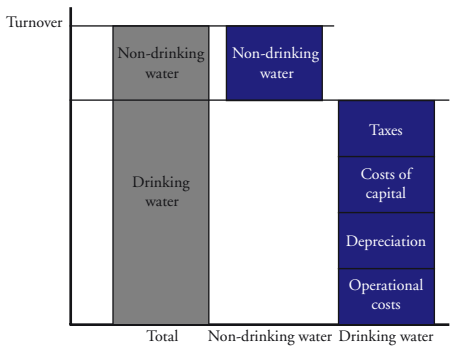


Figure 28 – The total costs per connection amount to an average of € 204, with a spread between water companies of € 64 per connection. The total costs are divided into four cost categories. These categories primarily differ in the way and extent to which they are controllable. In the figure below, a darker shade of blue shows higher costs per category.

	Total costs (€ / connection)	Taxes (€ / connection)	Costs of capital (€ / connection)	Depreciation (€ / connection)	Operational costs (€ / connection)
Wgron	165	31	13	27	94
Hydron-MN	173	30	30	29	85
Brabant Water	180	34	28	26	92
WMD	184	29	35	29	91
Vitens	196	31	44	31	90
WLB	196	6	24	43	122
DZH	210	12	46	53	100
Hydron-Fl	211	33	30	34	114
WML	215	25	51	52	87
PWN	229	3	55	49	
Sector	204	22	43	42	98

Source: water companies

Figure 29 – The average costs amount to € 1.31 per m³, with a spread of € 0.70 per m³. Because the average usage per connection differs between water companies, the picture for a number of companies differs per connection.

	Total costs (€ / m³)	Taxes (€ / m³)	Costs of capital (€ / m³)	Depreciation (€ / m³)	Operational costs (€ / m³)
Wgron	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
Hydron-MN	1.19	0.21	0.21	0.20	0.59
Vitens	1.25	0.20	0.28	0.20	0.57
WLB	1.34	0.04	0.17	0.30	0.83
Hydron-Fl	1.34	0.21	0.19	0.21	0.72
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
Sector	1.31	0.14	0.27	0.27	0.63

Source: water companies

Remark: a water company's total costs are not related one to one to efficiency, as explanatory factors can also play a significant role (see explanatory factors in Appendix E).

while on average customers estimate the price of drinking water too high by a factor of 56 to 96: on average customers think that the price of a litre of drinking water is 9.6 eurocents. In reality prices of a litre of drinking water vary between around 0.10 and 0.17 eurocents.

Spread between water companies amounts to € 64 per connection or € 0.70 per m³

It is possible to give insight in the differences in drinking water tariffs between water companies 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, or by reducing the loss through leaking. However – in the short term – this is not easy for a water company to control.

~ *Costs of capital.* These costs are related to a water company's financial structure. Costs of capital mainly 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 applied depreciation periods. Outside of adjusting these depreciation periods, these costs are not easy to control in the short term.

~ *Operational costs.* These costs are controlled among others through the efficiency of the operational management. In the short the management can have greater control on the operational costs in comparison with other cost categories.

The average costs per connection[19] amount to € 204. The spread varies between € 165 to € 229 per connection. The average costs amount to € 1.31 per m³, with a spread of € 0.70 per m³. Because the average use per connection differs between water companies, the picture differs with regard to the costs per connection.

As figure 28 and figure 29 show, the ranking order on total level is not simply applicable to the underlying cost categories. However, since 1997 there have almost been 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.

Labour productivity in the sector has shown a 33% decrease since 1997

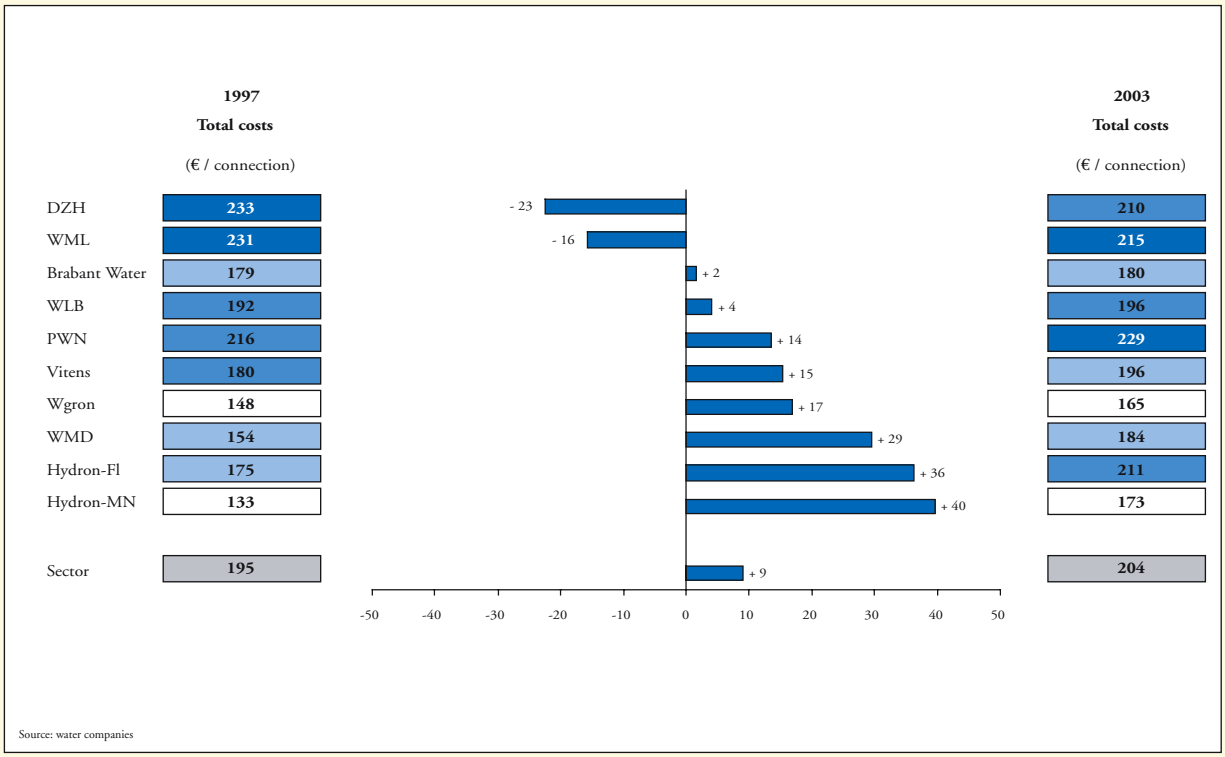
Cost differences between water companies are partially explainable through a number of factors. For the company level the following factors can be identified based on regression analysis:

~ *Production type.* Water companies can be typified based on the type of water they extract[20]. Surface water companies generally have higher total costs per m³ than groundwater companies, because they use a more extensive purification process. These higher costs are mainly found back in the operational costs and in the depreciation.

However, on balance surface water companies extract less groundwater than groundwater companies, and therefore pay less groundwater tax per produced m³ of drinking water. This is partly because surface water companies infiltrate water before extracting it. For the rest these companies directly use surface water for the production of drinking water.

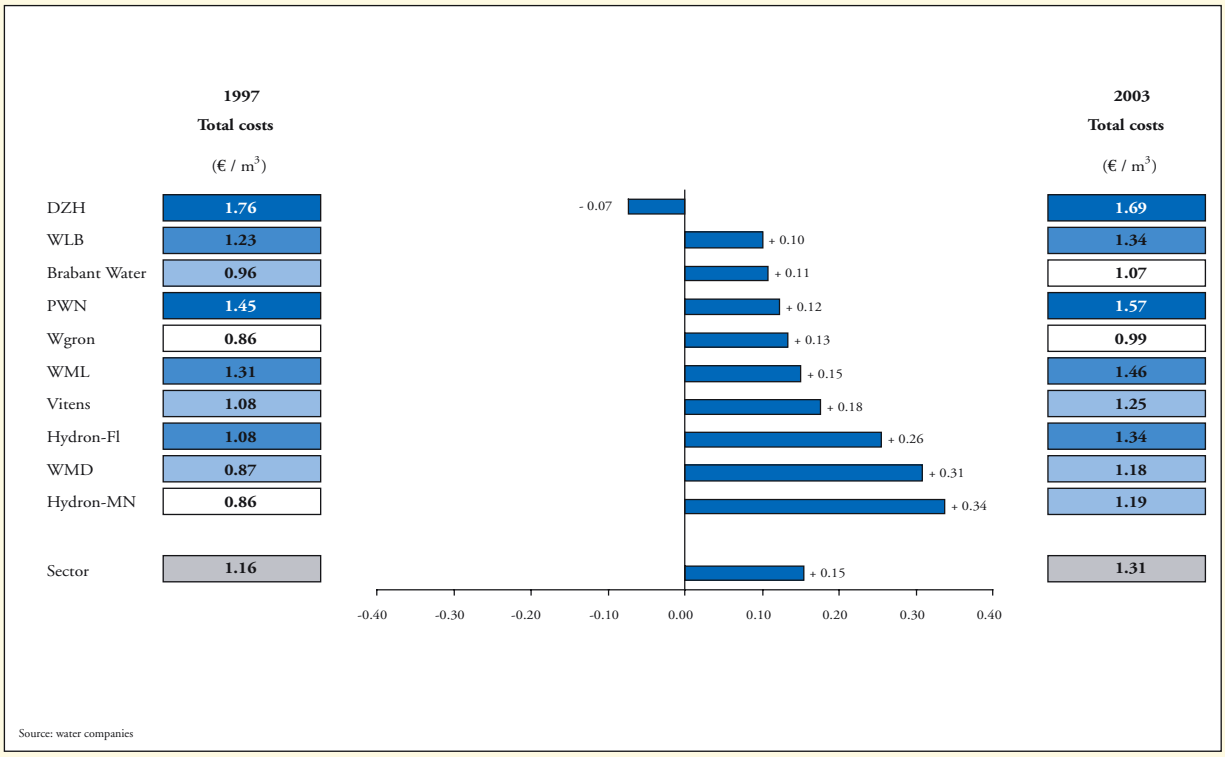
~ *Standard or normalised assets.* As companies use more assets per m³ of supplied drinking water certain costs rise. Depreciation costs, but also costs of capital and total costs per m³ of supplied drinking water increase as companies operate with more standard assets. Although it is sometimes assumed that the value of the standard asset is related to a water company's production type; no connection has been shown between both explanatory factors.

Figure 30 – The spread between the biggest cost increaser and decreaser amounts to € 62 per connection. The total costs per connection increased by an average of € 9 since 1997.



Source: water companies

Figure 31 – 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 € 0.15 since 1997. Because the average usage per connection differs between water companies, the picture deviates with regard to costs per connection.



Source: water companies

~ *Customer size.* The customer size is defined as the average drinking water usage per connection. Companies with a smaller average customer size generally have higher costs, with regard to depreciation and operational costs. Since 1997 the average customer size decreased by 8%, mainly due to water-saving measures.

~ *Network complexity.* The network complexity is the number of technical connections[17] per kilometre of distribution pipe. Depreciation costs and operational costs are higher as the network complexity increases.

~ *Labour productivity.* The labour productivity consists of the number of full time equivalents (FTEs)[21] per 100,000 connections. Companies with higher labour productivity generally have higher operational costs. Since 1997 the average labour productivity in the sector has decreased by no less than 33%. The water companies still supply clean drinking water and the service level has remained the same, in spite of lower full-time employment. The percentage of external employees has increased from 27% to 33%.

The overview of cost categories with the corresponding explanatory factors is shown in figure 32. In Appendix E a diagram has been included per explanatory factor, whereby the corresponding data are shown per water company.

Spread between largest cost increaser and decreaser is € 62 per connection

Figure 30 and Figure 31 show the change in costs per water company since 1997.

Since 1997 the total costs per connection increased by an average of € 9. The spread between the largest cost increaser (€ 40) and decreaser (– € 23) amounts to € 62 per connection. As a result of rounding off, this total is unequal to the sum of its parts.

Since 1997 the total costs per m^3 increased by an average of € 0.15. The spread between the biggest cost increaser (€ 0.34) and decreaser (– € 0.07) amounts to € 0.41 per m^3.

Figure 32 – For the company level a number of explanatory factors have been identified on the basis of regression analysis.

The total costs per m^3 of supplied drinking water are higher with:			
~ More assets per m^3 ~ Smaller customer size ~ Use of surface water with regard to mix, mix with regard to groundwater ~ Higher network complexity			
Taxes per m^3 higher with:	**Costs of capital per m^3 higher with:**	**Depreciation per m^3 are higher with:**	**Operational costs per m^3 are higher with:**
~ Use of groundwater	~ More assets per m^3	~ More assets per m^3 ~ Smaller customer size ~ Use of surface water ~ Higher network complexity	~ Use of surface water ~ Higher network complexity ~ Higher labour productivity ~ Smaller customer size

Figure 33 – The spread of taxes (between the highest and the lowest three) amounts to a factor 8. This is mainly because some water companies use surface water, so that on balance these companies extract less groundwater and pay less groundwater tax.

