



Water in figures



DANVA
Danish Water and Waste
Water Association



FRONT PAGE:
NAME: STEEN HOLM
AGE: 47
POSITION: SERVICE MECHANIC
PLACE OF WORK: RANDERS SPILDEVAND



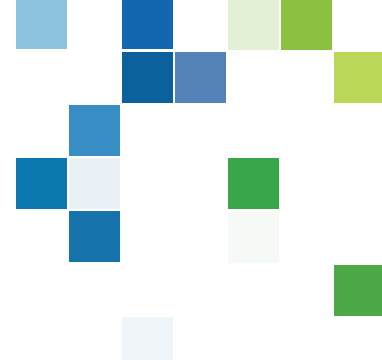
INCREASING EFFICIENCY THROUGH BENCHMARKING

Benchmarking is a tool for identifying performance and optimising working processes and methods by learning from 'best practice'. A total of 136 drinking water and waste-water companies have completed DANVA's benchmarking 2013 using data from 2012. They supply approx. 55% of the Danish population with clean drinking water and treat waste water from approx. 73% of the population.



KEY FIGURES 2013

- The average price of one litre of water is DKK 0.061.
- Average household water consumption is 107 litres per person per day.
- The drinking water companies' actual operating costs were DKK 4.84 per m³. Investments totalled DKK 5.23 per m³.
- The waste-water companies' actual operating costs were DKK 10.93 per m³. Investments totalled DKK 19.47 per m³.
- The electricity consumed to treat and discharge 1,000 litres of tap water to the receiving environment is 1.90 kWh. Of this, 0.43 kWh was used for the production and supply of drinking water, and 1.47 kWh was used for transporting and treating waste water, which corresponds to approx. 0.9 kg CO₂.



INCREASING EFFICIENCY AND INVESTMENTS

For the water companies, the past year was a year of streamlining and investment. DANVA's benchmarking provides an accurate description of the overall figures, which allows the water companies to share knowledge and experience and learn from the best.

This year, the water companies' average actual operating costs fell by 8.3%, among other things. These efficiency targets for operating costs are in stark contrast to the repeated statements by the Danish Competition and Consumer Authority that if it was not for them, the water companies would not be streamlining their activities. The fact is that the water companies are generally way ahead of the requirements set by the Danish Competition and Consumer Authority. Furthermore, the price caps have been referred for renegotiation year after year, which means that the companies are actually managing their finances without interference from the central supervisory body.

While the water companies' operating costs have fallen considerably, their investments in, for example, climate solutions have increased. Investments in climate solutions, for example, may seem costly in the short term. However, in light of the ever-increasing precipitation in Denmark which threatens Danish homeowners with flooding, it may prove economical in the long term to lead the way and invest in the development of climate solutions.

The knowledge and know-how gained may subsequently benefit the rest of world, and pave the way for new job and export opportunities.

Water in figures 2013 also shows that waste-water companies which use DANVA's benchmarking perform 11% better than other companies, and that water consumption has fallen by 13.1% over the past 10 years.

DANVA believes that the water sector should be run by efficient water companies that deliver the desired level of service through cooperation, consolidation and by using the latest technologies. Process benchmarking is one of the tools which can enable water companies to deliver the most efficient service and focus on the business.



Carl-Emil Larsen
Managing Director, DANVA

WHAT DOES WATER COST?

The average price of water in Denmark is DKK 60.62 per m³, corresponding to DKK 0.061 per litre. Average household water consumption is 107 litres per person per day.

The water price is not the same everywhere in Denmark, partly because of structural differences, and partly because the price composition can vary from company to company. Some companies have elected to charge a fixed annual contribution for water and/or waste water and a price per m³ for water consumed, while others charge only for the water consumed.

The price of drinking water covers the costs incidental to groundwater protection, water catchment and treatment as well as distribution from the waterworks to the consumers. The price of waste water covers the costs incidental to operation and maintenance, renovating and extending the sewer system, and operating and controlling the treatment plants to ensure compliance with standards for discharges to the receiving environment.

Average water price based on consumption, 2012



Simple average for 215 drinking water companies and 97 waste-water companies. The price includes VAT and taxes.

AVERAGE WATER PRICE

The average water price for an average family of 2.15 persons is DKK 60.62 per m³ calculated as a simple average based on the charges of 215 drinking water companies and 97 waste-water companies.

Quite apart from the fact that the water price varies from one company to the next, the water price may also be perceived differently within the same supply area depending on whether the price is calculated for a single person or a large family if the water company charges fixed contributions. If the company only charges on the basis of consumption, the price will be the same in all three examples.

Last year, the average water price for an average family was DKK 58.36 per m³ – a price increase of 3.9%. Some of the increase can be ascribed to inflation, but the increase is primarily due to the companies' increased investments in climate protection. Read more about the investments on the following pages.

i

THE AVERAGE PRICE OF HALF A LITRE OF COLD TAP WATER IS DKK 0.003.

Three quick questions about the water price

1 What does water cost?

That depends on the water company supplying the water.

Contact your local water company to see prices. The average price of one litre of water is DKK 0.061.

2 What does the water price cover?

The water price consists of five elements:

- Fixed contribution for drinking water.
- Drinking water priced per m³.
- Fixed contribution for waste water.
- Waste water priced per m³.
- Taxes and VAT.

3 Why does the price of water vary?

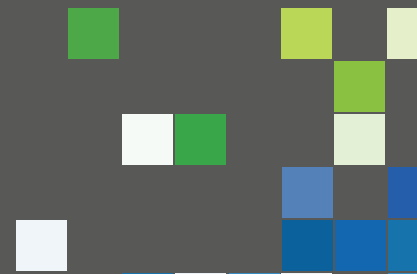
There is a big difference between the lowest and the highest charges among the water companies. The difference in the total prices of drinking water is generally attributable to a number of factors.

Structural differences:

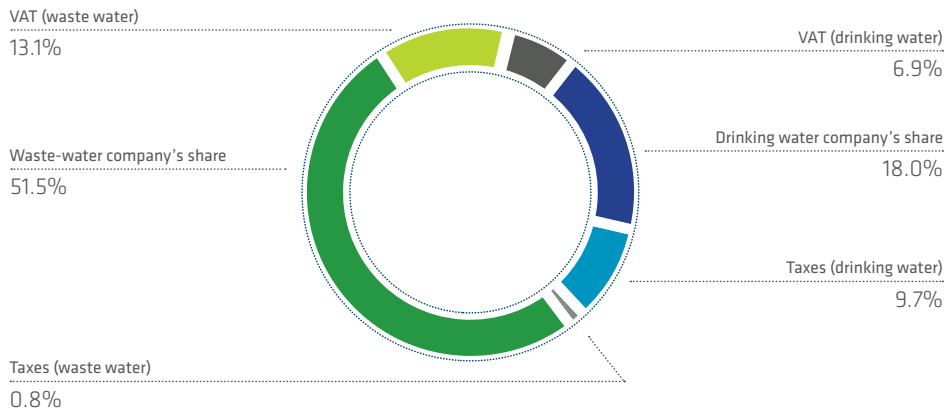
- It can be relatively cheaper to supply water-consuming industries than small customers, for example holiday cottages.
- Geological factors make it more expensive to pump water up in some places than in others.
- In some areas, investments have had to be made in new well-drilling areas due to contamination.
- The degree of waste-water treatment depends on the receiving environment.
- Decentralised waste-water treatment is more expensive than central waste-water treatment.
- And, of course, the older the plant, the more maintenance is required.
- Environmental factors.

Politically determined differences:

- Different companies pursue different investment policies. At the moment, many companies are investing in new sewers to accommodate the consequences of climate change.
- Some drinking water companies are investing a lot in groundwater protection.
- Difference in service levels.
- Different levels of security of supply.



Water price, 2012



WATER PRICE

Of the total water price, 18% is paid to the drinking water company, 51.5% to the waste-water treatment company and 30.5% to the state in the form of taxes and VAT.

The average water price can be split into the price of treating and supplying clean drinking water, comprising groundwater protection, pumping, treatment and the supply of clean water which totals DKK 21.00, corresponding to 34.6% of the total price. The price for collecting waste water in sewers,

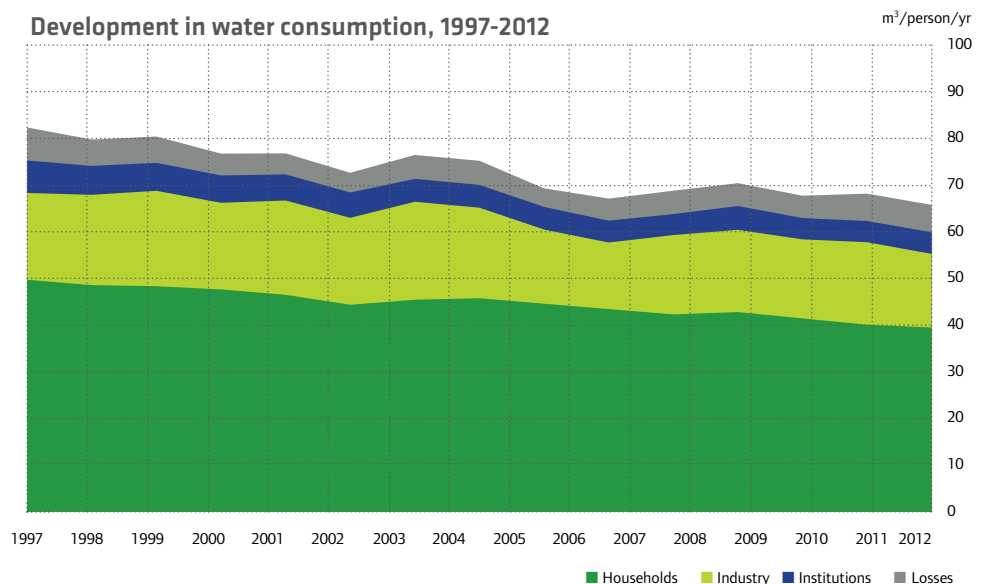
treatment and discharge totals DKK 39.62, corresponding to 65.4% of the total price. The prices include VAT and taxes.

The drinking water companies' income from water sales is made up of 32% from fixed contributions and 68% from variable consumption. For the waste-water companies, 11% of their income stems from fixed contributions and 89% from variable contributions.

WATER CONSUMPTION CONTINUES TO FALL

In 2012, the total average water consumption by households, businesses and institutions, including losses, was 64.41 m³ per person per year. This corresponds to a decline in the total water consumption of approx. 2% relative to 2011. Households account for 66% of total water volumes sold. Each person uses an average of 39.01 m³ per year in the household, or 107 litres a day. Over the past 10 years, household water consumption has fallen by 13.1%.

Development in water consumption, 1997-2012



Households Industry Institutions Losses



The best thing about my job is:
That I work with my hobby. I love water. It's a big part of my life. My star sign is Aquarius, water is my work and my hobby and I have built garden ponds and a swimming pool at home.

NAME: NIELS CHRISTIAN HAUGAARD SØRENSEN
AGE: 55
POSITION: OPERATIONS ASSISTANT
PLACE OF WORK: VESTFORSYNING, HOLSTEBRO



**The best thing about my job is:
My wonderful colleagues and how we always
help each other.**

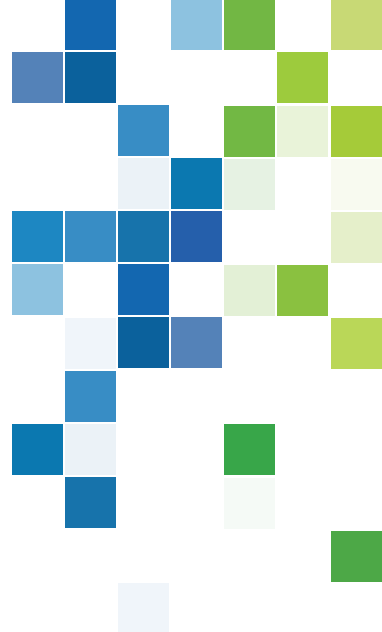
NAME: JENS V. BACH

AGE: 64

POSITION: WASTE-WATER OPERATOR

PLACE OF WORK: RANDERS SPILDEVAND

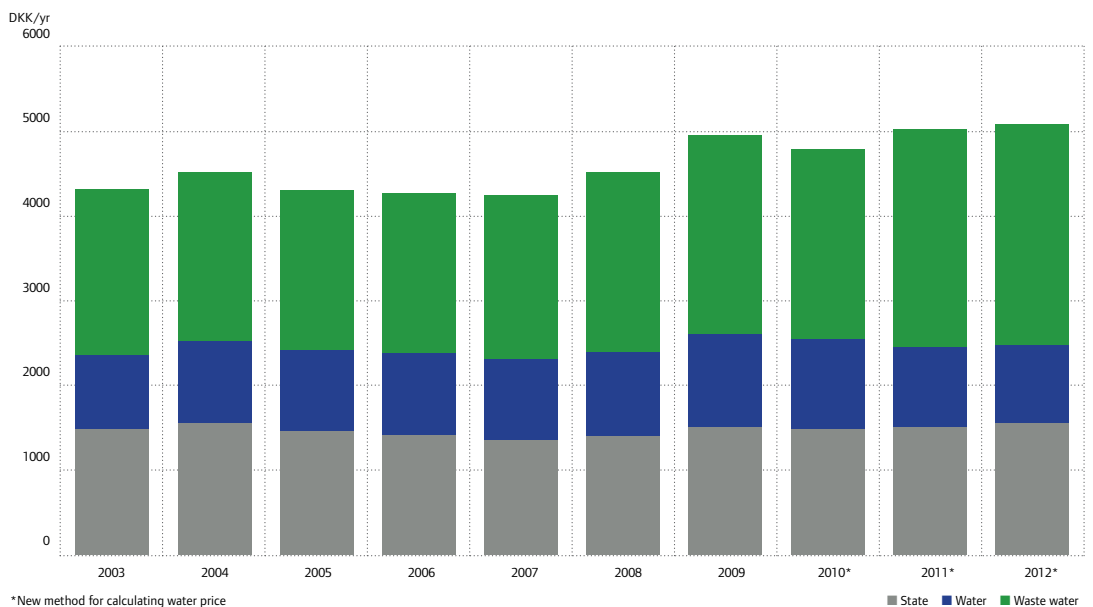




WATER IN THE HOUSEHOLD BUDGET

For a little more than DKK 5,000 a year, an average family of 2.15 persons can be supplied with fresh, clean and monitored drinking water from the tap while also having its waste water collected, treated and discharged responsibly to the environment.

An average household's water outgoings, 2003-2012:





The best thing about my job is:
That no two days are the same. Since I joined the company in 2009, it has undergone rapid development and I get to try my hand at a lot of tasks that I like. I also feel that we are working for the common good.

NAME: LISBETH BONDO HANSSON
AGE: 38
POSITION: COMMUNICATIONS OFFICER
PLACE OF WORK: VCS DENMARK, ODENSE



Skatepark and afforestation included in the water price

The water price covers not only clean, high-quality drinking water and the efficient discharge of waste water, but also environmental protection and recreational areas, such as a rainwater drainage system which doubles as a skatepark and new woodland.

BY KATHRINE SCHMEICHEL, FREELANCE JOURNALIST

It is not often that you hear about a rainwater drainage system that has received awards for design and sustainability and which was also nominated for the world's biggest design prize, the INDEX: Award.

One such system is the one-year-old rainwater drainage system Rabalder Parken, which is laid out as a recreational park with skateramps, trampolines, hammocks and fitness equipment.

The rainwater drainage system – the first of its kind in the world – is designed to climate-proof the new Musicon district in Roskilde and can hold 23 million litres of rainwater in the event of heavy downpours, the equivalent of ten swimming pools. The system is the result of a collaboration between the Municipality of Roskilde, the water company Roskilde Forsyning and a number of foundations.