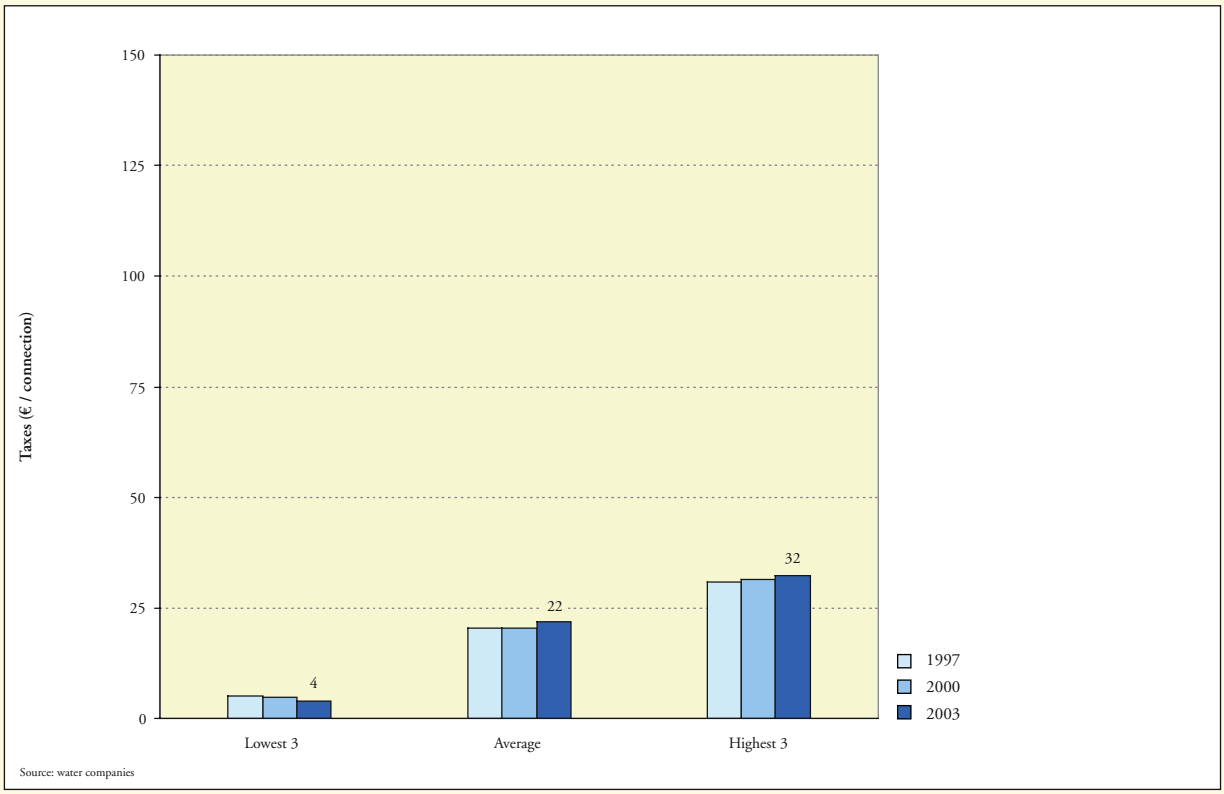
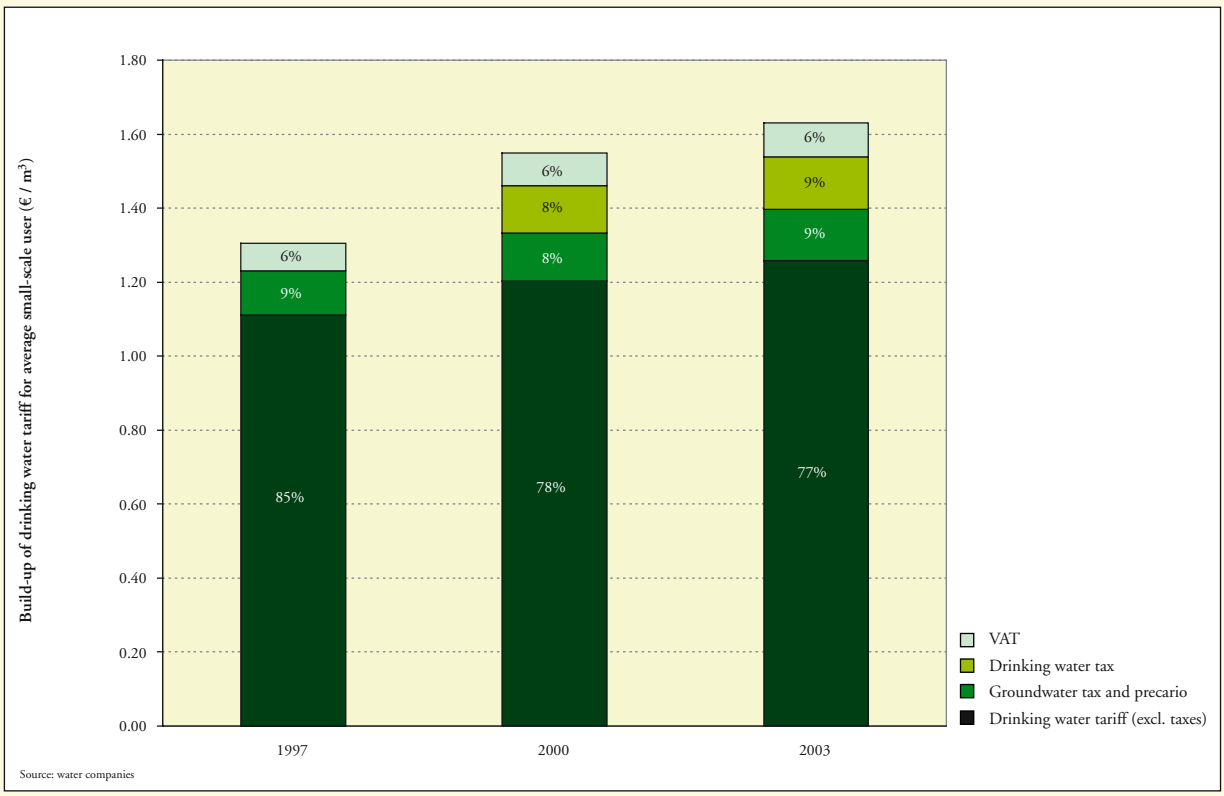


Figure 34 – If the average integral tariff per m³ of supplied drinking water is considered for an average small-scale user, then the tax component has increased from 15% to 23% since 1997.



Difference in taxes is mainly dependent on the production type

Water companies deal with different taxes. Of these taxes the groundwater tax has the greatest effect on a water company's total tax costs.

Precario levies consist of piping and concession compensation and are levied by several municipalities. The drinking water tax – introduced in 2000 – and VAT are shown in figure 34 only for the sake of completeness, but are not included in the rest of the benchmark, because water companies here are only transferring others' charges on.

The average taxes amount to € 22 per connection. A huge spread exists between water companies with regard to the amount of taxes. Figure 33 shows that the tax component of the three companies with the lowest taxes amounts to an average of € 4 per connection, while the tax component of the three companies with the highest taxes averages € 32 per connection. This difference can be explained because on balance surface water companies extract less groundwater and therefore pay less groundwater tax.

Figure 34 shows that for an average small-scale user the tax component amounts to 23% of the average integral drinking water tariff, or € 0.37 per m^3. In 1997 this component amounted to 15% of the average integral drinking water tariff.

Figure 35 – Since 1997 the average costs of capital have practically remained the same.

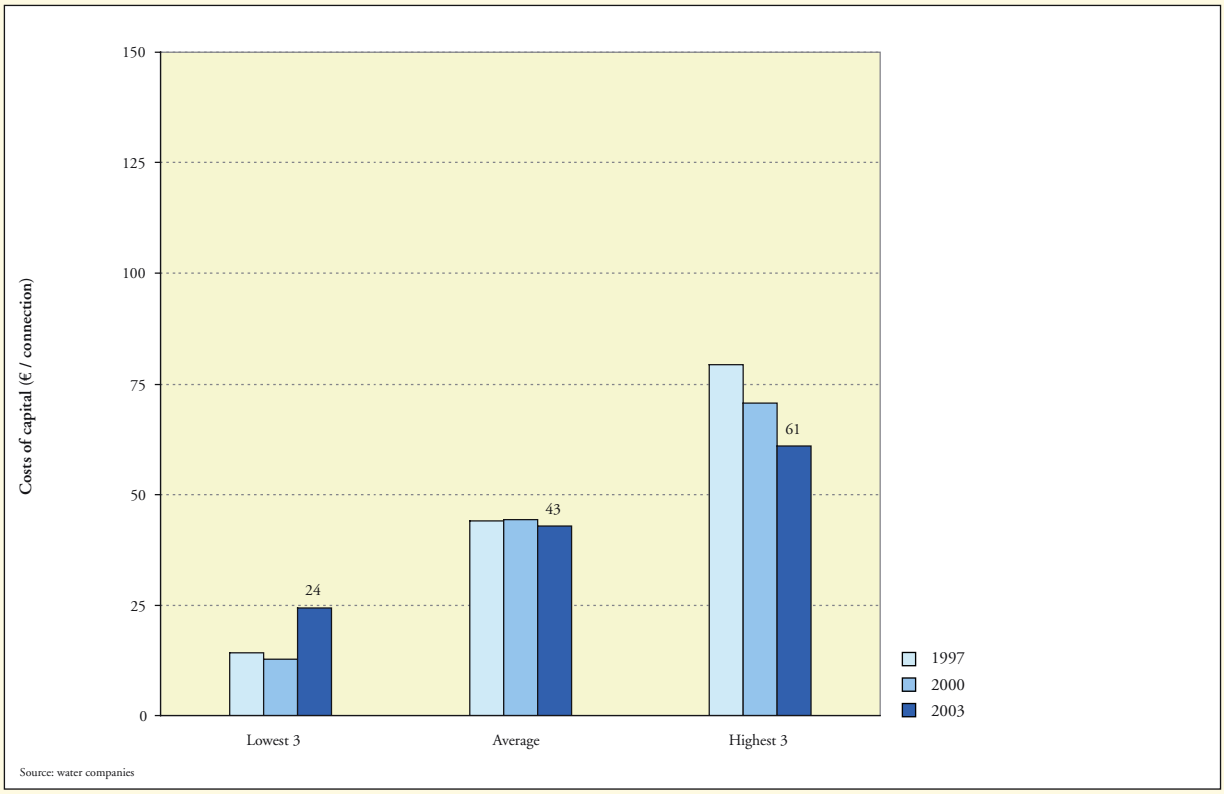
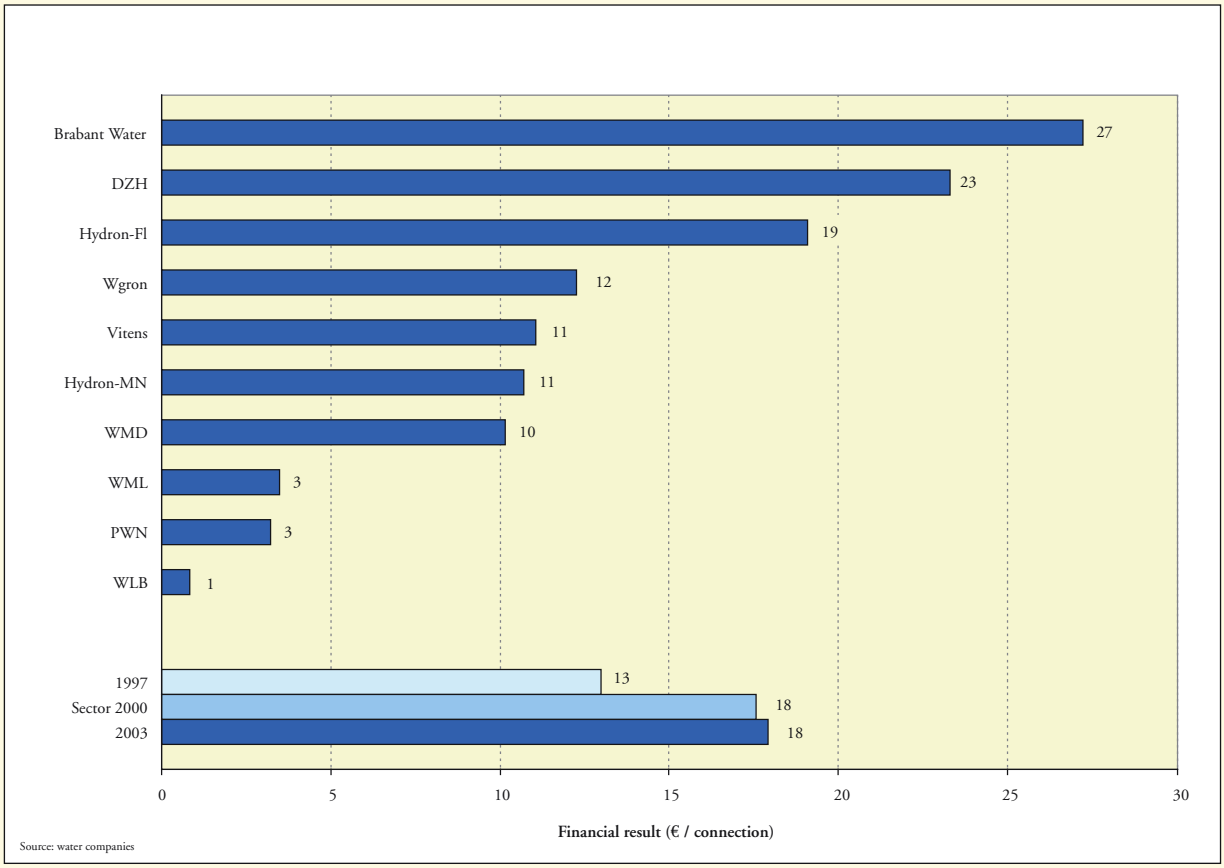


Figure 36 – The average financial result amounts to € 18 per connection[22].