According to Kirsten Toft, Planning and Project Manager at Roskilde Forsyning, the 40,000 sq m park close to the famous Roskilde festival site has been visited by skaters from near and far since its opening in August 2012.

But the park is not only used by skaters.
– In addition to skaters of all ages and children on kick scooters, the park and the

entire Musicon area are also used by artists and other creative individuals with workshops and studios in the area. Furthermore, the skatepark also hosts several cultural events and is visited by technical experts from all over Denmark who come to study the system at close quarters. We expect the number of visitors to grow even more once the municipality has completed a footpath system in the area, says Kirsten Toft.

Water course as bike route

The skatepark is just one of many examples of the added bonuses which citizens can enjoy through paying to be supplied with drinking water and having their waste water discharged and treated.

In the Municipality of Tårnby, citizens can learn about water's flow from groundwater to bathing water by following a seven-km-long bike route. The route features 11 information boards, QR codes and short films.

Raymond Skaarup, Managing Director of TÅRNBY FORSYNING, describes the background to the project:

– The idea behind the bike route is to give schoolchildren, parents, citizens and others

the opportunity to follow water's remarkable journey from groundwater to drinking water, through the sewers to the treatment plant before it is finally discharged into the Øresund – without us having to be present to tell the story. The aim of the 'Water's flow' project, which is a partnership between primary and lower secondary schools, upper secondary schools and children's institutions in Tårnby, is also to strengthen children's and young people's interest in science and technology as Tårnby is one of 25 science municipalities in Denmark.

Afforestation protects groundwater

In the Aarhus area, Aarhus Water is involved in several afforestation projects to protect the groundwater.

– In collaboration with the Danish state and the City of Aarhus, Aarhus Water contributes to afforestation by acquiring land in vulnerable catchment areas. We have thus contributed DKK 20 million to the acquisition of 240 hectares of farmland and are also involved in several upcoming projects where we have pledged to pay 50% of the land price. The actual planting of trees will be handled by the state, the municipality and private enterprises, says >

Lars Schrøder, Managing Director, Aarhus Water.

The afforestation projects are an important part of the City of Aarhus' vision of becoming CO₂ neutral by 2030. The goal is to plant a total of 3,200 hectares of new forest, which corresponds to almost a doubling of the municipality's existing forest area.

Demolished houses create space for recreational rainwater drainage system

In 2009, VSC Denmark became the first utility company in Denmark to acquire seven single-family houses in the flood-ridden Sanderum residential area on the outskirts of Odense in order to demolish them and construct a recreational rainwater drainage system.

– The area, which was originally wet meadows, has been a residential neighbourhood since the 1970s and was hit by heavy flooding several times between 2005 and 2008. In acknowledging that the forthcoming climate change with more extreme precipitation would make the problems worse, we realised that we needed a new solution, says Nena Kroghsbo, Graduate Engineer, VSC Denmark, and continues:

– In fact, it was the residents who suggested that the utility company acquire the plots and demolish the homes. In addition to being a voluntary process, the homeowners' solution was also the cheapest compared to the solutions we suggested. Today, residents in the neighbourhood have two additional green areas with lakes where they can walk their dogs, go for a run or just sit down and enjoy the scenery. Moreover, there has been no flooding in the area since 2008.



Skatepark-cum-rainwater drainage system in Roskilde

Rabalder Parken is a 40,000 sq m rainwater drainage system which is designed to climate-proof Musicon, the new cultural district in Roskilde. In addition to skating in canals and rainwater reservoirs, Rabalder Parken also features hammocks, trampolines, barbecues, seating, fitness equipment and swings.

Rabalder Parken, which has won the Urban Planning Award and Sustainable Concrete Award and was nominated for the world's biggest design prize, the INDEX: Award 2013, has cost around DKK 40 million and is the result of a collaboration between Roskilde Forsyning – which has contributed DKK 30 million – the Municipality of Roskilde and a number of foundations, including the Danish Foundation for Culture and Sports Facilities and the Roskilde Festival Foundation.

Read more:
www.klimatilpasning.dk

PHOTOS: ROSKILDE FORSYNING



PHOTOS: TARNBY FORSYNING

Afforestation in the Aarhus region

Aarhus Water is involved in several afforestation projects in the Aarhus area. The utility company has teamed up with the City of Aarhus to acquire 100 hectares of land at various locations in the municipality – between Beder and Malling, Trige and Tilst, among others – the majority of which have now been planted with trees. Co-funding amounts to approx. DKK 8 million.

By contributing around DKK 12 million, the Danish Nature Agency and Aarhus Water have helped fund 140 hectares of new woods in Solbjerg and True, among others. Under an afforestation agreement from 2013, new woods covering approx. 400 hectares must also be planted over a period of 20 years.

Read more:

<http://www.aarhus.dk/da/borger/natur-og-miljoe/Park-og-skov/Skove/Nye-skove.aspx>

PHOTOS: OLE HARTMANN SCHMIDT

Bike route in Tårnby illustrates water's flow

TÅRNBYFORSYNING has taken the initiative to launch a new and original information project about water. The utility company has worked with local primary and lower secondary schools and upper secondary schools to plan a bike route that tells the story of water's passage from groundwater to waste water by means of 11 information boards. The principal idea is to actively involve the children, which is why all material such as images and film have been produced by children. The project, which cost DKK 250,000, can also be followed in detail on Tårnby's website:

www.taarnbyforsyning.dk

Demolished homes in Odense replaced by recreational rainwater drainage system

In 2009, VCS Denmark acquired seven homes in Sanderum in Odense and demolished them to make way for two recreational rainwater reservoirs which can hold a total of approx. 10,000 cubic metres of rainwater, corresponding to a so-called 50-year rain incident – violent rainstorms which statistically only occur once every 50 years. The cost of the system is DKK 30 million, which is entirely funded by VCS Denmark.

Read more:

www.klimatilpasning.dk

PHOTOS: VCS DENMARK

INVESTMENTS POUR INTO WATER INDUSTRY

Danish water companies are investing as never before. Since 2010, more than DKK 1.6 billion extra has been spent on preventing flooding and ensuring clean drinking water.

BY KÅRE KILDALL RYSGAARD, FREELANCE JOURNALIST, ANALYTIK.DK

In Høje Gladsaxe Parken, a new artificial lake is designed to absorb water from cloudbursts. In Skive, the water company is paying farmers to not spray in specific areas to protect the groundwater, and near Silkeborg, Gudenå Waterworks have been renovated to make water supplies more secure.

Drinking water and waste-water companies across Denmark have speeded up the flow of investments to protect tomorrow's water supplies. In 2010, the waterworks invested a total of DKK 783 million, but last year that figure had risen to DKK 1,019 million. In the waste-water companies, the investments have been even bigger; last year they invested almost DKK 4 billion compared to DKK 2.6 billion in 2010. In other words, the water and waste-water companies have increased their investments by some DKK 1.6 billion in the period 2010-2012, according to figures from DANVA Benchmarking.

Preventing cloudburst damage

In recent years, news reports have regularly shown images of cloudbursts, overflowing sewers and flooded cars, homes and flats. The waste-water companies spend huge sums on preventing damage caused by cloudbursts.

In Gentofte, around 40% of all investments are spent on climate change adaptation.

Concrete reservoirs have been constructed underground to hold the flood water and prevent the sewers from overflowing. Above ground, the rainwater is led towards an artificial lake in Høje Gladsaxe Parken.

At Nordskrænten in Esbjerg, a large artificial lake collects all the rainwater. In the Municipality of Esbjerg, lakes or small ponds are often constructed on new land which is parcelled out for development.

Separating clean and dirty water

Many sewers in Denmark need replacing. Kilometres of underground pipes date back to the 1930s, and in Gentofte, for example, the pipe network is on average 57 years old. The water companies have already set about modernising the sewer network, and in most parts of the country separate sewer systems are being built whereby rainwater and waste water flow in separate pipes, keeping rainwater out of the waste-water treatment plants.

Avoid contamination in time

Clean drinking water is precious, and water companies are investing heavily to protect it. Like several other water utilities, Holbæk Vand A/S has spent additional money on dividing the distribution network into sections. This ensures that any bursts or contamination

Water and waste-water companies' investments from 2010-2012 in DKKm (current prices)

	2010	2011	2012	Figures from 2010-2012 (DKKm)
Waste water	2,580	3,669	3,952	1,372
Drinking water	783	1,004	1,019	235

SOURCE: DANVA BENCHMARKING



in one particular area do not affect everyone who receives water from the waterworks.

– All water companies risk contamination in unfortunate circumstances; The goal is to minimise this risk as much as possible, explains Mette Oht Klitgaard, Project and Development Manager, Holbæk Vand.

Earlier this year, E.coli-contaminated water left 560 citizens in Kalundborg without water. Over the years, similar incidents have occurred at other waterworks. The considerable investments being made are designed to reduce the inconvenience to consumers in the event of an accident.

In Silkeborg, the water utility has renovated Gudenå Waterworks. If a water bore from Hvinningdal, Silkeborg's largest waterworks, is contaminated, Gudenå Waterworks can ensure that the citizens of Silkeborg are still supplied with clean water.

– We have reduced our vulnerability to contamination, says Kim Harreskov, Managing Director, Silkeborg Forsyning.

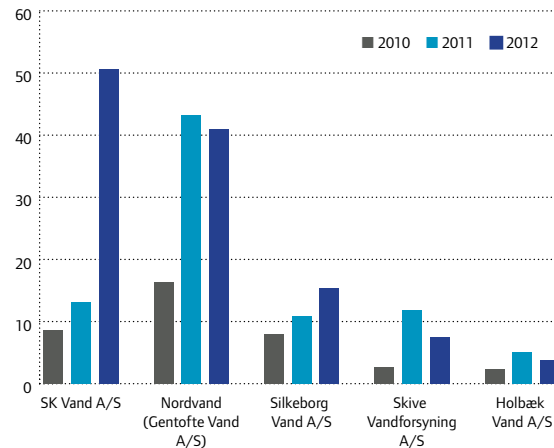
Investments affect the water price

The millions of kroner spent by the water and waste-water companies on adapting to climate change and ensuring clean drinking water increases the water price payable by consumers. However, new 40-year loans from Kommune Kredit allow the investments to be spread over many years which prevents excessive consumer price increases. The historically low interest rates also mean that it is relatively cheap for water and waste-water companies to borrow money.

DKK 1.6 billion in additional investments

From 2010 to 2012, the water companies increased their investments by a total of DKK 1.6 billion. The waste-water companies in particular have stepped up their investments to prevent flooding caused by cloudbursts, among other things. At the same time, several old sewers have been replaced and many utilities are working on separating rainwater and waste water in the sewers. The drinking water companies are investing more money in security of supply, afforestation and agreements with farmers on 'pesticide-free' zones to protect the groundwater.

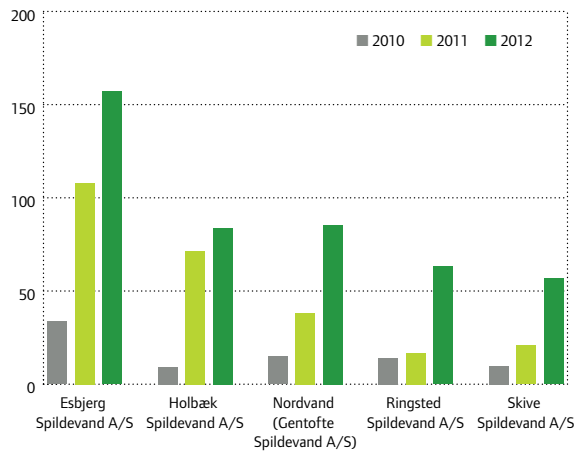
Investments in DKKm



Companies investing in clean drinking water

A number of water companies have stepped up their investments to safeguard drinking water supplies. Among other things, SK Water has increased its investments by DKK 42 million from 2010 to 2012. In Silkeborg, Gudenå Waterworks have been renovated, adding more bores to the water supply and making it less vulnerable to contamination in the distribution network.

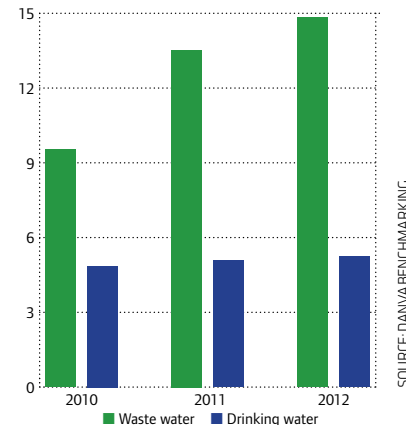
Investments in DKKm



Companies investing in climate protection

Esbjerg and Gentofte Spildevand are examples of waste-water companies that are sharply increasing their investments. From 2008 to 2010, Esbjerg Spildevand spent an additional DKK 123 million on separate sewer supply and climate change adaptation, among other things.

Investments in DKK per m³ waste water or drinking water sold



SOURCE: DANVA BENCHMARKING

NEW SEWER SYSTEM IN COPENHAGEN TO PROTECT ENVIRONMENT AND CLIMATE

Adapting to climate change and improving the environment combine to perfection when the largest utility company in Denmark’s capital region, HOFOR, completes two new sewer pipes along the Damhusåen stream in 2016. Totalling DKK 750 million, the project is the company’s biggest investment in the drainage area to date.

BY KATHRINE SCHMEICHEL, FREELANCE JOURNALIST

Cleaner bathing water, fewer odours and reduced risk of flooding

These are some of the benefits which can be enjoyed by the citizens of Valby and Hvidovre in Denmark’s capital region when HOFOR opens its largest and most expensive sewer system to date in 2016: Two pipes along the Damhusåen stream with a total length of 6 km and a diameter of up to 3 m.

The system, which is costing DKK 750 million, is divided into two projects – the Copenhagen Damhus pipe and the Hvidovre Damhus pipe. Morten E. Jensen, Project Manager, HOFOR, explains:

– For safety reasons, we have chosen to install two pipes rather than one. This is because Hvidovre is the lowest area, which means that all the water from Copenhagen, Frederiksberg and Rødovre would also end up here if there was a heavy cloudburst and we had only installed one large pipe.

Both pipes, which are installed in parallel, act as both storage reservoirs and transport pipes when it rains and are installed at a depth of 10-15 m below and along Vigerslevparken and Damhusåen, respectively. The aim is to relieve the pressure on the existing sewer system, which uses Damhusåen as an overflow in the event of a cloudburst. The water

i

THE NEW DAMHUS PIPES

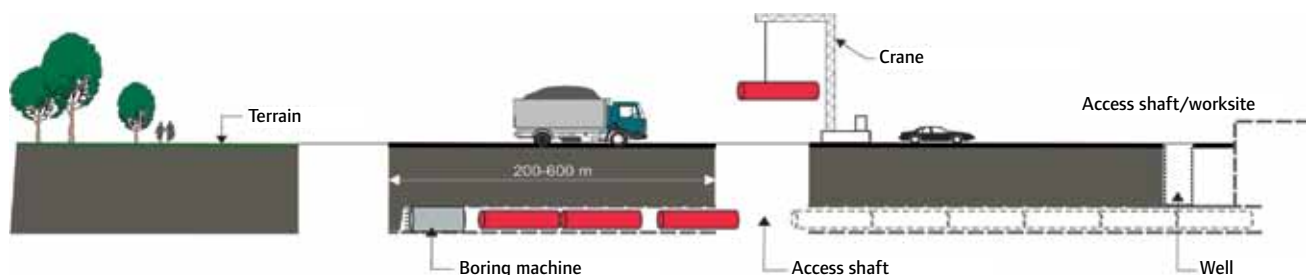
The new sewer system, which comprises two tunnel-bored pipes and extending a pump station near Åmarken Station, is scheduled for completion in 2016 at a cost of DKK 750 million.