Since 1997 the spread in costs of capital have decreased by 44%

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 € 43 per connection have practically remained the same. The spread between the water companies with the lowest and highest costs of capital has shown a strong decrease of 44%, or € 29 per connection since 1997.

Figure 36 shows the financial result per connection[22]. The spread between water companies amounts to € 26 per connection: Brabant Water's financial result amounts to € 27 per connection, while the financial result per connection at WLB amounts to € 1. The sector's average financial result amounts to € 18 per connection.

The hard solvency is the percentage of the shareholder equity in relation to the total capital[23]. The average solvency in the drinking water sector has increased from 14% to 20% since 1997. The spread between water companies ranges between 3% and 31%. WLB has a relatively low solvency, because the company's financing is related to that of the municipality.

Figure 37 – The average solvency in the drinking water sector has increased from 14% to 20% since 1997.

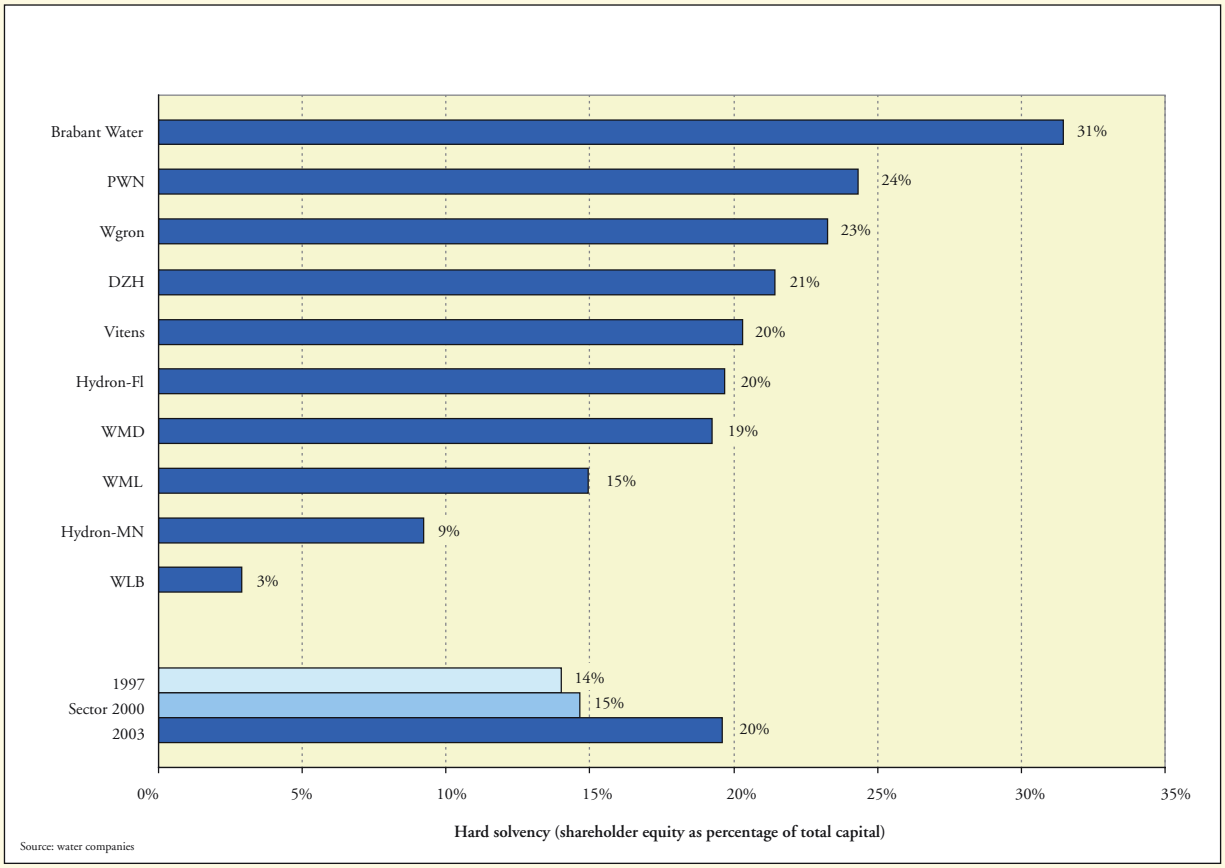


Figure 38 – The depreciation has been shown a virtually stable picture since 1997: the average fluctuates around € 40 per connection while the spread amounts to a factor of two.

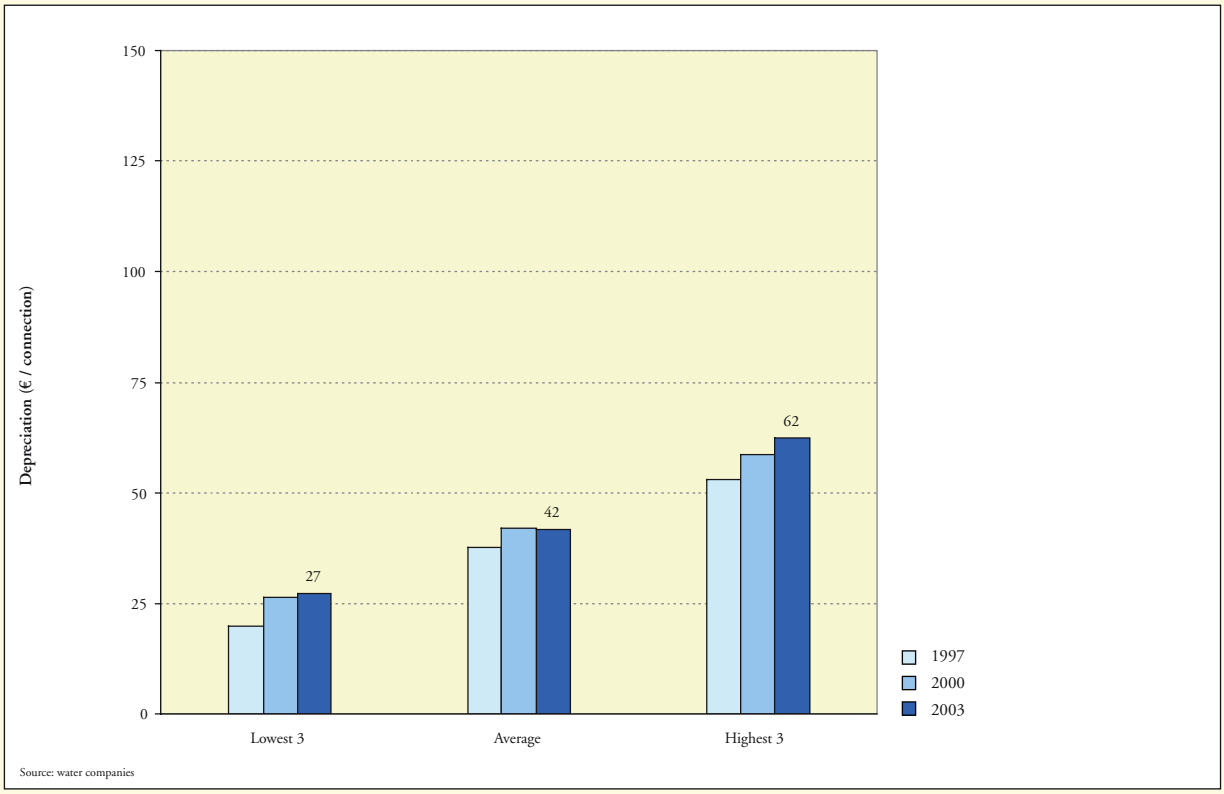
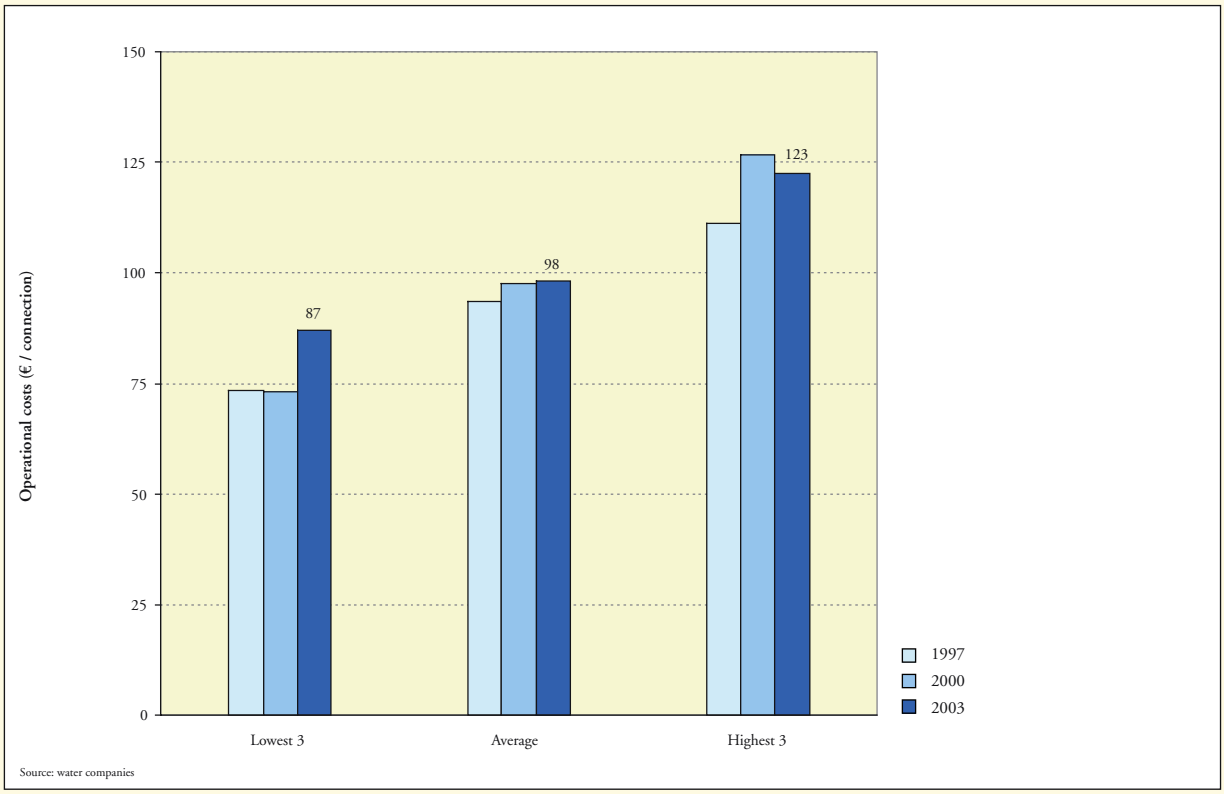


Figure 39 – The spread between the three water companies with the lowest and highest operational costs has decreased by 5% since 1997.



Depreciation remains stable

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

In 2003 the average depreciation was € 42 per connection, an 11% increase compared to 1997. The spread between water companies amounts to a factor of over two.

Since 1997 the operational costs per connection have shown a nominal increase of 5% and a real reduction of 11%

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

The average operational costs amount to € 98 per connection. After inflation correction, the operational costs have shown an 11% drop since 1997.

Since 1997 the spread between water companies dropped by 5%, or € 2 per connection. This is mainly due to the fact that companies which had the lowest and highest operational costs in 1997 have merged.

The operational costs consist of 38% personnel costs and 47% of services by third parties. The share of third-party services in the operational costs has increased by 4 percentage points since 1997 (figure 40).

Figure 40 – Since 1997 the share of third-party services in the operational costs has increased by 4 percentage points.

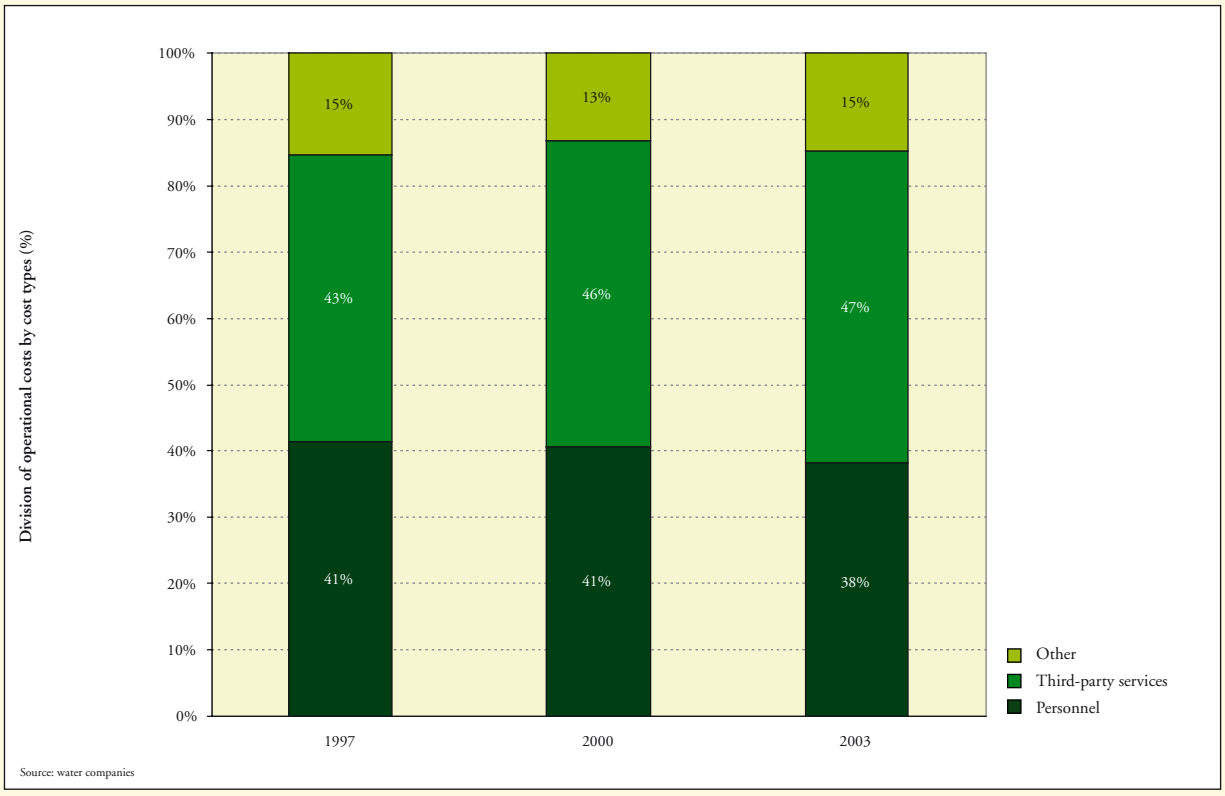


Figure 41 – In order to compare water companies, the operational costs are first corrected on a number of aspects, and subsequently assigned to six processes.

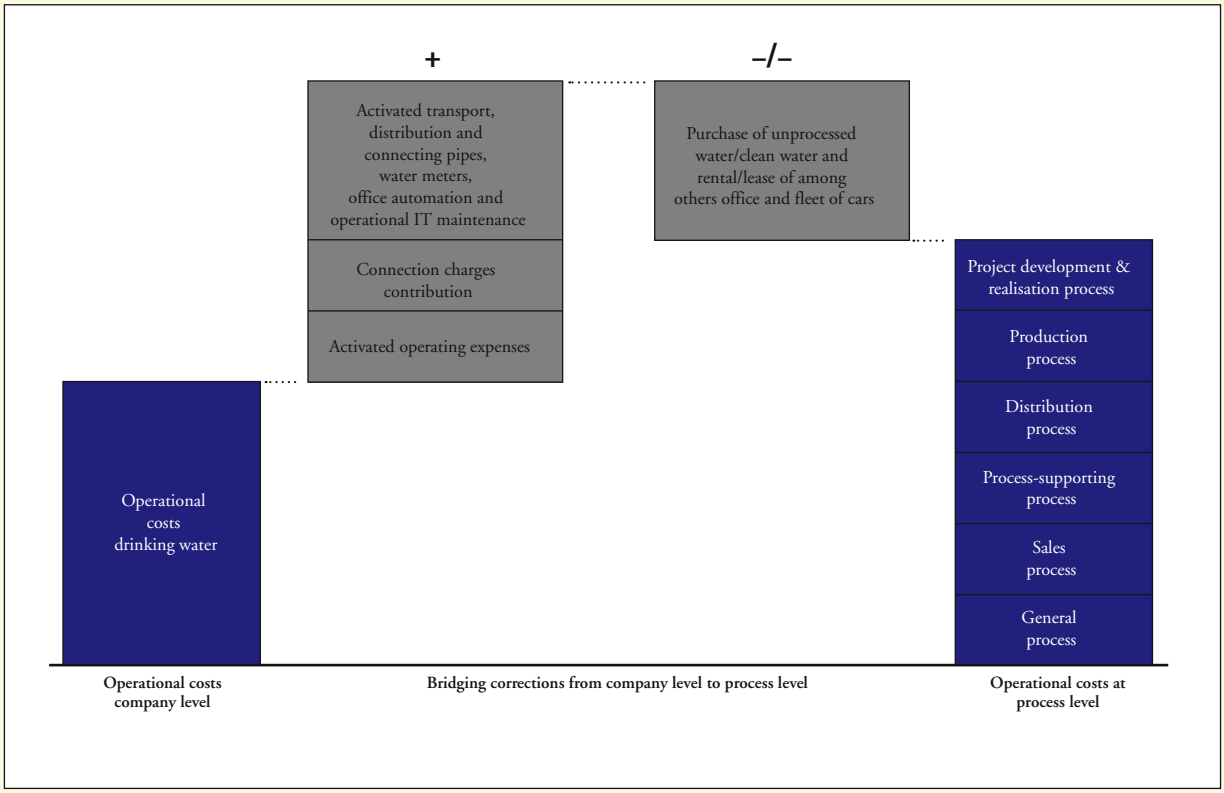
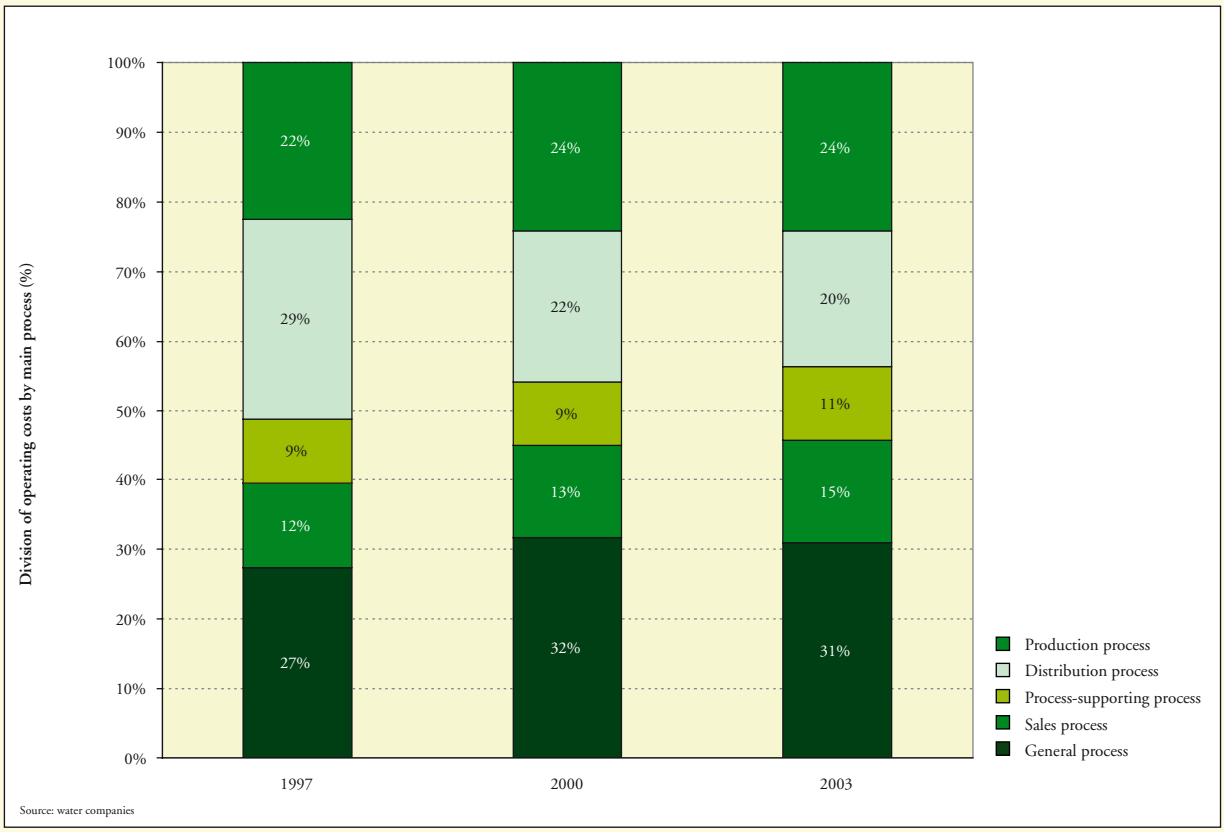


Figure 42 – Since 1997 the share of the distribution process has shown a decrease in the total operating costs. The share of the other processes has increased.



Since 1997 the share of distribution costs have dropped with regard to other costs

To make water companies' operational costs comparable on a more detailed level, these are assigned to six processes. Because water companies apply different accounting methods, the operational costs are first corrected on a number of aspects[24] (figure 41). Applying the corrections makes it possible to better compare the operational costs of water companies.

The project development & realisation process comprises all activities which are aimed at the development and realisation of projects (investments), for example the construction and replacement of pipes.

Because investments fluctuate from year to year and differ per water company, part of this process is benchmarked. Appendix F shows the results of four sub-processes related to the construction and replacement of connecting and distribution pipes.

In the benchmark the production process, distribution process, process-supporting process, sales and general process combined make up the operating processes. Figure 42 shows that the share of the distribution process compared to all operating processes has decreased by 9 percentage points since 1997.

Figure 43 – The spread in production costs amounts to € 0.11 per produced m³ of drinking water. Companies generally have a higher energy consumption per m³, and higher production costs.

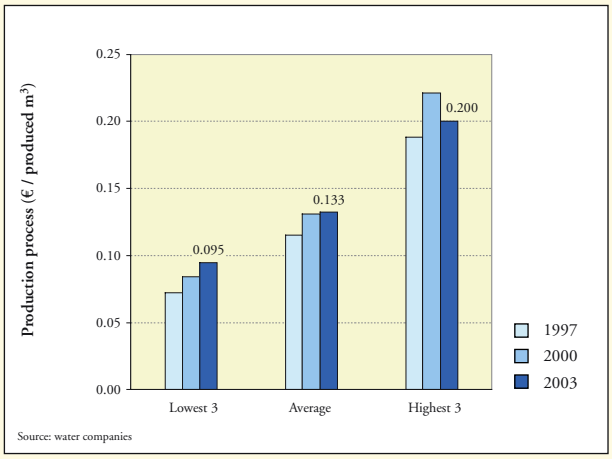


Figure 44 – Since 1997 the average costs of the distribution process have steadily decreased[25]. On top of this the spread in the sector also decreased from a factor of 3.5 to a factor of 1.8.