Copenhagen Damhus pipe:

- The sewer pipe is installed approx. 15 m below Vigerslevparken
- Length: 3.4 km
- Inside diameter: 3 m
- Volume: 24,000 m³ waste water
- Distance between the five access shafts: 600-1,000 m

Hvidovre Damhus pipe:

- The sewer pipe is installed approx. 10 m below ground along Vigerslevparken
- Length: 2.5 km
- Inside diameter: Up to 2.5 m
- Volume: 15,000 m³ waste water
- Distance between the nine access shafts: 200-600 m



○ Access shaft/worksite



TUNNELLING

The two Damhus pipes will be installed using a tunnelling method called 'open front with compressed air', which can be used to install reservoir and drainage pipes, walkway tunnels and wildlife crossings as well as sewer systems in vulnerable areas below the water table. The compressed air blows the groundwater away from the tunnelling front, so to speak.

The tunnel is created by cutting through the limestone using a boom cutter which pushes the tunnelling machine and the steel-reinforced steel pipes through the ground. This process is also known as pipe jacking.

Unlike the Copenhagen metro project, for example, whole pipes are used which are pushed through the ground from one end. The soil and limestone which are cut away are removed using a trolley running inside the tunnel and which transports the soil back to the start shaft where it is hoisted up and removed.

Read more at www.hofor.dk

In addition to offering enhanced protection against cloudbursts, the new system also benefits the environment.

- In the event of heavy rainfall, the Copenhagen Damhus pipe can transport up to 15,000 litres of water per second, while the Hvidovre Damhus pipe can handle 6,000 litres per second. This is a substantial increase in capacity which reduces the risk of flooding and sewer water accumulating in the homes along Vigerslevparken. Furthermore, Damhusåen will in future only have to function as an emergency overflow from the sewer once a year compared to 30 times a year as is the case today. The water in Damhusåen will thus be cleaner, which, in turn, will have a positive effect on the quality of the bathing water at Hvidovre Beach and any forthcoming Valby Beach near Kalveboderne in Copenhagen.

Tunnelling is both economical and green

For both projects, HOFOR has chosen to use the tunnelling method whereby a tunnel boring machine is used to bore a hole in the subsoil and simultaneously push concrete pipes into the ground. This takes place through special access shafts from which both the bored soil is retrieved and the underground sewer pipes are lowered.

- There are several reasons why we

decided to lay the two pipes as a bored tunnel. It costs virtually the same as a traditional solution, which has the disadvantage that we would have had to dig up soil, roads and trees along the entire section. Tunnelling is thus a greener solution as we only have to remove a few trees and bushes. Furthermore, tunnelling causes less inconvenience to the residents in the area as it reduces the nuisance caused by noise and digging, says Morten E. Jensen.

With tunnelling, citizens can still use most of Vigerslevparken – a conservation area – which, according to Morten E. Jensen, requires HOFOR to show as much consideration as possible to plants, wildlife and users of the park.

Limestone layer and high water table a challenge

One of the challenges is the high water table.

- The tunnelling itself can be performed without affecting the water table. But in some places we have to lower the water table when establishing the required work shafts. This presents a challenge as the water table in the area is high and lowering it could therefore affect the foundations of nearby properties. To avoid this, we pipe the pumped up groundwater back underground to maintain the water table in the area.

A high water table is not the only geological challenge presented by the geology of Greater Copenhagen.

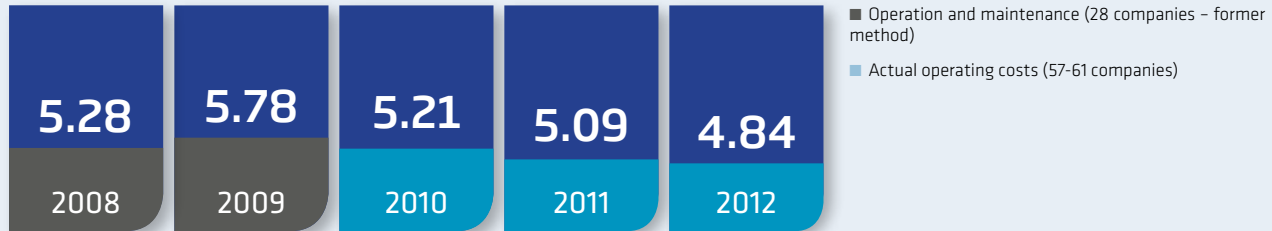
- The pipes must be tunnelled in the limestone which varies in hardness and also a layer of very hard flint. The big question is therefore at which speed we can actually bore the tunnels, which is the activity on which the entire schedule depends. However, we will know this with more certainty at the beginning of 2014 once we have bored the first 300-400 m of the pipes.

in the stream is therefore occasionally contaminated with waste water, which, according to Morten E. Jensen, is bad for the aquatic environment and causes unpleasant odours for park guests and residents in the area.

DRINKING WATER COMPANIES IN DANVA BENCHMARKING

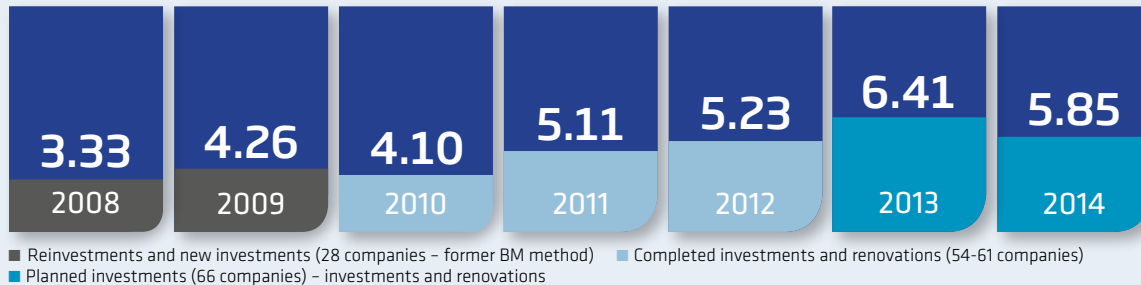
Operating costs, 2008-2012 (2012 prices)

DKK/m³ of water sold



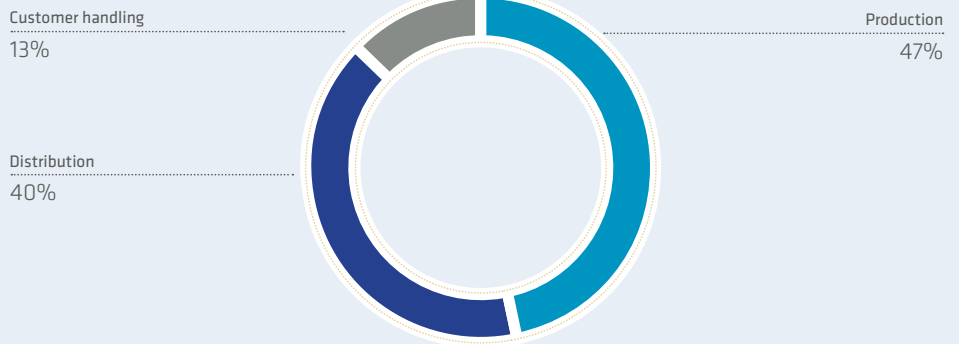
Investments, 2008-2014 (2012 prices)

DKK/m³ of water sold



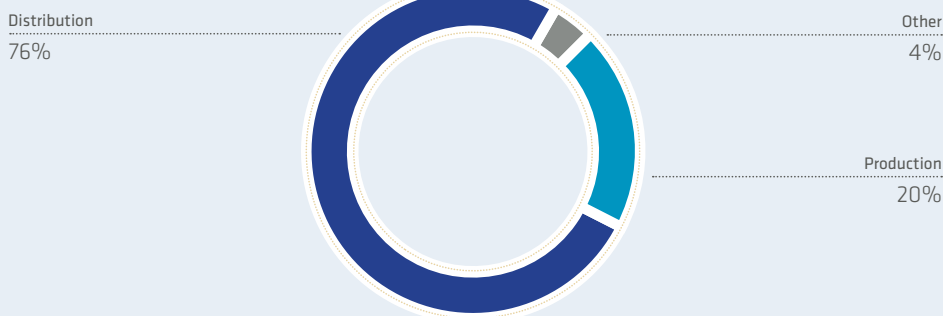
Breakdown of actual operating costs, 2012

(61 water companies)



Breakdown of investments, 2012

(43 water companies)



In 2013, 61 drinking water companies completed the DANVA Benchmarking. The figures stated are for 2012. These water companies administer 1,798 water extraction bores, 247 waterworks, approx. 28,082 km of distribution networks and approx. 713,531 service pipes. The participating companies extracted approx. 207 million m³ and supplied more than 3 million people with water. Total costs exclusive of taxes totalled approx. DKK 2.53 billion

(see an overview of the participants' key figures at the back of the publication).

Drinking water companies' operating costs continue to fall

Figures for 2012 of 61 drinking water companies' actual operating costs show operating costs of DKK 4.84 per m³ sold. The actual operating costs are subject to the Danish Water Sector Reform Act's (*Vandsektorloven*) requirements for streamlining measures and form the basis for benchmarking the efficiency of the companies. The actual operating costs are exclusive of VAT and taxes, 1:1 costs, environmental and service goals, associated activities and depreciation.

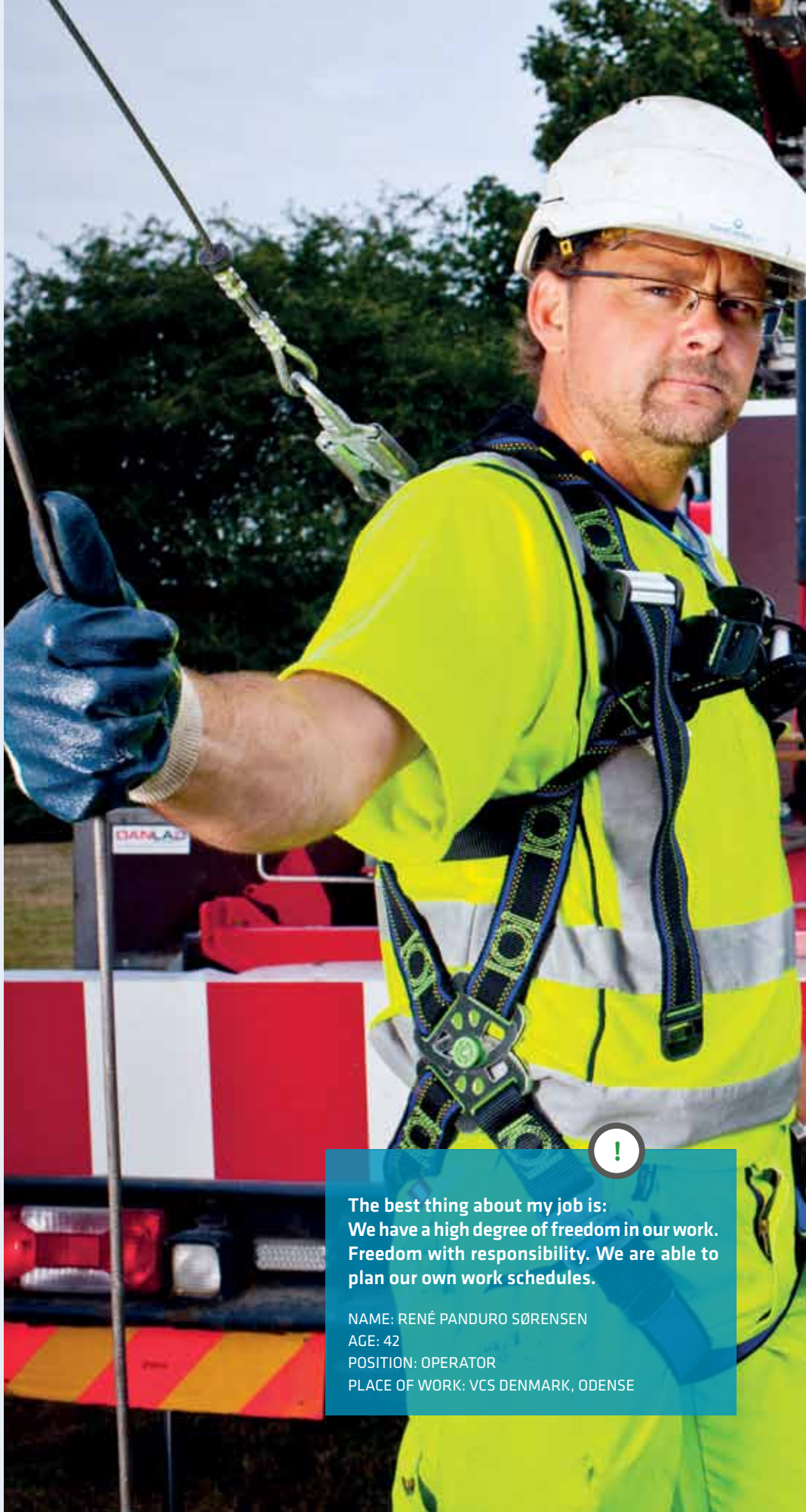
The operating figures show a fall of 7.1% from 2010 to 2012.

Investments continue to increase

Figures for 61 drinking water companies' investments in 2012 show investments of approx. DKK 5.23 per m³. The investment figures show an increase of 28% from 2010 to 2012 and are expected to continue to increase in the coming years.

Breakdown of costs

The drinking water companies use 47% of their actual operating costs on producing clean water and 40% on distributing the water to customers. On average, they use 13% of their actual operating costs on customer handling. The investments are split so that approx. two thirds are spent on renewing the distribution network while a third is allocated to bores and production plant.



**The best thing about my job is:
We have a high degree of freedom in our work.
Freedom with responsibility. We are able to
plan our own work schedules.**

NAME: RENÉ PANDURO SØRENSEN
AGE: 42
POSITION: OPERATOR
PLACE OF WORK: VCS DENMARK, ODENSE

WASTE-WATER COMPANIES IN DANVA BENCHMARKING

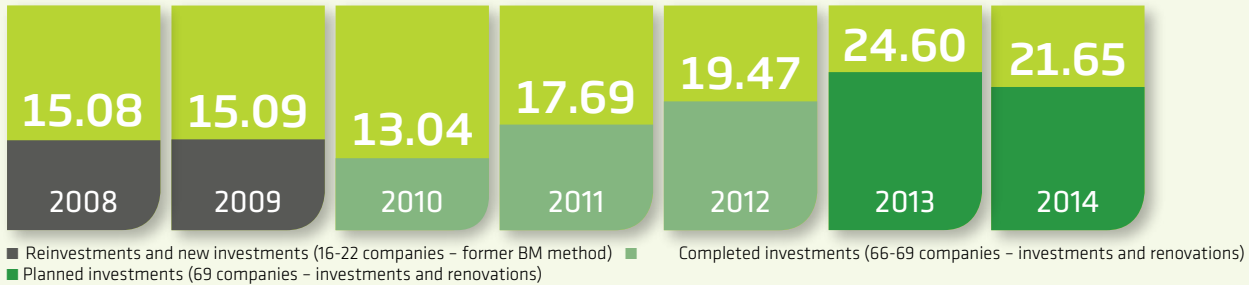
Operating costs, 2008-2012 (2012 prices)

DKK/m³ of water sold



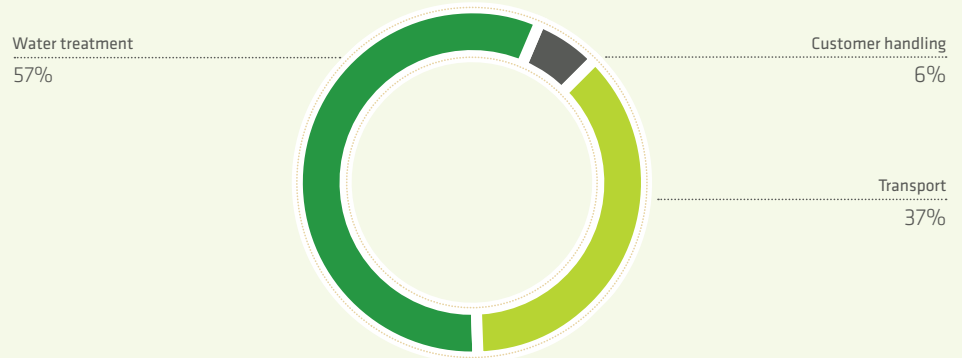
Investments, 2008-2012 (2012 prices)

DKK/m³ of water sold



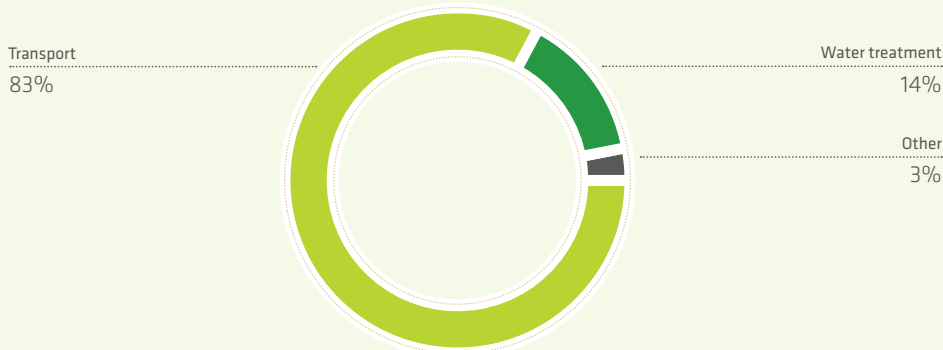
Breakdown of actual operating costs, 2012

(73 waste-water companies)



Breakdown of investments, 2012

(49 waste-water companies)



In 2013, 73 waste-water companies completed the DANVA Benchmarking. The figures stated are for 2012. The companies run a total of 563 treatment plants, which treat more than 605 million m³ of waste water, handling more than 7.0 million person equivalents (PE). Together, they service approx. 3.5 million customers via 55,700 km of sewer pipes, corresponding to a drained area of more than 208,000 hectares. Total costs exclusive of taxes totalled more than DKK 7.91 billion (see an overview of the participants' key figures at the back of the publication).

Waste-water companies' actual operating costs continue to fall

Figures for 2013 of 73 waste-water companies' actual operating costs show expenditure of approx. DKK 11.99 per m³. The actual operating costs are subject to the Danish Water Sector Reform Act's (*Vandsektorloven*) requirements for streamlining measures and form the basis for benchmarking the efficiency of the companies. The actual operating costs are exclusive of VAT and taxes, interest, 1:1 costs, environmental and service goals, associated activities, investments and depreciation.

The operating figures show a fall of 8.8% from 2010 to 2012.

Investments continue to increase

Figures for 73 waste-water companies' completed investments in 2012 show expenditure of DKK 19.47 per m³ sold in the treatment plants' catchment areas, up 49% on 2010. The same companies expect to increase their investments in 2013 and 2014.

Breakdown of costs

On average, the waste-water companies use 37% of their actual operating costs on the transport network and 57% on operating the treatment plants. On average, they use 6% of their actual operating costs on customer handling. Figures for investments and renovations show that 83% of the completed investments and renovations are used to improve and extend the transport network, while 14% are used on the treatment plants. The remaining 3% are used on other investments.



**The best thing about my job is:
My wonderful colleagues and the freedom we
are given to organise our daily work.**

NAME: JOHN TURE ROWEDDER
AGE: 56
POSITION: WASTE-WATER OPERATOR
PLACE OF WORK: RANDERS SPILDEVAND

VOLUNTARY BENCHMARKING ENSURES **BETTER PRICES AND QUALITY FOR WATER CUSTOMERS**

Since 2010, benchmarking has been mandatory for water companies. However, the great majority of the water industry has used DANVA's benchmarking system on a voluntary basis for more than 10 years, which has sharpened quality and prices and improved the possibilities for the industry of influencing statutory benchmarking.

BY KATHRINE SCHMEICHEL, FREELANCE JOURNALIST

– It is unique for companies to be able to come together and share tips on how to improve each other's competitiveness. And it is even more unusual that we, as water companies in a monopoly market, have chosen to make it voluntary, long before process benchmarking became compulsory in 2010.

The statements made by Lars Therkildsen, DANVA chairman and managing director of HOFOR, in a way sum up the purpose of the benchmarking system that DANVA has been offering the water industry for more than a decade.

Under the Danish Water Sector Reform Act, water companies above a certain size are required to carry out process benchmarking which shows key figures such as costs, investments, energy consumption, customer handling and water quality. The idea is to enable water companies to "share knowledge and experience on the efficient planning of work procedures, methods and processes" as stated in the explanatory notes to the act.

Before 2010, there were no statutory requirements for benchmarking for water companies, which at that time were included as an integral part of the municipal operations.

Competition in a monopoly market

Lars Therkildsen says about the background to DANVA's voluntary benchmarking initiative:

– As the water industry is operating in a monopoly market, our customers are not able to vote with their

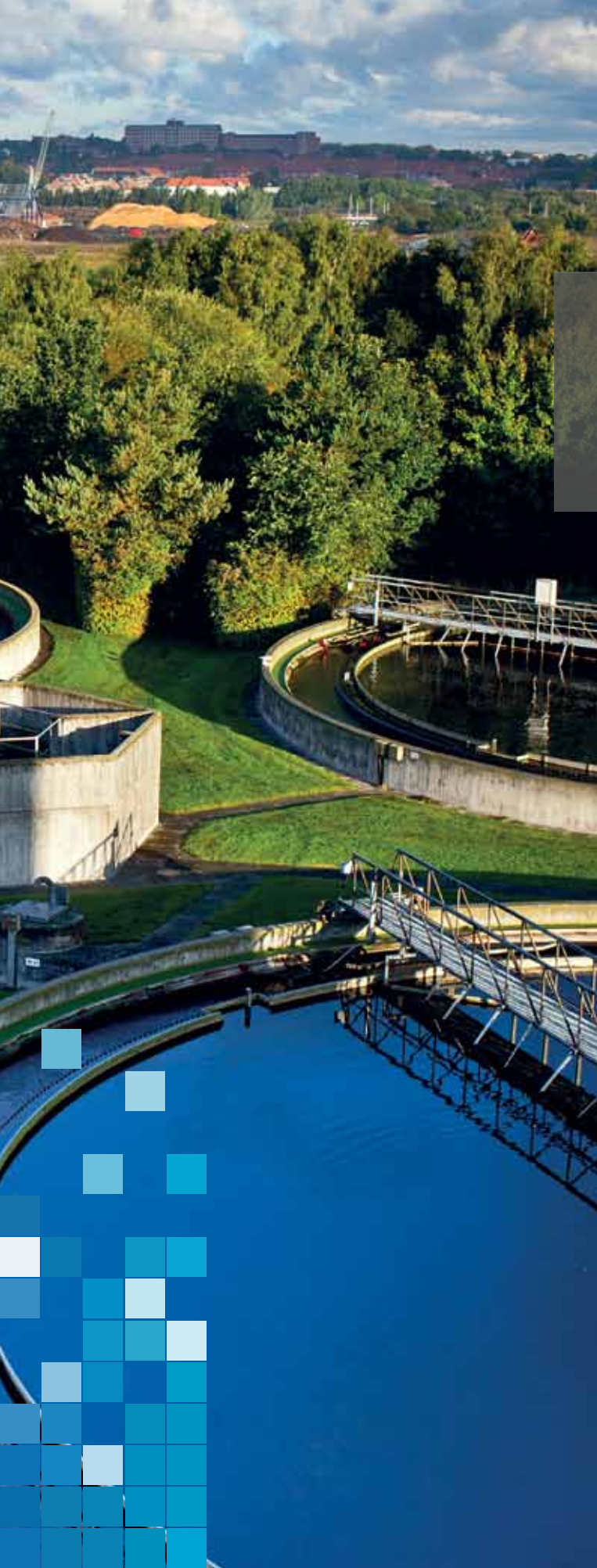
feet. So, in terms of the market forces, the next best thing is for each of us to carry out professional benchmarking of our performance as a company. As water and waste-water customers, we all have the right to demand that water and waste water be supplied and discharged efficiently and responsibly, both with regard to cost and the quality of the water. This is why DANVA has put a lot of effort into developing a benchmarking model that enables the individual water company to compare itself to others and learn from the most efficient companies to see which methods they use and what makes them better, for example when treating water or installing pipes.

As managing director of HOFOR, Lars Therkildsen is an avid user of benchmarking.

– We have compared ourselves to water companies in major cities such as Aarhus, Odense, Aalborg and Randers where we have worked systematically to examine the reasons why costs in one city develop differently to those in others. We have also used our benchmarking to compare our costs to those of water companies in Gothenburg, Malmö and Stockholm for example and found that HOFOR's prices and quality were highly competitive.

According to Lars Therkildsen, DANVA's benchmarking – which currently represents just over 40% of the water companies covered by the Danish Water Sector Reform Act – has driven progress in the water industry.





– According to a survey conducted by DANVA, waste-water companies which use DANVA's benchmarking do 11% better than other companies. No similar survey has yet been conducted for drinking water companies as the industry is slightly more complex due to the large number of small private waterworks. However, I think that the industry as a whole benefits from the extensive benchmarking.

i

DANVA BENCHMARKING

The DANVA Benchmarking system complies with the requirements set out in the Danish Water Sector Reform Act for process benchmarking and comprises 136 water companies, which together account for 54% of water consumption and treat 78% of the waste water in Denmark.

Benchmarking is like Chinese football

Thorbjørn Fangel, Deputy Director General of the Danish Nature Agency, which is responsible for the Danish Water Sector Reform Act, praises DANVA for its long-term voluntary benchmarking initiative:

– As a process optimisation tool, DANVA's benchmarking model helps to support the industry and enable the water companies to work strategically and constructively with process optimisation across organisational, business and production processes, among other things.

According to Carsten Schmidt, Deputy Director General of the Danish Competition and Consumer Authority, no data is available for measuring the impact of voluntary benchmarking on the water industry as a whole. However, he agrees that voluntary benchmarking helps to support the sector and adds that benchmarking is more advanced in the water industry than in other monopoly sectors.

– The water industry has focused a lot more on benchmarking than the heating, electricity and gas industries, which has provided the water companies with a better basis for working with statutory benchmarking. Moreover, the water industry has been more open about its benchmarking than other industries. What's more, it is clear that utilities which use DANVA's benchmarking often are the ones actively taking part in benchmarking discussions with us, which provides them with a wider platform for exercising their influence.

For the DANVA chairman who, in addition to being managing director of Denmark's largest water company while also serving as chairman of the Board of Directors of Greve Solrød Forsyning, benchmarking is both "a tool for systematically examining and assessing your own and other companies' production methods and efficiency" and a kind of game:

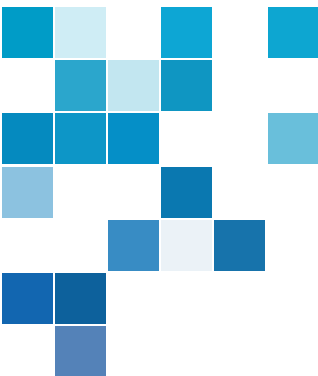
– Every year at HOFOR and Greve Solrød Forsyning, we excitedly await our benchmark ranking, and afterwards we discuss our ranking and the improvements made by us and other companies. It is like playing Chinese football where the goals keep moving because the others are moving as well. The charm of benchmarking is that it encourages the individual to move forward.



GOOD MANAGEMENT AND LONG-TERM STRATEGIES ENSURE EFFICIENCY

Vestforsyning in Holstebro is one of Denmark's most efficient utility companies. According to the company's managing director, Jørgen Udby, the recipe for success consists of equal parts long-term strategy plans, local management structure, good infrastructure and a healthy dose of innovation.

BY LISA RESCHEFSKI, DANVA.



The multi-utility company Vestforsyning is comfortably placed in the benchmarking. Seen over a number of years, Vestforsyning has established itself as one of the most efficient companies in DANVA's and the Danish Competition and Consumer Authority's benchmarking. According to Managing Director Jørgen Udby, this is because the company has kept abreast of developments by focusing heavily on involving the employees in the company's long-term plans and structuring the organisation so it is self-governing at all levels.

– During the past 6 years, we have made an enormous effort to secure our long-term goals. They are evaluated each year, involving the employees in a bottom-up process. The process takes the values which the employees have helped to formulate as its starting point. We ask all departments to state their objectives in relation to the values for the coming year. This results in a number of proposals which are translated into concrete goals, for example within the climate, the environment or streamlining.

These may take many forms and result in detailed action plans which the employees are subsequently measured against. An example of this could be climate goals where we decide to replace all the pumps because they use too much power, he says.

Ensuring efficiency

Managing Director Jørgen Udby's recipe for success comprises three main ingredients:

1) Long-term strategy plans

It is extremely important to have goals stretching 30-40 years into the future, particularly given the current level of regulation where operating costs are strictly regulated, while investments are subject to less stringent regulation. We are currently not utilising our investment capabilities because it would indebt our grandchildren. Being able to look into the crystal ball and ensure solid rolling planning would require a lot of hard work. Plans are therefore revised each year where new objectives are added.

2) Local management structure

It is crucial that everyone in the organisation feels a sense of ownership and that they feel involved in the planning and execution of our objectives. We try to prepare our employees as best we can through training plans which have focused more on social than professional aspects in recent years.

3) Good infrastructure and innovation

It is crucial to have an efficient infrastructure and the courage to work with new technology. Modern IT solutions are extremely important, but it is equally important to ensure that employees overcome the potential barrier to trying new technology and throwing themselves into growth and development projects. In most organisations there is always resistance to change, but we have seen that as employees became involved they embraced the new initiatives. The same is also seen among our customers, where our customer surveys show that they have become much more open to the many new projects and experiments we launch. We do things differently and are not afraid to take chances with new IT solutions.



Nibsbjerg Vandcenter in Holstebro.



COMMON VALUES

In their daily work, employees at Vestforsyning can refer to a common set of values: SEID.

SEID stands for:

- Service-minded – we deal with our customers individually, quickly, respectfully and competently
- Environmental awareness – we incorporate environmental and climate thinking into everything we do
- Innovative – we have the courage and the will to explore new possibilities
- Dialogue-based – we create results through open dialogue and involvement

Read more at www.vestforsyning.dk

KEEPING ABREAST OF CHANGE

The history of Vestforsyning has also been very significant for the company's efficiency.

In 2002, Vestforsyning was spun off from the Municipality of Holstebro along with the heating and electricity utilities, subsequently becoming the multi-utility Vestforsyning. However, as early as the early 1970s water utilities agreed on a common setup under which all urban and rural households could be supplied with water at uniform tariffs. This led to the installation of a vast distribution network to which many consumers were connected. The distribution network was comprehensive as virtually no small private waterworks were established.

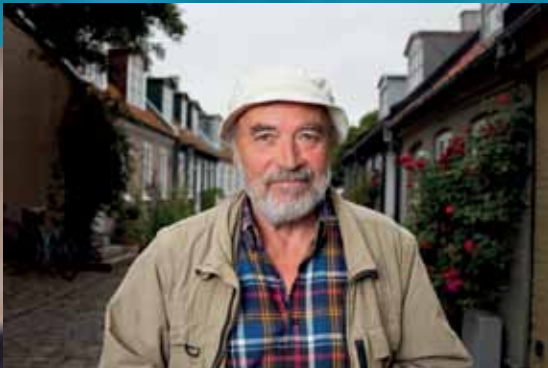
As early as the early 1980s, it was

decided to centralise waste-water treatment which geared the company for the stricter requirements that were subsequently introduced successively. In the early 1990s, the treatment plant adopted a new strategy called 'operational optimisation before installation'. The strategy was backed by annual investments to the tune of DKK 30 million which could be spent on renovating the distribution network (including separation) and/or on the treatment plant as it saw fit. At the same time, control technology has had a very high priority.