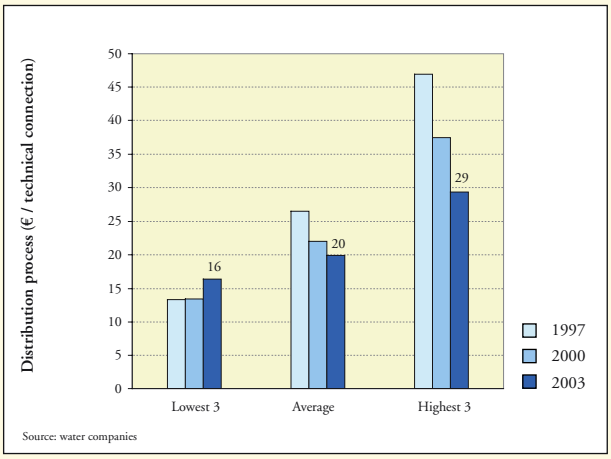


Figure 45 – The relation between the average of the lowest three and highest three companies in the process-supporting process amounts to a factor of 3.6.

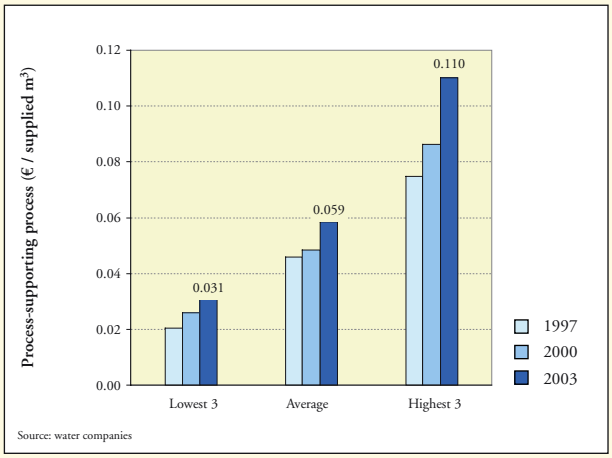


Figure 46 – Compared to 1997 the costs of the sales process in 2003 were 24% higher on average, mainly due to higher costs for invoicing and debt collection.

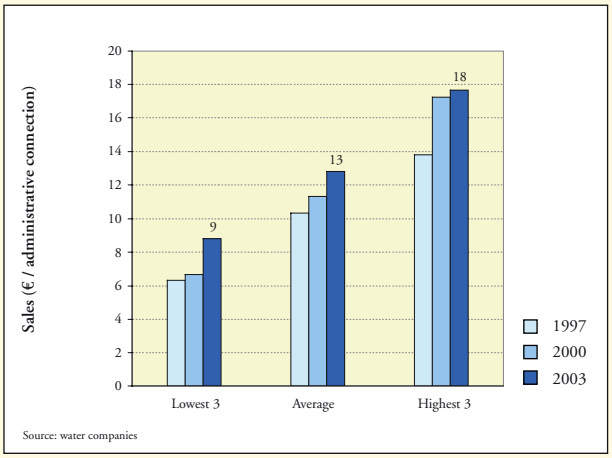
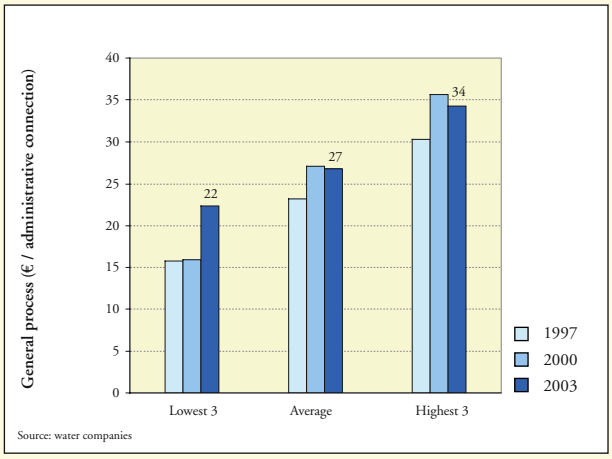


Figure 47 – The average costs of the general process showed a 16% increase since 1997.



The following aspects deserve extra attention per operating process:

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

The production costs of a water company amount to average of € 0.13 per produced m^3. These costs have increased by 15% since 1997. The spread between the three lowest and three highest companies per produced m^3 is a factor 2.1. In general companies with a higher energy consumption per m^3 also have higher production costs. The average energy costs amount 22% of the production costs.

~ *Distribution process.* This process comprises all activities related to the maintenance of mains, connecting pipes and replacement of waters.

Since 1997 the average distribution costs have decreased by 25% to € 20 per technical connection. On top of that the spread in the sector has increased from a factor of 3.5 to a factor of 1.8.

~ *Process-supporting process.* This process consists of managing the water-extraction and water-protection areas and controlling the water quality.

The average costs of the process-supporting process amount to € 0.06 per supplied m^3. This is an increase of 27% compared to 1997. The relation between the average of the lowest three and highest three companies in 2003 is a factor 3.6.

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

The sales costs of an average water company amount to € 13 per administrative connection. Compared to 1997 these are 24% higher in 2003. This increase is mainly due to the increase of the invoicing costs. The spread amounts to a factor 2.0.

~ *General process.* This process consists of activities with a company-wide supporting function.

The costs of the general process average € 27 per administrative connection, and increased by 16% since 1997. The spread amounts to a factor of 1.5.

Figure 48 – Water companies' supply areas in the Netherlands[4].

Appendices

Appendix A

Figure 49 – Overview of all water companies stating several characteristics (annual averages) in the reference year 2003.

Company name (abbreviation)	Company (in full)	Administrative connections (x1000)	Drinking water supplied (million m^3)	Drinking water turnover (million €)	Employees (FTE)**
Brabant Water	Brabant Water N.V.	932	157	168	705
Delta*	N.V. Delta	218	36	49	39
Doorn*	N.V. Bronwaterleiding Doorn	4	1	1	4
DZH	N.V. Duinwaterbedrijf Zuid-Holland	570	71	120	519
Hydron-Fl	N.V. Hydron Flevoland	117	18	25	96
Hydron-MN	N.V. Hydron Midden-Nederland	535	77	92	387
Hydron-ZH*	N.V. Hydron Zuid-Holland	316	48	70 ***	220
PWN	N.V. PWN Waterleidingbedrijf Noord-Holland	704	103	161	523
TWM*	N.V. Tilburgsche Waterleiding-Maatschappij	90	13	10	88
Vitens	Vitens N.V.	1,598	250	313	968
WBE*	N.V. Waterbedrijf Europoort	741	140	173	454
Wgron	N.V. Waterbedrijf Groningen	270	45	45	224
WLB	Waterleidingbedrijf Amsterdam	478	70	94	511
WMD	N.V. Waterleidingmaatschappij Drenthe	186	29	34	145
WML	N.V. Waterleiding Maatschappij Limburg	509	75	109	446
Total		**7,268**	**1,133**	**1,464**	**5,330**

* These companies have not participated in A view of Water 2003. These are estimated figures.

** Concerns employees involved in drinking water activities, excluding external employees.

*** Concerns the 'net turnover'; for more information please refer to the annual accounts of Hydron Zuid-Holland.

Source: water companies

Appendix B

Figure 50 – Overview of all parameters included in the Water Quality Index for the reference year 2003 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
	Copper solving capacity	Saturation index	Sodium
	Nickel	Temperature	Sulphate
	Nitrate	Hydrogen carbonate	Degree of turbidity
	Nitrite	pH value	
	PACs	Oxygen	
	Crop protection agents		
	Tetra- and trichloroethylene		
	Trihalomethanes		

Appendix C

Overview of the costs per connection and per m^3 in 1997 and 2000. Water companies which have merged since 1997, have also been integrated in the figures and, as such, have been made comparable.

Figure 51 – Costs per connection in 1997.

	Total costs (€ / connection)	Taxes (€ / connection)	Costs of capital (€ / connection)	Depreciation (€ / connection)	Operational costs (€ / connection)
Hydron-MN	133	28	9	21	75
Wgron	148	27	13	16	92
WMD	154	28	29	23	76
Hydron-Fl	175	31	34	34	77
Brabant Water	179	31	31	27	90
Vitens	180	28	28	34	91
WLB	192	4	43	42	102
PWN	216	6	46	52	112
WML	231	28	79	37	86
DZH	233	10	84	44	95
Sector	195	20	44	38	93

Source: water companies

Figure 52 – Costs per m^3 in 1997.

	Total costs (€ / m^3)	Taxes (€ / m^3)	Costs of capital (€ / m^3)	Depreciation (€ / m^3)	Operational costs (€ / m^3)
Hydron-MN	0.86	0.18	0.06	0.13	0.48
Wgron	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	1.08	0.16	0.17	0.21	0.54
Hydron-Fl	1.08	0.19	0.21	0.21	0.47
WLB	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
DZH	1.76	0.08	0.64	0.33	0.72
Sector	1.16	0.12	0.26	0.22	0.55

Source: water companies

Figure 53 – Costs per connection in 2000

	Total costs (€ / connection)	Taxes (€ / connection)	Costs of capital (€ / connection)	Depreciation (€ / connection)	Operational costs (€ / connection)
Wgron	147	26	6	26	88
Hydron-MN	152	29	16	27	79
WMD	165	26	25	26	87
Hydron-Fl	180	30	27	39	83
Vitens	190	27	37	34	92
WLB	198	6	40	42	110
Brabant Water	204	32	44	48	80
WML	221	26	59	38	98
DZH	229	11	81	40	96
PWN	241	5	53	57	126
Sector	204	20	44	42	97

Source: water companies

Figure 54 – Costs per m^3 in 2000.

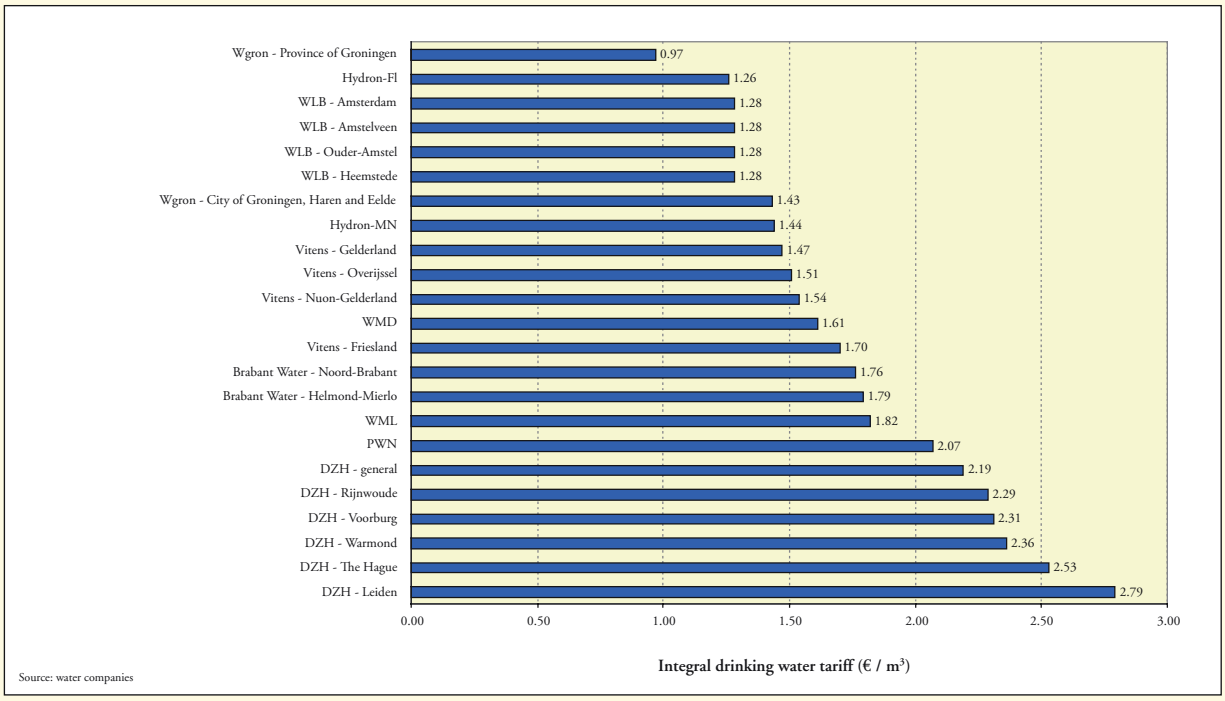
	Total costs (€ / m^3)	Taxes (€ / m^3)	Costs of capital (€ / m^3)	Depreciation (€ / m^3)	Operational costs (€ / m^3)
Wgron	0.90	0.16	0.04	0.16	0.54
Hydron-MN	1.01	0.19	0.11	0.18	0.53
WMD	1.06	0.17	0.16	0.17	0.56
Hydron-Fl	1.10	0.19	0.17	0.24	0.51
Brabant Water	1.19	0.19	0.26	0.28	0.47
Vitens	1.19	0.17	0.23	0.21	0.58
WLB	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
DZH	1.78	0.08	0.63	0.32	0.75
Sector	1.28	0.13	0.28	0.26	0.61