WHAT DOES YOUR WATER BILL COVER?

Do you know what your water bill covers? DANVA has conducted a small survey to find out what customers think they pay for.

BY LISA RESCHEFSKI, DANVA.



"I actually don't look at my bill, but I think it covers the supply of clean water and the discharge of waste water. And I suppose it also covers repairs to the underground pipes to my house. The fact that some of the money I pay is used to deal with rainwater and protect the environment is fine by me, but I was not aware of it."

Klaus Wegener, 69, former actor.



"I don't know, I just pay. It is of so little interest to me, so I have never studied my bill in detail."

Lea Enevoldsen, 28, nurse.

"I have never bothered to understand my bill, but if it got much higher I would probably look at it more closely instead of just paying it."

Louise Andersen, 33, physiotherapist.

ERS? WASTE WATER? ? AFFORESTATION? SEPARATI ER PROTECTION? WATER? ADAPTI



"The bill covers a lot of things. In addition to the water price, there are many different taxes, but I think it is difficult to understand what I am actually paying for. I have just moved from a house to a flat, and now that my water bill is included in the rent it is even harder to keep track of what I am paying for. However, I would not mind paying more for environmental protection or climate change adaptation, for example, as this will also benefit future generations."

Kirsten Petersen, 72, former secretary at Aarhus University.



"I am guessing hot and cold water? Actually, I have never looked at my bill – I just pay it by direct debit. The environment is not really a priority for me, so I would probably react if my bill was to increase significantly because of it. But usually I don't give it a second thought."

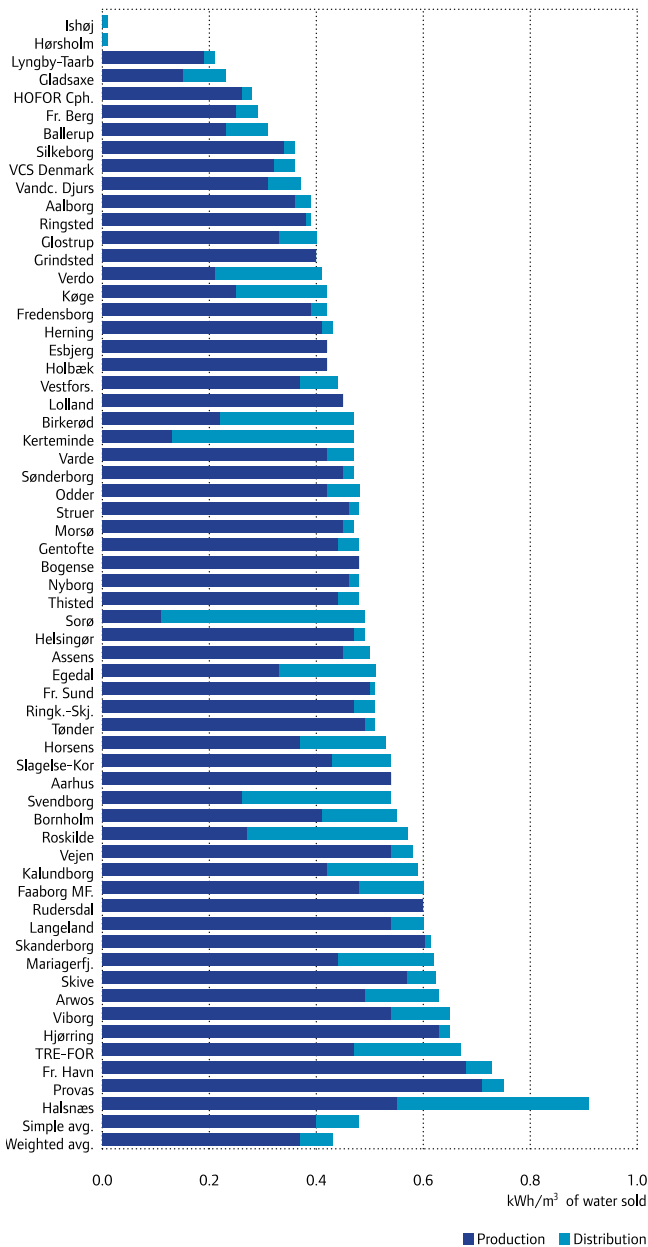
Kevin Hejl, 32, unemployed.



Electricity consumption in the drinking water companies

There are large differences in the electricity consumed to produce and distribute 1 m³ of clean water to customers. Part of the difference can be explained by particularly energy-demanding bores, topographical factors in the distribution network, water imports or a very energy-demanding distribution system. In recent years, there has been a lot of focus on energy savings through, for example, the installation of new pump technology on the discharge pumps and pressure boosters as well as optimised bore pump management, which should mean that energy consumption will fall. The average electricity consumption for drinking water is 0.43 kWh per m³ sold.

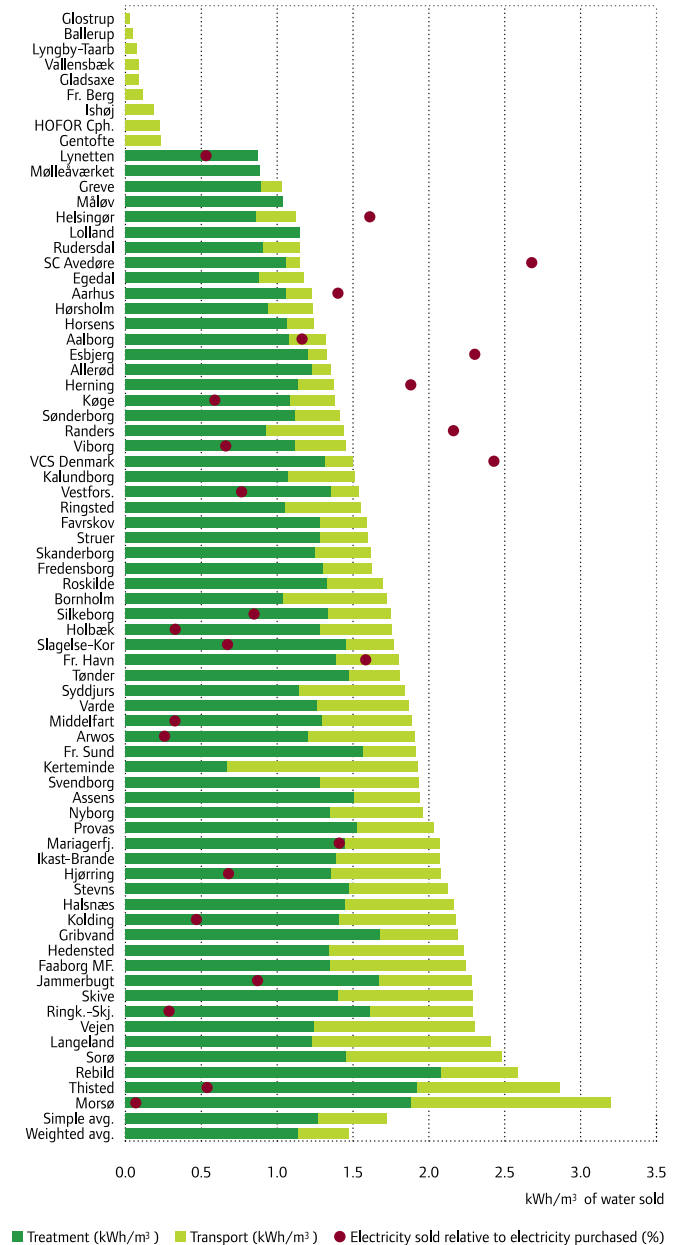
Drinking water companies' electricity consumption, 2012



Electricity consumption in the waste-water companies

There are still huge variations in the waste-water companies' electricity consumption per m³ of treated water. Among other things, this can be explained by the fact there are differences in the composition of the waste water, which means differences in the electricity consumption for aeration at the treatment plants. Another important factor is how much the water is pumped. A large distribution network which requires a lot of pumping will be more expensive than a network where the waste water can largely run freely on its own. In recent years, considerable efforts have gone into process optimisation, and especially into optimising aeration systems, which all contribute to reducing electricity consumption. The average electricity consumption per m³ of water treated and sold is 1.47 kWh per m³ sold.

Waste-water companies' electricity consumption, 2012





The best thing about my job is: That we spend a lot of time outdoors and get to experience so many things driving around to all the different bores. We get around a lot in all kinds of weather.

NAME: VAGN HANSEN (LEFT)
AGE: 60
POSITION: FITTER
PLACE OF WORK: VCS DENMARK, ODENSE

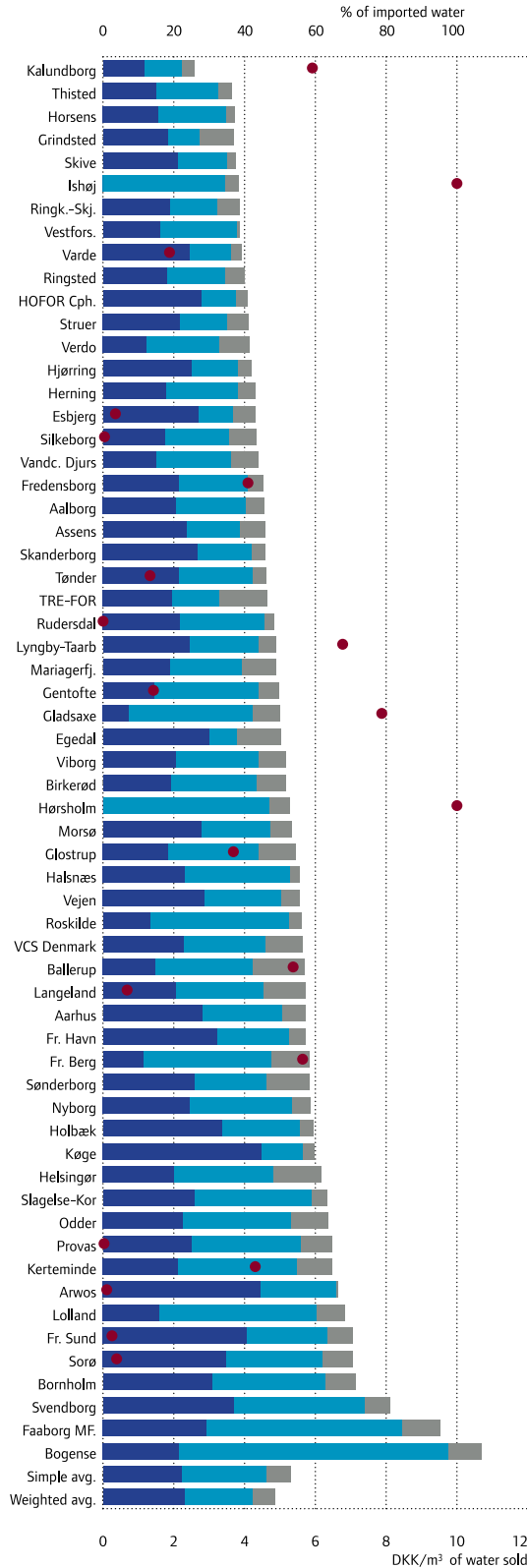
Big variation in actual costs

The weighted average actual cost of producing and distributing 1 m³ of water is DKK 4.84. However, there is a big difference between the lowest and highest costs, primarily due to the very different conditions under which the companies operate. Production costs are impacted, among other things, by the geological conditions and access to the groundwater, the extent of groundwater protection and the treatment steps which are required before the water is pumped to the distribution network. For the distribution, factors such as urban density and the extent, quality and age of the distribution network influence the costs.

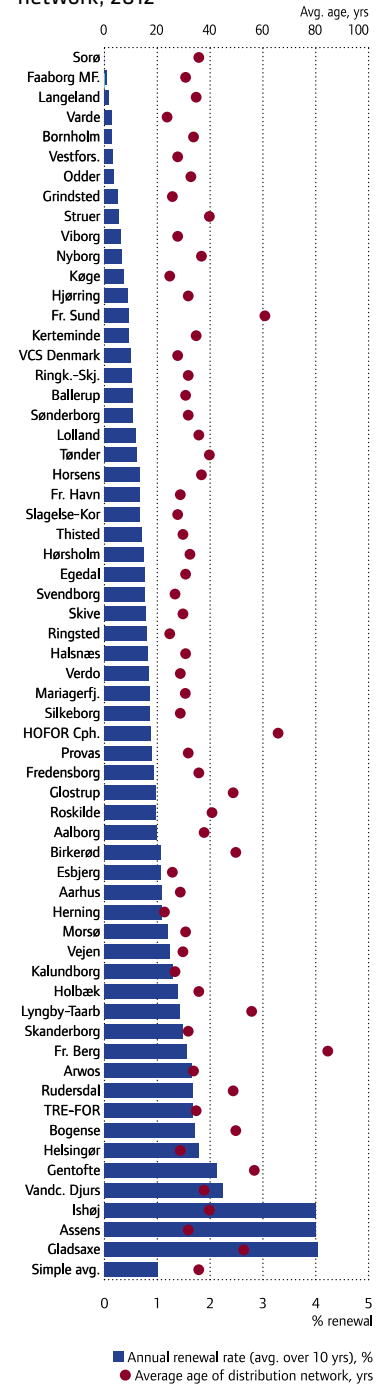
Renewal of the distribution network

The distribution network is continually being renewed in order to maintain the high standards, i.e. a low level of non-revenue water and a high reliability of supply. The renewal rate of the distribution network shows what percentage of the network has on average been replaced each year over the past 10 years. The average age of the distribution networks owned by the participating companies is 36 years. Many factors determine the rate at which a network needs to be renewed, including for example materials, geological conditions and age.

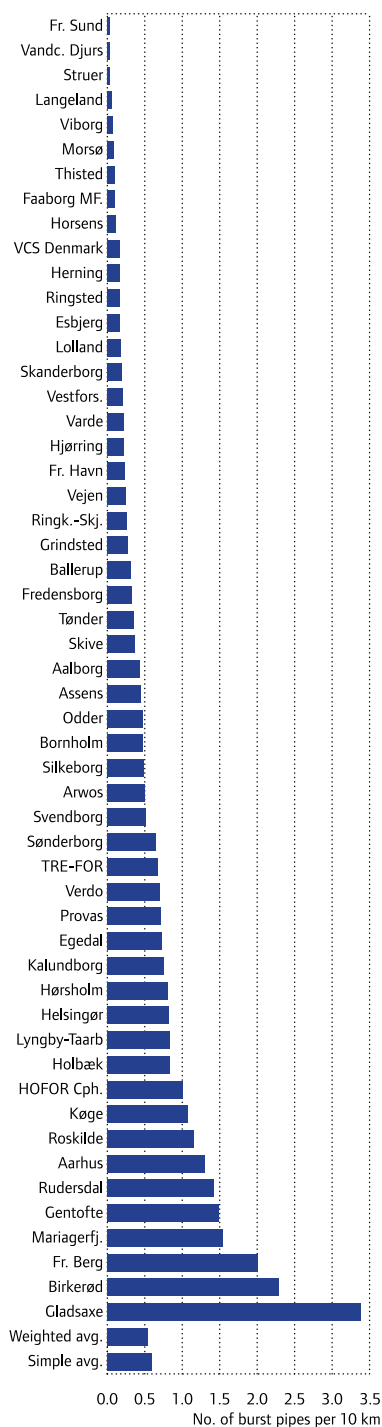
Actual operating costs, 2012



Renewal rate of the distribution network, 2012



Frequency of burst pipes in the distribution network, 2012 (excluding external factors)



Considerable variation in no. of burst pipes

Among the participating companies, there is considerable variation in the frequency of burst water pipes, measured as burst pipes per 10 km of supply line. The number of burst pipes excludes incidents caused by external factors and burst service pipes. External factors may be damage to the pipes caused by, for example, excavation work. Burst water pipes may also be attributable to age, pipe materials, brackets, geology as well as the quality of the work.

Non-revenue water is stable

For 33 drinking water companies which have participated in the DANVA Benchmarking over the past 5 years, it looks as though non-revenue water has stabilised.

The companies are spending an increasing amount of resources on leak loss where the distribution network is examined for 'holes' through which water can seep out. Even if the distribution network is continually improved, it is not reflected in a clear fall in the non-revenue water percentage as the continuing decline in water consumption pushes the percentage up.

Non-revenue water

The drinking water companies calculate non-revenue water as the difference between the water volume pumped out to the network and the water volumes registered by customers. Non-revenue water can be calculated as a percentage of the water volume pumped out to the network or as non-revenue water per km of pipes per day. Non-revenue water includes direct losses via leakages in the distribution network, losses due to repairs and burst pipes, water for flushing pipes in connection with repairs and water used for fire fighting as well as measuring uncertainty.

Note:

The registration does not take into account any subsequent adjustments of non-revenue water relative to approved water volumes used for additional flushing in the event of contamination etc. This means that there may be a small difference between the non-revenue water in the chart and the non-revenue water reported by the companies (see chart on the next page).





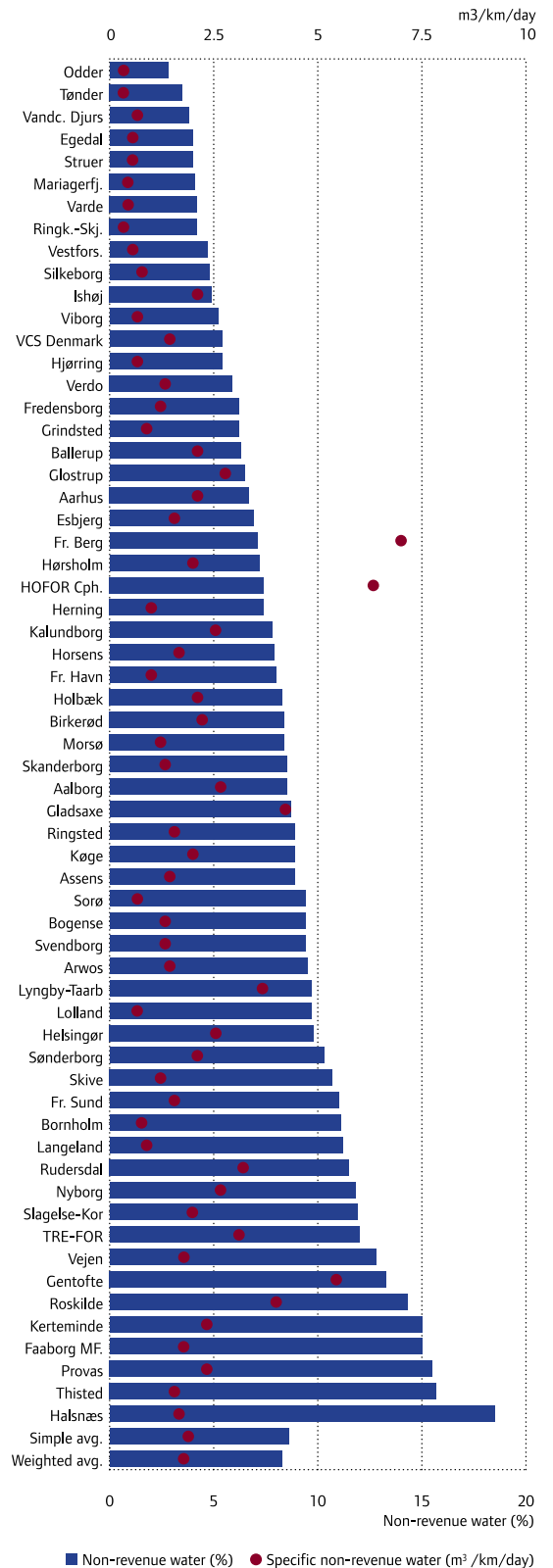
Non-revenue water, 2008-2012



Average for 33 companies which have participated in DANVA Benchmarking the past 5 years

(see text on previous page)

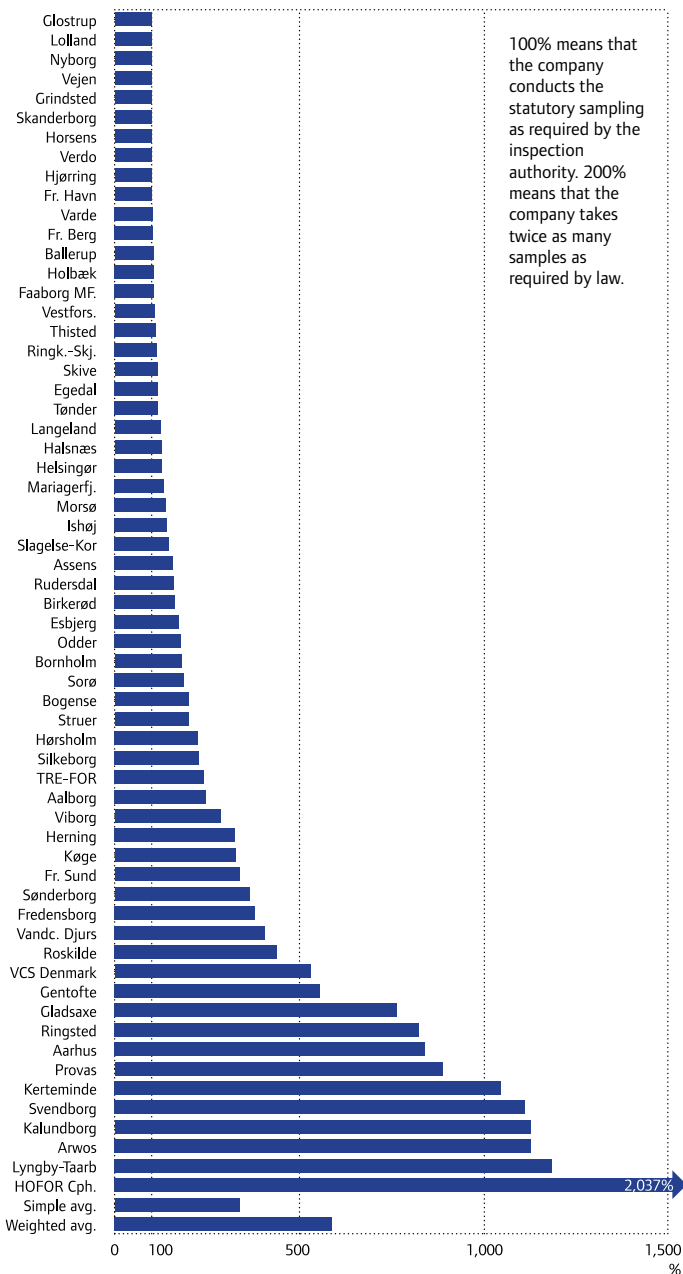
Non-revenue water, 2012



Microbiological samples in relation to requirements, 2012

All drinking water companies conduct checks on the water before it is supplied to customers – the checks are carried out both at the waterworks and on water in the distribution network. Five out of six drinking water companies take more water samples than required by the inspection authority in order to check for microbiological contamination. Every ten companies take more than ten times as many samples as is required by law. Of the microbiological samples taken, 96% comply with all the quality requirements. If just one analysis parameter in a water sample fails to comply with the quality requirements, the sample is registered as 'failed', but it does not necessarily mean that the water is hazardous to health, just that there are factors which need to be investigated. It is up to the individual drinking water company to decide on the extent of sampling over and above the statutory requirements.

Microbiological samples in relation to requirements, 2012



100% means that the company conducts the statutory sampling as required by the inspection authority. 200% means that the company takes twice as many samples as required by law.

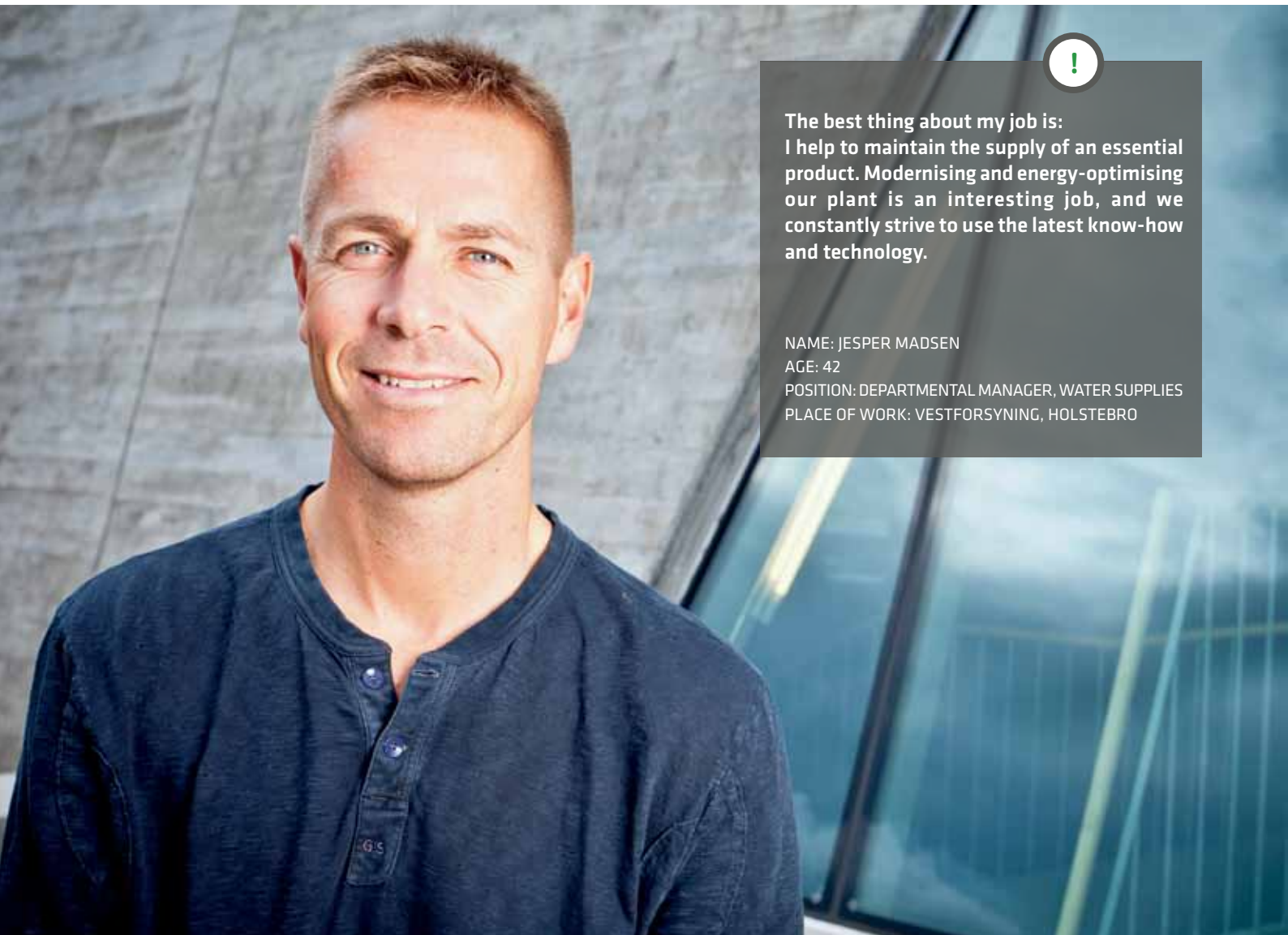


Big variation in actual operating costs

The calculated average of the actual costs of transporting and treating 1 m³ of water sold is DKK 10.93. However, there is a big difference between the individual companies' costs, which reflects the very different conditions under which the companies operate. For example, there are considerable topographical differences, differences in population density, as well as differences between residential areas and major industrial areas. The type of excess sludge and the disposal options also have a big impact on treatment costs.

Renewal rate of sewer network

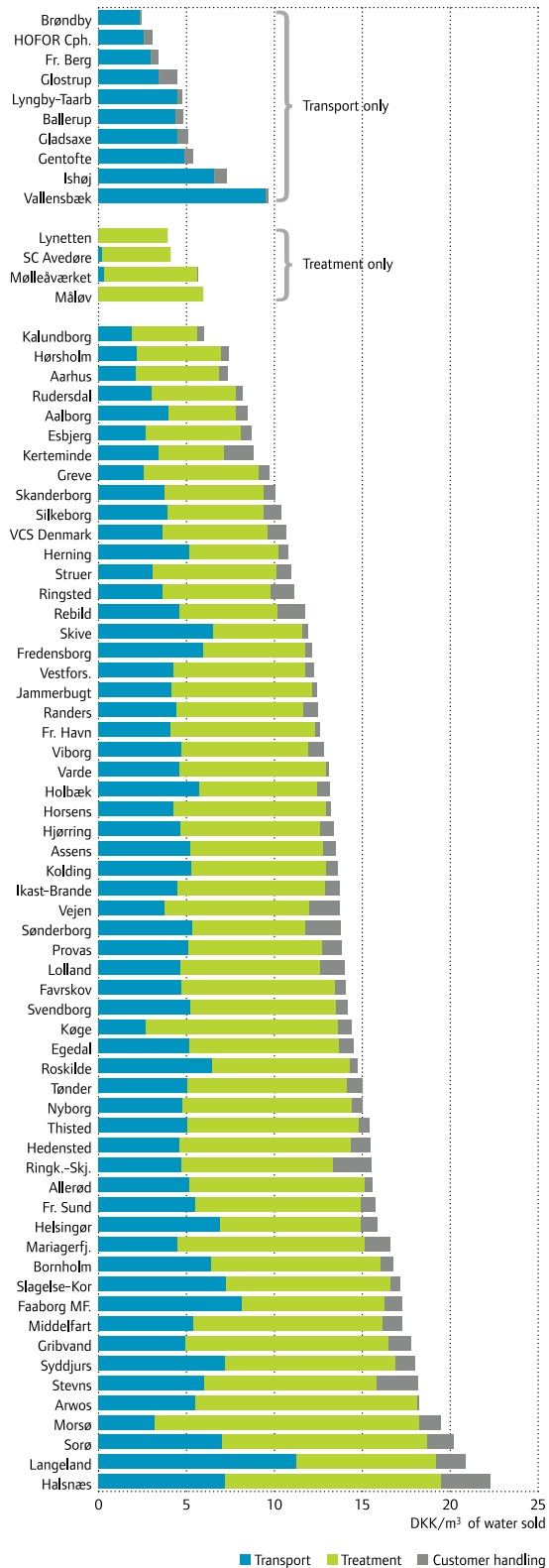
The renewal rate of the sewer network shows how high a percentage of the network owned by the company in question has on average been replaced over the past 10 years. In recent years, the benchmarking has shown that more and more companies have a renewal rate above 1%, which very much reflects the major investments which have been made in the sewer network lately. The companies participating in the benchmarking have sewer networks which are an average of 34.5 years old.