Source: water companies

Appendix D

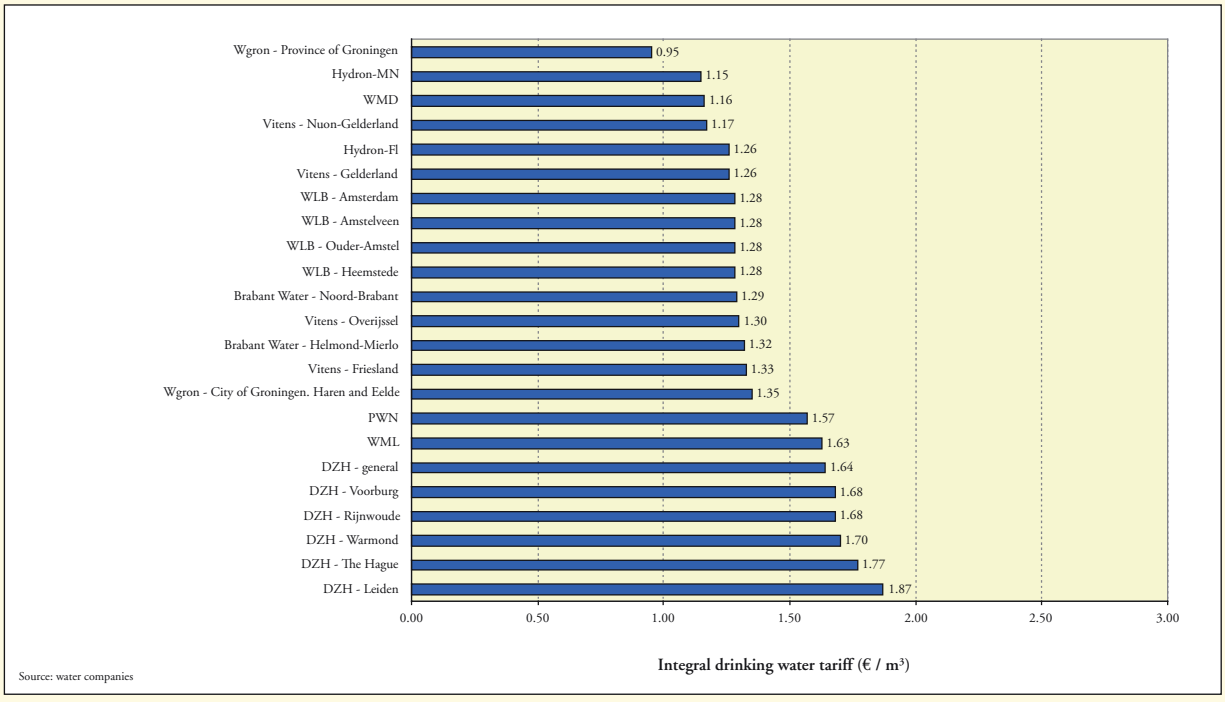
Overview of the integral drinking water tariffs at the end of 2003 which the water companies apply in the different tariff areas[18]. 'Integral' tariffs means that any fixed components are discounted in a variable tariff. These tariffs are shown on the basis of five standard consumer categories in terms of annual drinking water usage and throughput capacity of the water meter.

Figure 55 – Consumer category of a single person household (usage 50 m³/year).



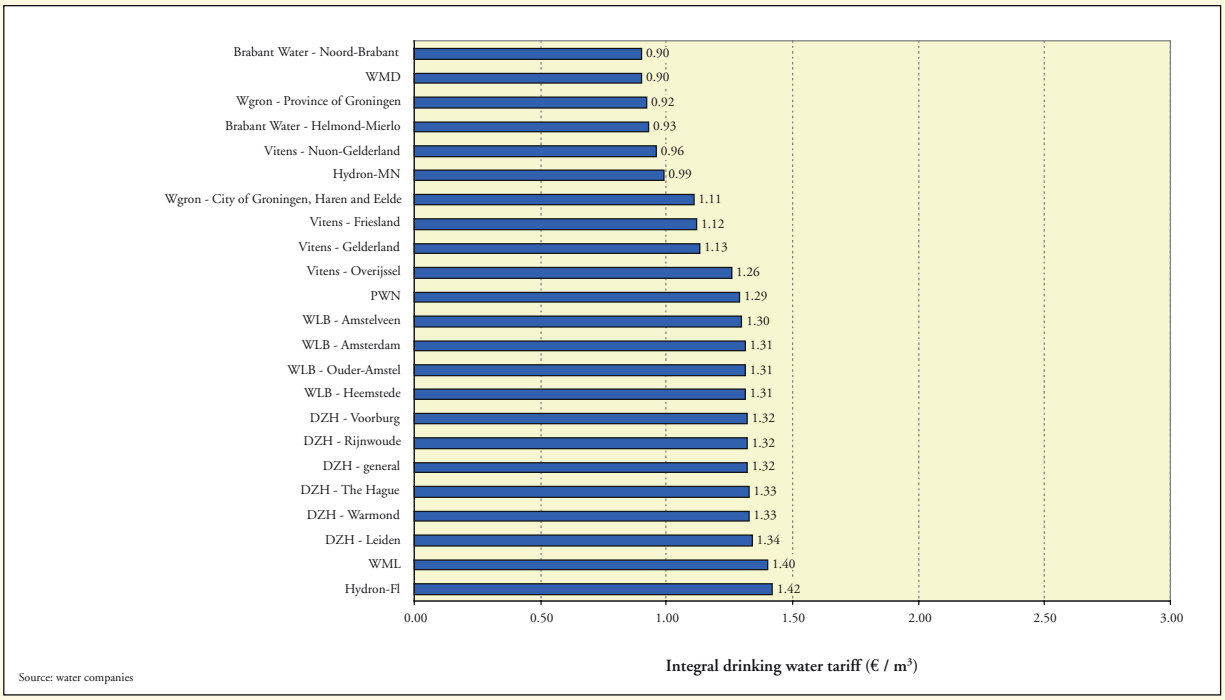
Source: water companies

Figure 56 – Consumer category of a household (usage 130 m³/year).



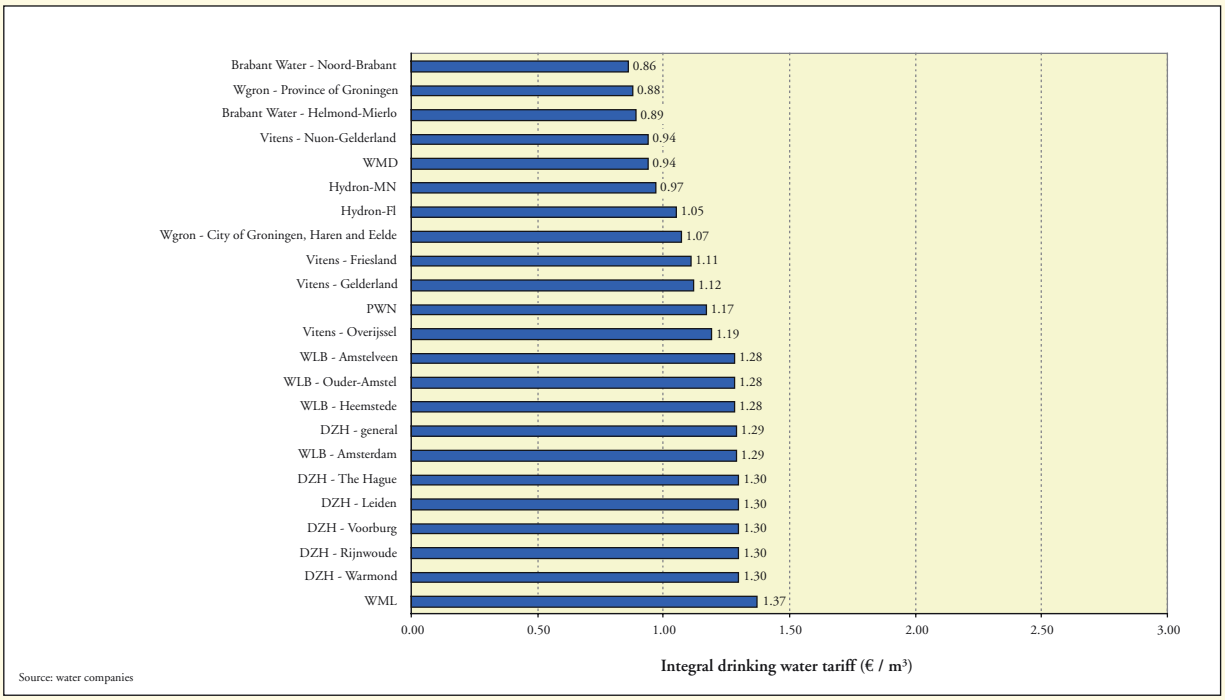
Source: water companies

Figure 57 – Consumer category small business user (usage 1,300 m³/year, water meter capacity 3 m³/hour).



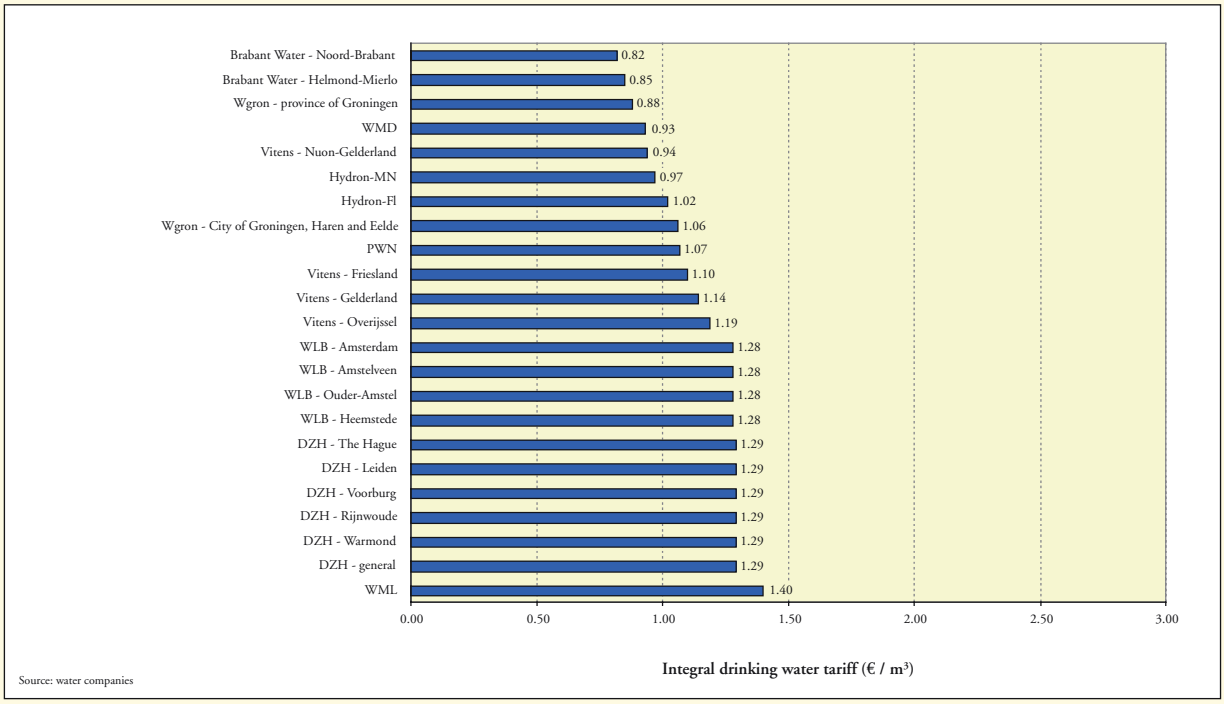
Source: water companies

Figure 58 – Consumer category of the business user (usage 10,000 m³/year, water meter capacity 5 m³/hour).



Source: water companies

Figure 59 – Consumer category of the large business user (usage 25,000 m³/year, water meter capacity 10 m³/hour).



Source: water companies

Appendix E

Overview of the explanatory factors with the cost categories.

Figure 60 – Explanatory factor production type: groundwater companies face higher taxes per m³ of produced drinking water. Surface water companies have higher operational and depreciation costs.