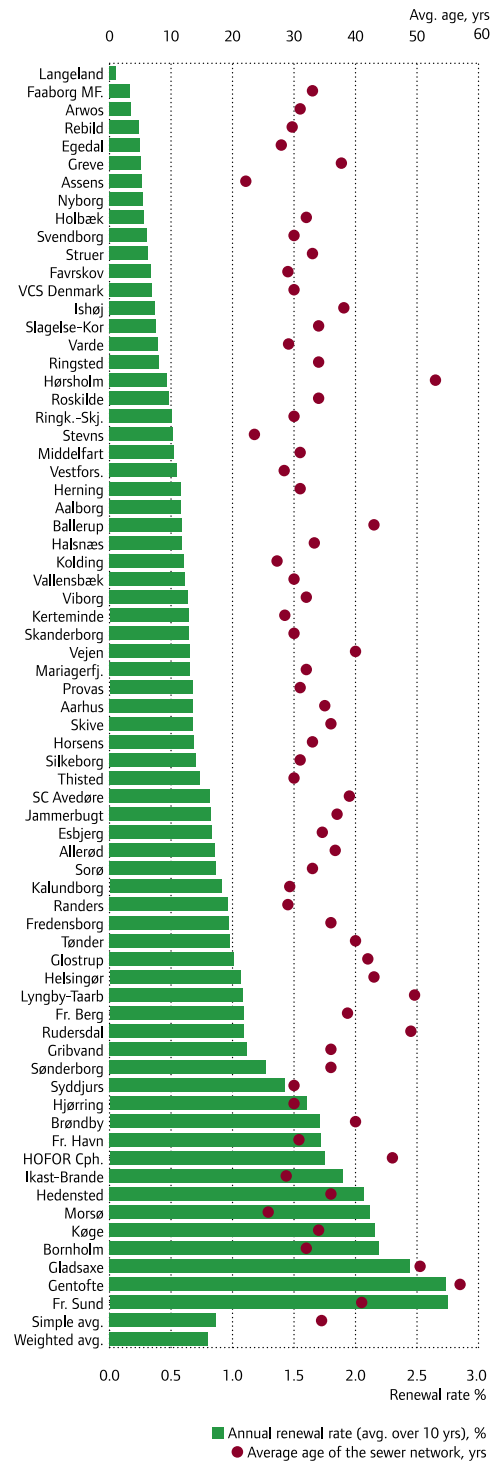
The best thing about my job is: I help to maintain the supply of an essential product. Modernising and energy-optimising our plant is an interesting job, and we constantly strive to use the latest know-how and technology.

NAME: JESPER MADSEN
AGE: 42
POSITION: DEPARTMENTAL MANAGER, WATER SUPPLIES
PLACE OF WORK: VESTFORSYNING, HOLSTEBRO

Actual operating costs, 2012



Renewal rate of the sewer network, 2012





The best thing about my job is: Customer contact. I receive about 20-30 enquiries a day, and being able to offer our customers a good service and help them with their problems is very important to me.

NAME: LENE NØRREGAARD JENSEN

AGE: 36

POSITION: CUSTOMER ADVISER

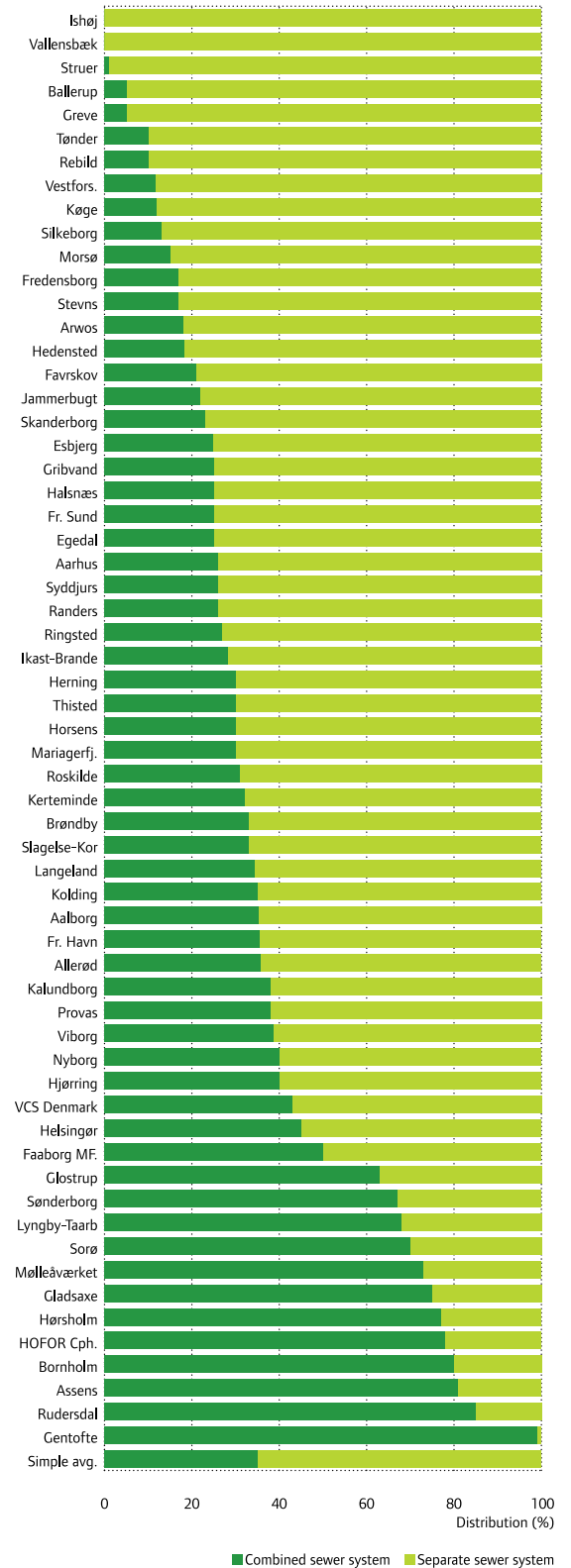
PLACE OF WORK: VCS DENMARK, ODENSE



Combined and separate sewer systems

There are big differences between the extent to which the benchmarked waste-water companies have separate sewer systems. Some companies have almost only combined waste-water systems, while others have primarily separate waste-water and rainwater sewer systems. Replacing a combined sewer system with a separate system is a major investment as the combined sewer systems are often seen in town centres.

Distribution of combined and separate sewer systems, 2012



Drinking water companies participating in DANVA Benchmarking 2013 (data for 2012)	KEY DATA				
	Population of the supply area	Total volume of water sold	Bores (water extraction)	Waterworks	Distribution network
Companies	individuals	m³/yr	no.	no.	km
Arvos Vand A/S	22,000	1,209,424	16	3	260
Assens Vandværk a/s	8,378	665,461	9	3	135
Birkerød Vandforsyning a.m.b.a.	22,000	1,142,443	9	1	144
Bogense Forsyningsselskab A.m.b.a.	4,500	235,181	2	1	58
Bornholms Forsyning A/S	20,000	1,287,323	27	5	673
Egedal Vandforsyning A/S	16,400	622,575	9	1	152
Energi Viborg Vand A/S	51,517	2,232,253	11	4	535
Energiforsyningen (Køge Vand A/S)	31,180	1,851,737	21	3	278
Esbjerg Vand A/S	92,000	6,846,631	48	6	993
FFV Vand A/S	9,308	729,460	7	2	201
Forsyning Ballerup A/S	54,000	3,217,893	11	5	319
Forsyning Helsingør Vand A/S	58,000	2,888,126	23	4	376
Fredensborg Vand A/S	38,150	1,701,943	13	2	273
Frederiksberg Vand A/S	101,247	5,111,838	5	1	169
Frederikshavn Vand A/S	50,700	4,281,176	100	6	1,133
Frederikssund Vand A/S	27,700	1,307,873	19	5	325
Glostrup Vand A/S	21,650	1,249,063	10	3	95
Grindsted Vandværk A.m.b.a.	11,939	1,110,732	11	2	254
Halsnæs Kommunale Vandforsyning A/S	14,700	581,566	20	3	243
Herning Vand A/S	49,710	3,235,000	21	3	743
Hjørring Vandselskab A/S	34,000	3,544,053	50	5	830
HOFOR Vand København A/S	554,245	47,971,981	473	7	1,130
Holbæk Vand A/S	7,814	2,206,994	14	2	214
Horsens Vand A/S	49,355	3,848,455	23	4	612
Hørsholm Vand ApS	24,321	1,261,306	0	0	149
Ishøj Vand A/S	21,131	1,039,690			75
Kalundborg Vandforsyning A/S	13,433	2,776,987	16	1	277
Kerteminde Forsyning – Vand A/S	17,000	880,208	9	2	193
Langeland Vand ApS	9,500	834,243	25	4	337
Lolland Vand A/S	38,500	1,741,446	29	4	840
Lyngby-Taarbæk Vand A/S	53,840	2,856,444	8	2	253
Mariagerfjord Vand a/s	15,200	1,260,422	16	8	291
Morsø Vand A/S	9,222	532,263	9	2	117
NFS A/S	16,000	1,222,983	18	2	184
Nordvand (Gentofte Vand A/S)	72,264	3,699,270	23	1	316
Nordvand (Gldsaxe Vand A/S)	64,515	3,470,154	5	2	240
Odder Vandværk A.m.b.a.	10,649	855,976	5	2	212

PROCESS BENCHMARKING (OVERALL FIGURES)					PRICES 2012		
Actual operating costs for production, distribution and customer handling	Operating costs for production	Operating costs for distribution	Operating costs for customer handling	Completed investments and renovations	Fixed annual contribution including VAT	Variable water contribution including VAT and taxes	Cost of consumption of 100 m³/yr
DKK/m³ sold	DKK/m³ sold	DKK/m³ sold	DKK/m³ sold	DKK/m³ sold	DKK	DKK/m³ sold	DKK
7.28	4.45	2.14	0.06	4.75	563	15.06	2,042
4.57	2.35	1.51	0.71	12.74	575	14.78	2,053
5.18	1.91	2.44	0.83	2.89	425	14.04	1,829
10.69	2.14	7.62	0.93	4.88	1,125	14.26	2,551
7.15	3.07	3.20	0.88	5.77	1,221	17.14	2,935
5.02	2.99	0.78	1.25	6.75	330	15.73	1,903
5.17	2.05	2.33	0.79	3.35	565	16.13	2,178
5.85	4.47	1.17	0.33	4.36	239	20.28	2,267
4.31	2.69	0.96	0.66	4.21	1,055	14.33	2,488
9.52	2.93	5.51	1.08	5.52	875	17.38	2,613
5.69	1.48	2.73	1.48	2.06	0	22.02	2,202
6.16	2.01	2.79	1.36	12.68	550	20.49	2,599
4.52	2.14	1.94	0.45	6.50	254	16.15	1,869
5.83	1.12	3.63	1.07	2.70	370	21.93	2,563
5.74	3.21	2.04	0.49	4.63	1,313	14.89	2,802
7.05	4.06	2.27	0.72	4.82	763	15.00	2,263
5.44	1.83	2.56	1.05	3.87	214	23.46	2,560
3.71	1.83	0.91	0.97	1.04	675	10.09	1,684
8.04	2.32	2.95	0.29	7.56	525	21.04	2,629
4.31	1.77	2.05	0.49	3.98	630	14.81	2,111
4.18	2.49	1.32	0.36	3.60	938	14.75	2,413
4.08	2.77	0.98	0.33	2.46	475	18.60	2,335
5.95	3.35	2.21	0.39	2.27	0	17.52	1,752
3.70	1.56	1.93	0.22	3.17	930	13.59	2,289
5.28	0.00	4.69	0.59	4.59	0	24.80	2,480
3.84	0.00	3.46	0.38	7.45	226	24.50	2,676
2.59	1.16	1.08	0.35	3.03	0	19.63	1,963
6.46	2.12	3.35	0.98	3.29	425	19.03	2,328
5.73	2.05	2.48	1.20	6.67	500	13.80	1,880
6.84	1.59	4.42	0.83	15.74	767	28.53	3,620
4.88	2.44	1.95	0.49	15.08	0	23.00	2,300
4.89	1.87	2.04	0.98	3.97	780	13.00	2,080
5.33	2.77	1.96	0.59	5.42	680	15.57	2,237
5.87	2.45	2.87	0.55	2.45	500	17.38	2,238
4.96	1.44	2.96	0.57	11.05	0	20.15	2,015
5.01	0.73	3.49	0.80	11.42	0	20.75	2,075
6.37	2.26	3.05	1.06	1.41	700	13.81	2,081

Drinking water companies participating in DANVA Benchmarking 2013 (data for 2012)	KEY DATA				
	Population of the supply area	Total volume of water sold	Bores (water extraction)	Waterworks	Distribution network
Companies	individuals	m³/yr	no.	no.	km
Provas	33,000	1,677,331	13	3	407
Ringkøbing-Skjern Vand A/S	43,723	3,261,103	34	8	1,140
Ringsted Vand A/S	33,242	1,968,268	13	4	369
Roskilde Vand A/S	49,100	2,986,928	20	3	371
Rudersdal Forsyning	33,000	1,699,180	13	3	204
Silkeborg Vand A/S	45,600	2,428,799	7	2	496
SK Vand A/S	66,000	3,549,893	49	6	731
Skanderborg Forsyningsvirksomhed A/S	17,500	976,052	20	5	201
Skive Vandforsyning A/S	33,000	2,316,736	28	9	690
Sorø Vand A/S	10,000	480,618	8	1	246
Struer Forsyning Vand A/S	16,000	1,110,624	11	3	264
Svendborg Vand A/S	37,500	1,942,480	27	6	450
Sønderborg Vandforsyning A/S	40,248	2,180,413	24	7	359
Thisted Vand	31,470	2,913,468	38	9	1,042
TRE-FOR Vand A/S	147,000	10,608,651	86	10	1,423
Tønder Vand A/S	24,370	1,686,594	12	5	547
Vandcenter Djurs a.m.b.a.	16,000	1,510,000	19	4	264
VCS Denmark	156,000	8,582,926	45	7	995
Varde Vandforsyning A/S	18,575	1,664,753	15	3	510
Vejen Forsyning A/S	12,700	642,101	5	3	161
Verdo Vand A/S	47,304	2,346,495	20	4	343
Vestforsyning Vand A/S	42,924	3,702,715	31	7	1,098
Aalborg Forsyning, Vand A/S	111,919	6,516,715	57	14	682
Aarhus Water A/S	269,794	14,323,721	88	10	1,461

PROCESS BENCHMARKING (OVERALL FIGURES)					PRICES 2012		
Actual operating costs for production, distribution and customer handling	Operating costs for production	Operating costs for distribution	Operating costs for customer handling	Completed investments and renovations	Fixed annual contribution including VAT	Variable water contribution including VAT and taxes	Cost of consumption of 100 m³/yr
DKK/m³ sold	DKK/m³ sold	DKK/m³ sold	DKK/m³ sold	DKK/m³ sold	DKK	DKK/m³ sold	DKK
6.46	2.49	3.10	0.87	5.71	825	17.49	2,574
3.85	1.90	1.32	0.64	11.90	1,038	14.35	2,473
4.00	1.79	1.66	0.55	3.62	186	19.70	2,156
5.61	1.33	3.91	0.37	2.93	376	21.85	2,561
4.82	2.17	2.38	0.27	4.95	424	16.29	2,053
4.34	1.75	1.82	0.78	6.34	788	13.55	2,143
6.30	2.58	3.31	0.45	14.27	1,200	13.21	2,521
4.59	2.67	1.51	0.41	8.57	1,128	14.04	2,532
3.75	2.10	1.40	0.24	3.25	688	13.94	2,082
7.06	3.48	2.70	0.88	6.88	520	19.10	2,430
4.11	2.18	1.31	0.62	1.22	539	12.57	1,796
8.11	3.68	3.71	0.72	4.44	784	17.79	2,563
5.84	2.57	2.04	1.23	2.74	555	15.36	2,091
3.63	1.51	1.75	0.37	5.76	693	15.71	2,264
4.64	1.95	1.33	1.35	11.19	1,188	14.88	2,676
4.61	2.14	2.06	0.40	8.06	516	17.25	2,241
4.39	1.49	2.11	0.78	3.67	650	12.13	1,863
5.64	2.28	2.31	1.05	6.75	600	16.19	2,219
3.91	2.46	1.14	0.31	4.61	1,039	12.36	2,275
5.56	2.87	2.15	0.55	3.95	500	14.76	1,238
4.13	1.23	2.06	0.84	4.31	694	15.70	2,264
3.86	1.61	2.16	0.09	6.38	658	13.53	2,011
4.54	2.07	1.95	0.53	2.25	1,250	13.63	2,613
5.73	2.79	2.27	0.66	5.50	688	20.89	2,777

Waste-water companies participating in DANVA Benchmarking 2013 (data for 2012)	KEY DATA					
	Population of the supply area	Sewer pipes (waste water and rainwater)	Debited water volume	Treatment plant above 30 PE	Volume of inflow to treatment plants	Total organic impact
Companies	individuals	km	m ³ /yr	no.	m ³ /yr	PE, person equivalents
Afløb Ballerup A/S	48,098	377	2,780,849	0		
Allerød Spildevand A/S	7,479	271	1,104,815	3	2,638,150	34,500
Arwos Spildevand A/S	22,823	1,108	2,564,715	8	7,434,576	66,429
Assens Spildevand A/S	35,200	949	1,843,200	9	5,647,653	78,441
Bornholms Forsyning A/S	30,000	800	1,871,062	9	6,958,000	65,000
Brøndby Kloakforsyning A/S	34,700	290	1,844,863	0		
Egedal Spildevand A/S	39,828	588	1,555,033	4	2,513,299	21,933
Energi Viborg Spildevand A/S	42,113	1,669	3,919,570	22	11,621,665	128,328
Energiforsyningen (Køge Afløb A/S)	55,021	543	2,699,674	7	6,827,190	99,156
Esbjerg Spildevand A/S	119,000	1,268	6,599,960	11	18,467,431	251,082
Favrskov Forsyning	41,436	836	1,831,337	10	4,674,927	45,500
FFV Spildevand A/S	25,000	1,214	2,399,915	8	9,131,000	63,127
Forsyning Helsingør Spildevand A/S	61,000	573	2,997,814	3	6,730,574	62,613
Fredensborg Spildevand A/S	39,462	423	1,701,943	3	2,909,611	23,619
Frederiksberg Kloak A/S	101,247	146	4,981,067	0		
Frederikshavn Spildevand A/S	51,823	856	3,814,703	9	12,023,469	215,363
Frederikssund Spildevand A/S	39,000	655	1,986,726	8	4,654,979	41,699
Glostrup Spildevand A/S	21,650	156	1,229,169	0		
Greve Solrød Spildevand A/S	68,752	812	3,072,207	2	6,658,392	71,132
Gribvand Spildevand A/S	38,000	759	1,796,734	10	6,359,879	38,730
Halsnæs Kommunale Spildevandsforsyning A/S	19,800	550	1,295,680	4	4,155,078	21,433
Hedensted Spildevand A/S	46,044	865	1,823,792	6	6,350,539	63,264
Herning Vand A/S	70,000	1,195	4,195,633	14	15,530,156	242,236
Hjørring Vandselskab A/S	62,878	1124	3,345,737	10	10,698,851	203,121
HØFOR Spildevand København A/S	554,245	1,070	29,334,581	0		
Holbæk Spildevand A/S	34,106	931	2,846,094	16	6,526,377	82,668
Horsens Vand A/S	71,137	1,164	4,494,520	7	11,141,982	298,778
Hørsholm Vand ApS	9,697	191	1,727,999	1	4,432,740	29,819
Ikast-Brande Spildevand A/S	35,600	611	1,770,513	4	7,339,634	49,973
Ishøj Spildevand A/S	24,033	155	1,042,101	0		
Jammerbugt Forsyning A/S	45,600	799	1,791,446	5	5,737,573	40,342
Kalundborg Spildevandsanlæg A/S	38,389	771	6,815,629	13	8,294,179	92,894
Kerteminde Forsyning – Spildevand A/S	20,642	392	1,319,498	4	2,585,209	20,063
Kolding Spildevand a/s	83,315	1,390	4,233,210	7	14,594,508	122,534
Langeland Spildevand ApS	8,701	312	600,468	7	2,338,466	11,104
Lolland Spildevand A/S	24,000	880	1,775,334	57	7,200,000	95,000
Lynettefællesskabet I/S			41,768,250	2	85,600,000	1,132,603

PROCESS BENCHMARKING (OVERALL FIGURES)					PRICES 2012		
Actual operating costs for transport, treatment and customer handling	Operating costs for transport	Operating costs for treatment	Operating costs for customer handling	Completed investments and renovations	Fixed annual contribution including VAT	Variable contribution including VAT and taxes	Cost of consumption of 100 m³/yr
DKK/m³ sold	DKK/m³ sold	DKK/m³ sold	DKK/m³ sold	DKK/m³ sold	DKK	DKK/m³	DKK
4.81	4.38	0.00	0.44	14.25	0	25.91	2,591
15.58	5.16	9.95	0.47	26.25	0	49.25	4,925
17.61	5.50	12.61	0.09	17.75	313	38.75	4,188
13.51	5.22	7.52	0.77	31.18	664	41.74	4,838
16.78	6.42	9.63	0.72	16.24	644	33.45	3,989
2.44	2.36	0.00	0.08	12.95	0	29.50	2,950
14.50	5.14	8.50	0.86	15.89	0	44.86	4,486
12.82	4.72	7.21	0.90	16.53	0	35.43	3,543
14.37	2.67	10.92	0.78	27.44	0	37.34	3,734
8.71	2.70	5.39	0.62	23.81	694	23.16	3,010
14.03	4.73	8.71	0.59	31.86	546	35.87	4,133
17.24	8.15	8.10	0.99	14.81	706	34.58	4,164
15.84	6.91	7.97	0.96	23.11	640	39.50	4,590
12.15	5.95	5.76	0.45	29.81	0	42.59	4,259
3.40	2.96	0.00	0.44	3.54	0	14.24	1,424
12.61	4.06	8.24	0.31	20.93	879	38.21	4,700
15.76	5.48	9.43	0.84	22.74	668	33.75	4,043
4.51	3.39	0.00	1.11	8.36	0	23.95	2,395
9.70	2.59	6.49	0.63	14.79	0	31.55	3,155
17.74	4.93	11.52	1.30	47.74	640	43.38	4,978
22.25	7.18	12.28	2.79	42.56	588	51.00	5,688
15.44	4.60	9.75	1.09	65.12	705	48.00	5,505
10.79	5.13	5.12	0.54	16.79	0	25.62	2,562
13.36	4.63	7.98	0.76	10.56	835	31.13	3,948
3.05	2.59	0.00	0.46	3.42	0	20.44	2,044
13.13	5.70	6.72	0.70	29.43	0	31.42	3,142
13.20	4.23	8.71	0.26	12.14	686	24.80	3,166
7.36	2.17	4.79	0.40	20.78	0	31.25	3,125
13.68	4.49	8.38	0.81	21.08	625	34.38	4,063
7.30	6.57	0.00	0.73	15.32	0	32.50	3,250
12.40	4.17	7.97	0.26	18.23	706	23.55	3,061
5.97	1.91	3.71	0.35	7.06	0	44.07	4,407
8.83	3.39	3.73	1.71	16.60	0	32.80	3,280
13.43	5.28	7.61	0.70	21.12	584	36.25	4,209
20.83	11.26	7.92	1.66	31.79	688	30.18	3,706
14.00	4.65	7.90	1.45	30.95			
3.93	0.00	3.93	0.00	2.65			

Waste-water companies participating in DANVA Benchmarking 2013 (data for 2012)	KEY DATA					
	Population of the supply area	Sewer pipes (waste water and rainwater)	Debited water volume	Treatment plant above 30 PE	Volume of inflow to treatment plants	Total organic impact
Companies	individuals	km	m ³ /yr	no.	m ³ /yr	PE, person equivalents
Lyngby-Taarbæk Spildevand A/S	53,825	338	2,697,648	0		
Mariagerfjord Spildevand A/S	30,000	717	1,970,752	10	7,198,530	71,008
Middelfart Spildevand A/S	37,523	672	1,517,905	7	6,985,352	51,954
Morsø Spildevand A/S	15,190	439	870,184	5	3,365,656	25,252
Mølleåværket Renseanlæg Lundtofte	0	0	5,155,345	1	10,031,150	138,000
Måløv Rens A/S			2,078,773	1	4,365,200	53,996
NFS A/S	35,548	521	1,568,207	5	5,707,323	54,268
Nordvand (Gentofte Spildevand A/S)	72,264	369	3,672,820	0		
Nordvand (Gldsaxe Spildevand A/S)	64,515	240	3,382,243	0		
Provas	49,744	949	2,360,988	17	9,961,573	71,889
Randers Spildevand A/S	90,177	1,470	4,140,085	8	10,010,941	80,386
Rebild Vand & Spildevand A/S	21,500	539	1,102,487	14	807,407	10,058
Ringkøbing-Skjern Spildevand A/S	47,500	981	2,252,826	18	9,132,890	66,592
Ringsted Spildevand A/S	29,361	556	1,951,443	3	3,946,000	82,461
Roskilde Spildevand A/S	65,363	863	3,960,423	5	8,659,732	104,685
Rudersdal Forsyning	54,827	456	2,780,403	4	4,710,238	24,783
Silkeborg Spildevand A/S	79,700	1,384	3,722,272	16	7,766,806	107,659
SK Spildevand A/S	53,650	1,246	3,134,457	19	8,163,396	114,285
Skanderborg Forsyningsvirksomhed A/S	40,000	1,166	2,473,740	8	5,716,926	61,220
Skive Spildevand A/S	15,102	978	1,932,473	5	8,164,625	40,162
Sorø Spildevand A/S	21,000	392	1,033,858	12	3,376,311	23,994
Spildevandscenter Avedøre I/S	211,670	55	13,235,152	1	23,308,263	200,000
Stevns Spildevand A/S	18,403	420	818,479	6	2,343,607	20,416
Struer Forsyning Spildevand A/S	8,188	382	1,106,986	3	2,457,630	62,275
Svendborg Spildevand A/S	20,252	803	2,670,421	8	7,973,785	78,416
Syddjurs Spildevand A/S	35,500	764	1,524,781	12	3,286,647	50,144
Sønderborg Spildevandsforsyning A/S	31,750	1,417	3,393,750	9	8,920,280	91,909
Thisted Vand	38,598	784	2,260,208	5	7,861,574	129,946
Tønder Spildevand A/S	28,572	715	2,116,520	20	5,981,019	53,444
Vallensbæk Kloakforsyning A/S	14,045	133	634,052	0		
VCS Denmark	215,000	2,230	11,099,633	14	32,760,000	337,928
Varde Kloak & Spildevand A/S	33,354	799	2,229,053	10	8,034,463	100,630
Vejen Forsyning A/S	42,683	793	1,828,799	12	6,908,947	39,929
Vestforsyning Spildevand A/S	41,091	916	3,459,388	6	8,380,021	188,807
Aalborg Forsyning, Kloak A/S	193,575	1,946	10,138,931	6	26,390,797	247,334
Aarhus Water A/S	311,500	2,574	15,227,383	10	34,421,017	413,190

PROCESS BENCHMARKING (OVERALL FIGURES)					PRICES 2012		
Actual operating costs for transport, treatment and customer handling	Operating costs for transport	Operating costs for treatment	Operating costs for customer handling	Completed investments and renovations	Fixed annual contribution including VAT	Variable contribution including VAT and taxes	Cost of consumption of 100 m³/yr
DKK/m³ sold	DKK/m³ sold	DKK/m³ sold	DKK/m³ sold	DKK/m³ sold	DKK	DKK/m³	DKK
4.74	4.50	0.00	0.26	19.91	0	33.17	3,317
16.60	4.48	10.62	1.49	17.90	643	32.19	3,862
17.25	5.41	10.73	1.10	29.68	0	50.00	5,000
19.47	3.19	15.01	1.27	59.16	619	42.38	4,857
5.65	0.32	5.29	0.04	20.89			
5.96	0.00	5.96	0.00	4.06			
15.00	4.79	9.61	0.60	16.44	500	42.50	4,750
5.37	4.87	0.00	0.49	23.25	0	26.55	2,655
5.06	4.48	0.00	0.58	21.00	0	26.80	2,680
13.86	5.12	7.56	1.18	32.73	704	43.73	5,077
12.47	4.43	7.18	0.86	18.92	0	38.50	3,850
11.75	4.59	5.55	1.61	7.72	0	32.50	3,250
15.51	4.68	8.65	2.18	36.55	787	35.88	4,375
11.12	3.65	6.12	1.35	32.43	0	37.38	3,738
14.72	6.46	7.79	0.48	22.65	0	33.13	3,313
8.20	2.99	4.84	0.37	9.32	0	27.69	2,769
10.38	3.92	5.43	1.03	23.41	656	30.00	3,656
17.17	7.26	9.30	0.61	31.94	706	43.75	5,081
10.02	3.75	5.62	0.65	16.54	389	30.00	3,389
11.92	6.49	5.08	0.35	29.39	625	30.63	3,688
20.21	7.02	11.66	1.53	32.36	563	51.55	5,718
4.09	0.18	3.92	0.00	3.16			
18.17	5.98	9.85	2.34	41.63	740	58.19	6,559
10.91	3.09	7.03	0.79	11.35	0	23.75	2,375
14.17	5.21	8.28	0.68	28.93	0	36.22	3,622
18.00	7.18	9.67	1.16	14.91	780	40.50	4,830
13.76	5.32	6.40	2.05	21.05	0	41.13	4,113
15.38	5.04	9.71	0.63	25.15	706	28.54	3,560
14.99	5.05	9.06	0.88	5.06	568	32.50	3,818
9.66	9.47	0.00	0.19	13.06	0	37.00	3,700
10.66	3.66	5.96	1.04	23.94	625	28.56	3,481
13.11	4.57	8.36	0.18	21.85	705	29.40	3,645
13.70	3.76	8.21	1.72	27.26	700	31.75	3,875
12.25	4.28	7.47	0.49	10.09	686	24.34	3,120
8.46	3.98	3.82	0.65	16.48	688	28.13	3,501
7.36	2.13	4.73	0.50	18.40	0	28.86	2,886



KEY FIGURES 2013

- The average price of one litre of water is DKK 0.061.
- Average household water consumption is 107 litres per person per day.
- The drinking water companies' actual operating costs were DKK 4.84 per m³ on average. Investments totalled DKK 5.23 per m³.
- The waste-water companies' actual operating costs were DKK 10.93 per m³ on average. Investments totalled DKK 19.47 per m³.
- The electricity consumed to supply 1,000 litres of tap water is 1.90 kWh. Of this, 0.43 kWh is used for the production and supply of drinking water, and 1.47 kWh is used for transporting and treating waste water, which corresponds to approx. 0.9 kg CO₂.

WHAT IS DANVA?

DANVA, Danish Water and Waste Water Association, is a national association of more than 120 of Denmark's largest water companies. Members also include contractors and personal members. The water companies in DANVA supply drinking water and treat waste water for more than 5 million Danes.

Read more at www.danva.dk

Additional copies of this publication may be purchased by contacting DANVA by email at danva@danva.dk or by calling +45 7021 0055. Further information: danva.dk and bessy.dk (The publication can be downloaded from both sites) 'Water in figures' is published by: DANVA, Godthåbsvej 83, 8660 Skanderborg, Denmark
danva@danva.dk, tel.: +45 7021 0055.
November 2013

Editors:

Lisa Reschefski, Espen Brader Gatzwiller, Thomas Bo Sørensen, Karsten Bjørno, Carl-Emil Larsen, DANVA. Lise Tarp Johansen (HOFOR), John Hartvig Mølgaard (Provas) and Arne Svendsen (VCS Denmark).

Text: Lisa Reschefski, Thomas Bo Sørensen, Karsten Bjørno, Kathrine Schmeichel, Kåre Kildall Rysgaard.

Photos: Toke Hage

We would like to thank Randers Spildevand, VCS Denmark and Vestforsyning.

Layout and printing: Jørn Thomsen Elbo A/S

Print-run: 1,800

ISSN 1903-3494

Contact DANVA Benchmarking

Any queries concerning the data may be addressed to DANVA Benchmarking at bm@danva.dk