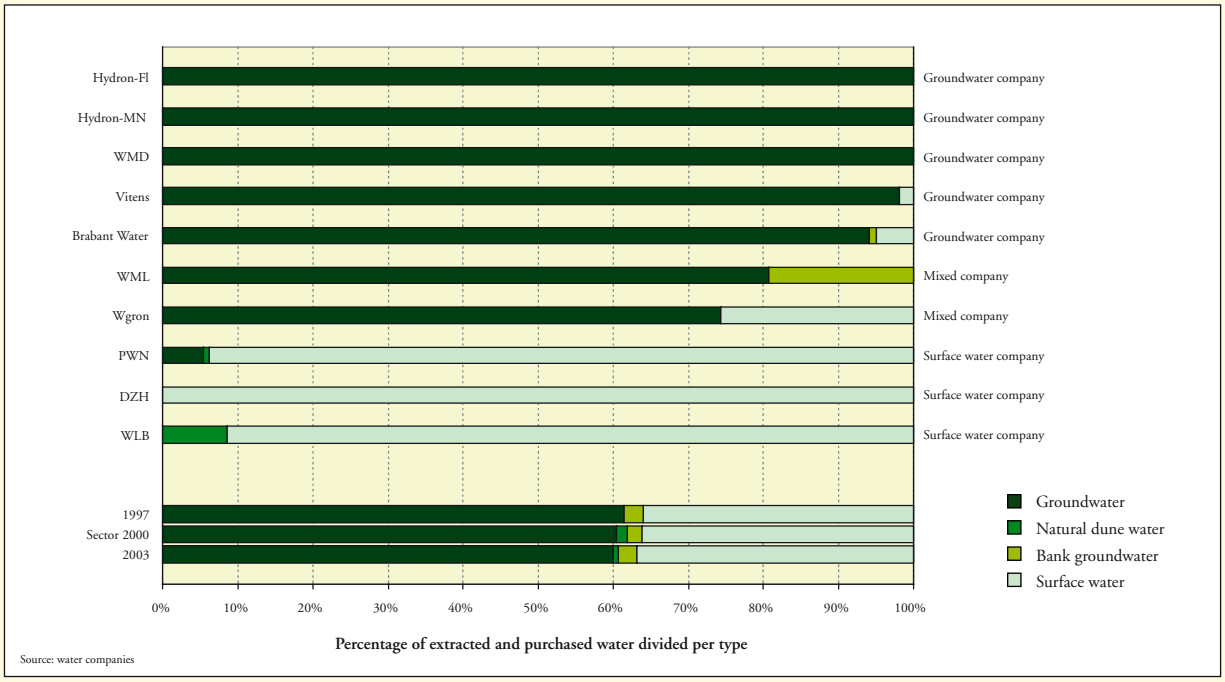


Figure 61 – Explanatory factor standard assets: mainly depreciation costs, but also costs of capital and total costs per m³ supplied drinking water, are higher as companies have more assets per m³ supplied drinking water. There is no correlation between standard assets and the production type.

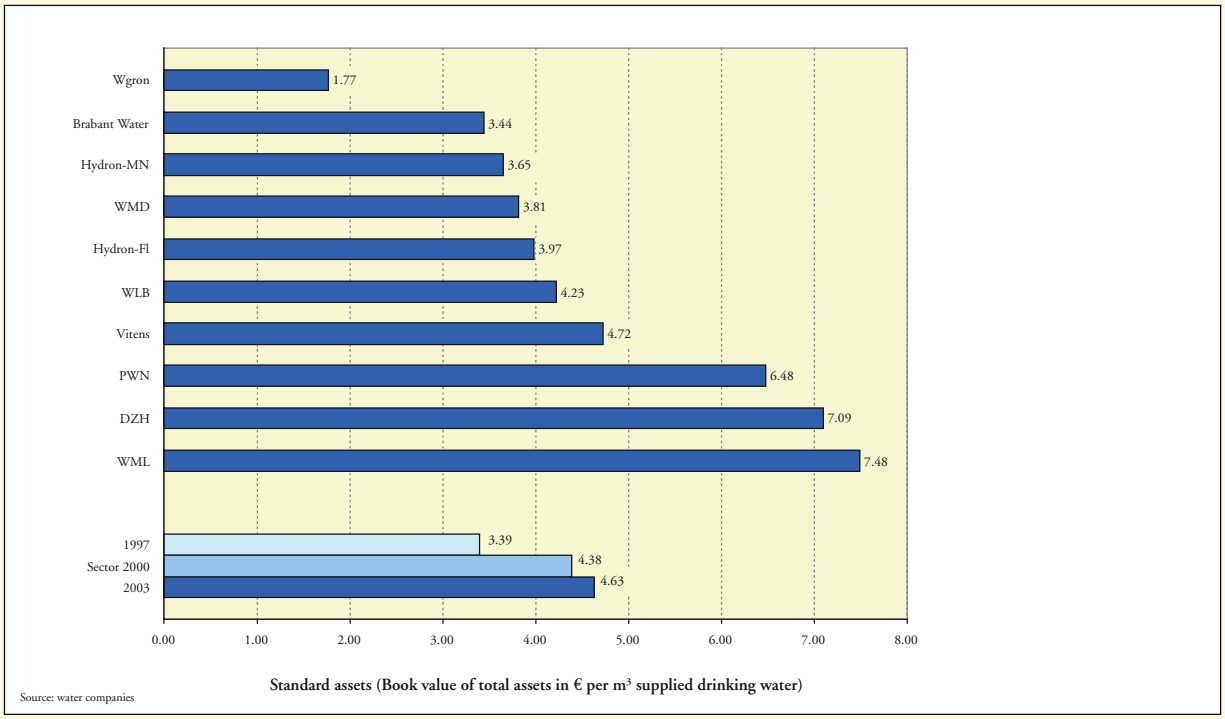
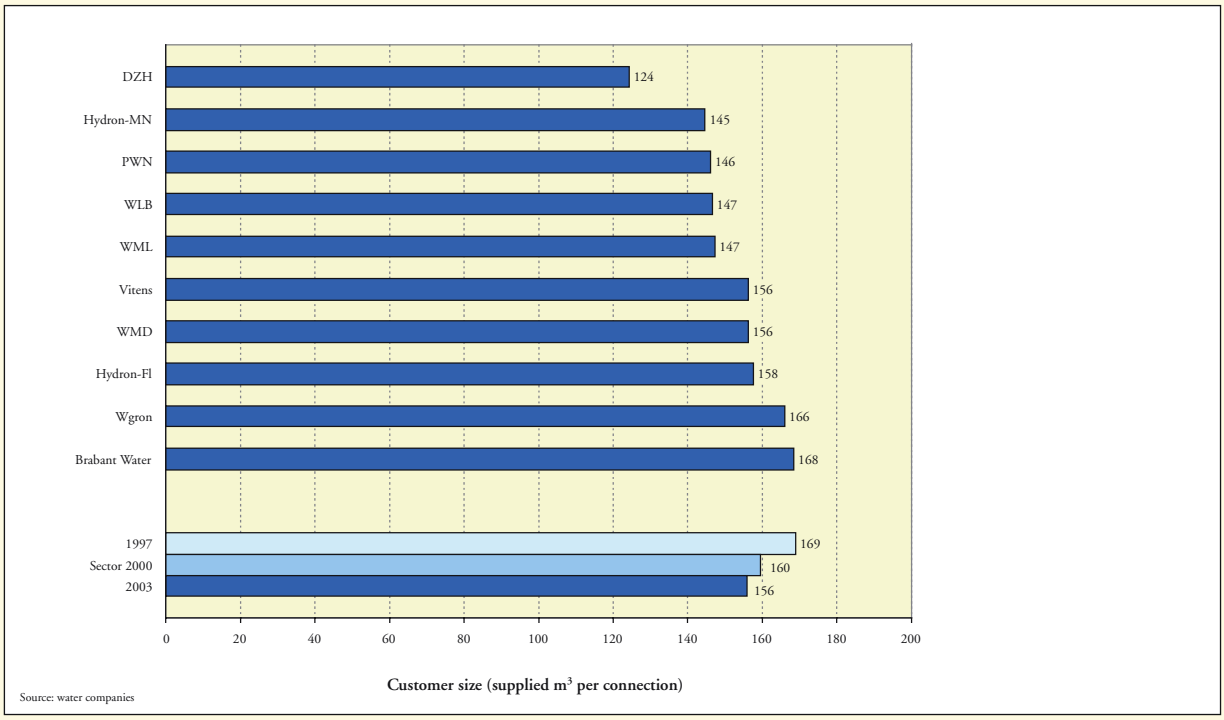
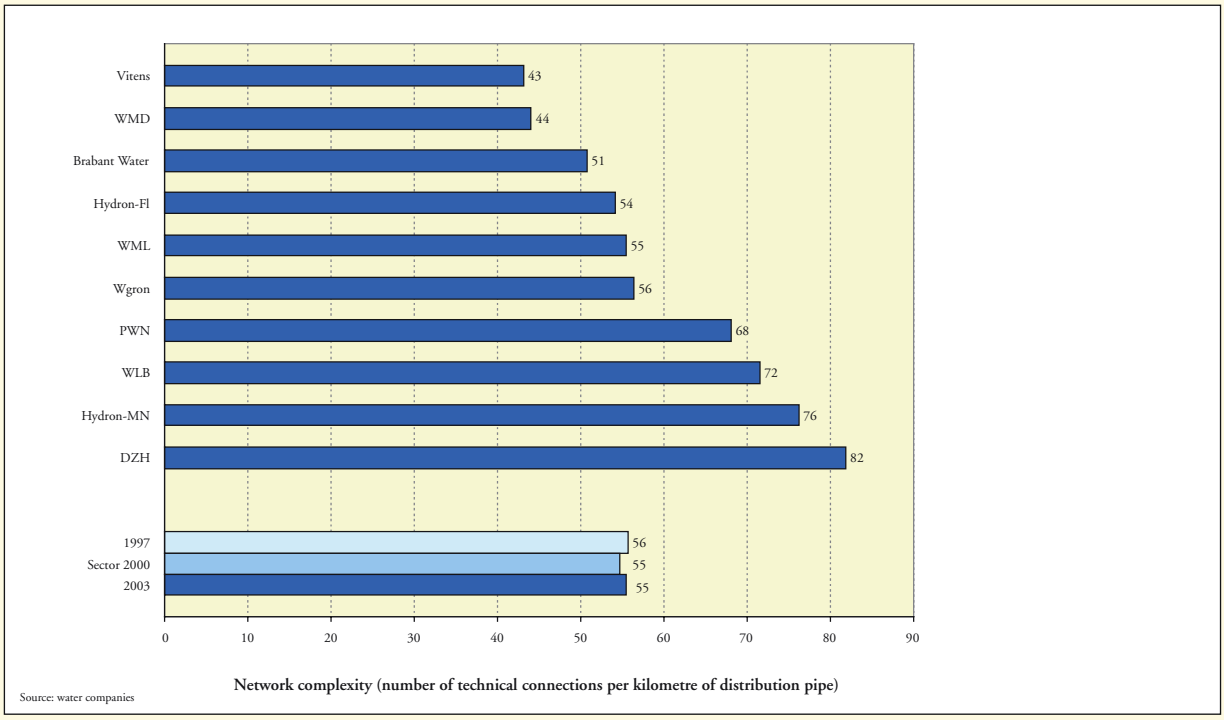


Figure 62 – Explanatory factor customer size: companies with a smaller average customer size generally have higher costs, especially with regard to depreciation and operational costs. Since 1997 the average customer size has decreased by 8%.



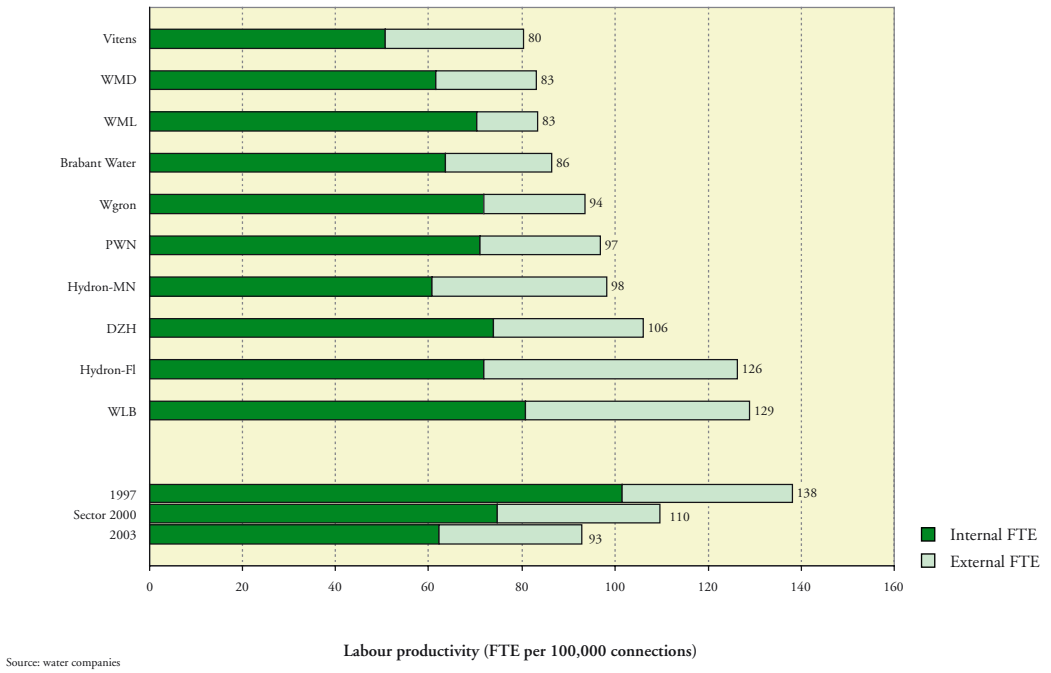
Source: water companies

Figure 63 – Explanatory factor network complexity: depreciation costs and operational costs are higher as the network complexity increases.



Source: water companies

Figure 64 – Explanatory factor labour productivity: companies with a higher labour productivity generally have higher operational costs. Since 1997 the average labour productivity in the sector decreased by 33%. The percentage of external employees has increased from 27% to 33%.



Source: water companies

Appendix F

Overview of the investment processes 'laying a connecting pipe', 'replacing connecting pipe', 'constructing distribution pipe' and 'replacing distribution pipe'. These processes are mapped as of the benchmark 2003.

Figure 65 – The costs of the investment process 'laying connecting pipe' are linked to the ground type

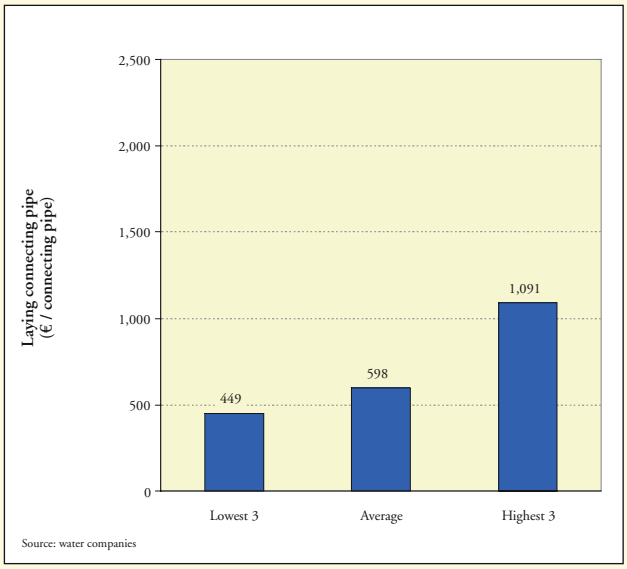


Figure 66 – the costs of the investment process 'replacing connecting pipe' are linked to the ground type.

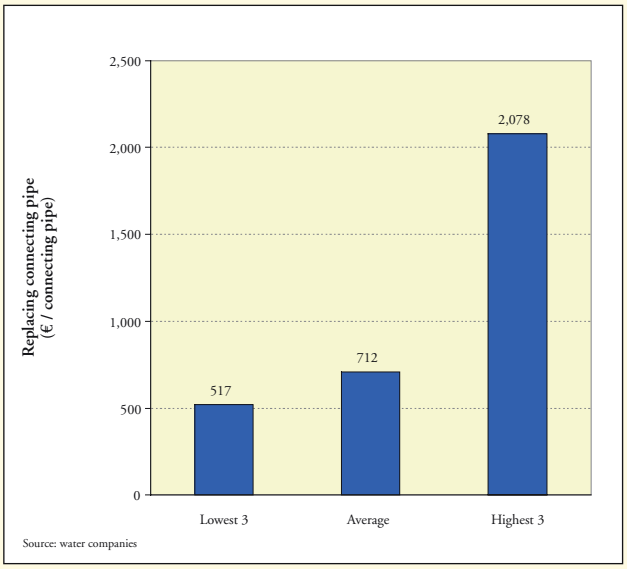


Figure 67 – Investment process 'constructing distribution pipe'.

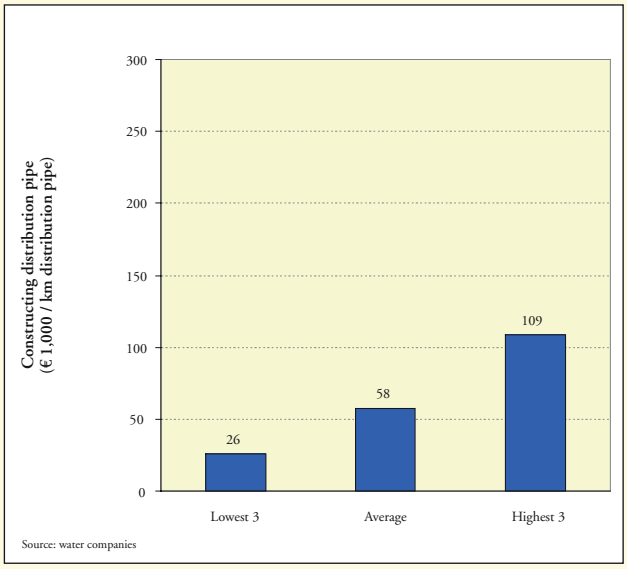
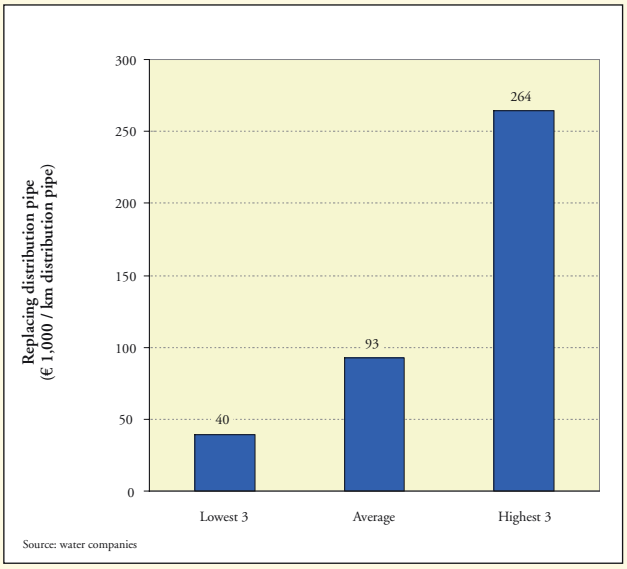


Figure 68 – The costs of the investment process 'replacing distribution pipe' are linked to the labour productivity, network complexity and ground type.



Notes

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

1 The closed model means a comparison is made between water companies of the costs the customer makes for his drinking water. These costs are processed in the water companies' tariffs. The customer's costs are therefore revenue for the water company. In the benchmark it has been examined per water company what the revenues of the drinking water companies are. This is done on the basis of a water company's annual accounts. Subsequently the costs are calculated which are opposed to these revenues. Because the customer must also pay for the financial result attained by the water companies, the financial result is also included in the costs.

2 'Other water' is understood to mean: water, that is not of drinking water quality. This also includes water of inferior/lower quality (for example non-semi-filtered surface water) and superior/better quality (for example distilled and demineralised water) with regard to drinking water.

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

4 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 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. Brabant Water was created in 2002 from the merger between Waterleiding Maatschappij Noord-West Brabant and Waterleiding Maatschappij Oost-Brabant. At the Benchmark 2003's publication, Delta and WBE merged to become Evides; this report mentions these companies separately, because it describes the situation in 2003.

5 Water companies are required by law to supply the inspection authorities of the Ministry of Housing, 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 programme (this stands for REgistration report for WAter distribution companies) was developed. The REWAB data were used as the starting point for determining the measured values of parameters in the framework of the study.

6 For the standardisation the legal requirements are applied in the Water Quality Index which apply in the year in which the Water Quality Index 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 for the customer-oriented parameters and the parameters not included in the Water Supply Degree 1984, the VEWIN recommendations and the Inspection Guideline (Inspection guideline for reporting exceeding of norms of drinking water quality, VROM Inspection 2000) were selected as applicable. In 2003 the VEWIN recommendations were cancelled. For the standardisation of the Water Quality Index in the benchmark 2003 the standards set down in the Water Supply Degree 2001 were applied.

7 In the event of structural exceeding of the norms, the supervisor can issue the water company an exemption. As condition for the exemption, this is not allowed to constitute a danger to public health and 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.

8 The methodology of the Water Quality Index was revised in consultation with RIVM (National Institute of Public Health and Environmental Protection). For this purpose the measurements of 1997 and 2000 were once again requested from REWAB and the calculation of the Water Quality Index for 1997 and 2000 was done again.

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

10 The standard for the total hardness from the Water Supply Degree applies when softening is applied. In site of this, this standard has been included for 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 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.

13 Empathy in this context is understood to mean: paying individual care and attention to the customer. External characteristics are understood to mean: tangible items that make up part of the service. Responsiveness is understood to mean: the willingness to offer service quickly. Reliability is understood to mean: reliable and accurate execution of the promised service. Care means: the politeness and courtesy of the employees and radiation of confidence.

14 Residues can be recycled in three ways. Residues can be sold to third parties via the Residues Union. Residues can be sold directly to third parties via the water companies. And water companies can use the residues themselves on location.

15 Water extraction area is understood to mean the zone directly around the extraction wells. The dimensions are initially based on the breakdown time for disease-causing bacteria. Ground water protection area means the area around the water extraction. The dimensions of the area are generally determined on the basis of the place from where the groundwater is 25 years underway before it is pumped up at the extraction wells.

16 The figures for the household budget concern the reference year 2000, as these are the most recent figures.

17 A distinction is made between administrative and technical connections. An administrative connection is a right to the supply of drinking water at a certain location. The number of administrative connections is approximately the same as the number of subscriptions, plots or apartments. A technical connection is a transfer point between the drinking water network, managed by the water company, and the network or draw-off point to which drinking water can be or is delivered.

18 Figure 26 shows the spread of drinking water tariffs for five standard consumer categories. This includes the tariffs of all – also non participating – water companies[19]. Appendix D only shows the drinking water tariffs of the participating water companies. The spread in figure 26 can therefore deviate from the spread in Appendix D.

19 Year after year differences occur in the set of participating water companies, this makes it difficult to compare the gathered sector data. To overcome this incompleteness, not only the participating companies have been considered per year, but the position of the non-participating companies in that year has also been estimated. This estimate is only possible for the non-participating companies of which there is sufficient historical data, because these companies have participating in previous benchmarks. It is assumed that in a certain year the non-participating companies have developed in accordance with sector trends. Because some water companies have provided the actual data afterwards, the sector data provided in this benchmark can deviate from sector data presented in previous reports.

20 A 'groundwater company' uses at least 85% groundwater; a 'surface water company' uses at least 85% surface water. The other water companies are named 'mixed company'. As of the year

2000 natural dune water is considered a separate category, in 1997 this was placed under the category groundwater.

21 Labour productivity is defined as the number of full-time equivalents per 100,000 connections, where one FTE is one man-year in employment/ work.

22 The financial result is determined on the basis of a water company's total profit and loss account. On the basis of the profit and loss account it is not possible to distinguish between the financial result attained with drinking or non-drinking water activities.

23 To determine the hard solvency, the book value is based on the historical cost price of assets. The book value of assets is not balanced with contributions by third parties. To make an unambiguous calculation of the solvency of water companies, this is based on the gross balance sheet. This means that in 2003 several companies supplied a grossed up balance in sheet in contravention to their annual accounts. For 1997 and 2000 the sector average only includes those companies whose solvency could be determined in the same way as in 2003. The water companies which have not been included in the sector average are DZH, NUON West-Friesland, WBE, and WMD. The water companies which were not included in the 2000 sector average are DZH, Hydron Zuid-Holland, WBE, WML and WOB.

24 The operational costs are made comparable and are subsequently divided over six processes.
To make the costs comparable the following corrections have been made:
Activated costs of waters, office automation and operational IT maintenance have been returned to the operational costs. These costs are also returned when water companies receive contributions from third parties for connection costs and infrastructural works. Additionally, activated business costs, mainly staff costs are returned. To benchmark the sub-processes of the project development & realisation process the activated costs of investments in transport, distribution and connecting pipes are also returned.
Purchasing costs of unprocessed water and clean water are not allocated to the processes and have therefore been removed from the operational costs. These purchasing costs say little about how water companies perform. Additionally, the part of the rental and lease amounts intended for compensating the costs of capital are corrected (the non-operational part). In this way can be abstracted from whether or not having certain assets.

25 The process model for distribution was refined after 1997. To make the figures of the three publications comparable, the figures for 1997 have been estimated.

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