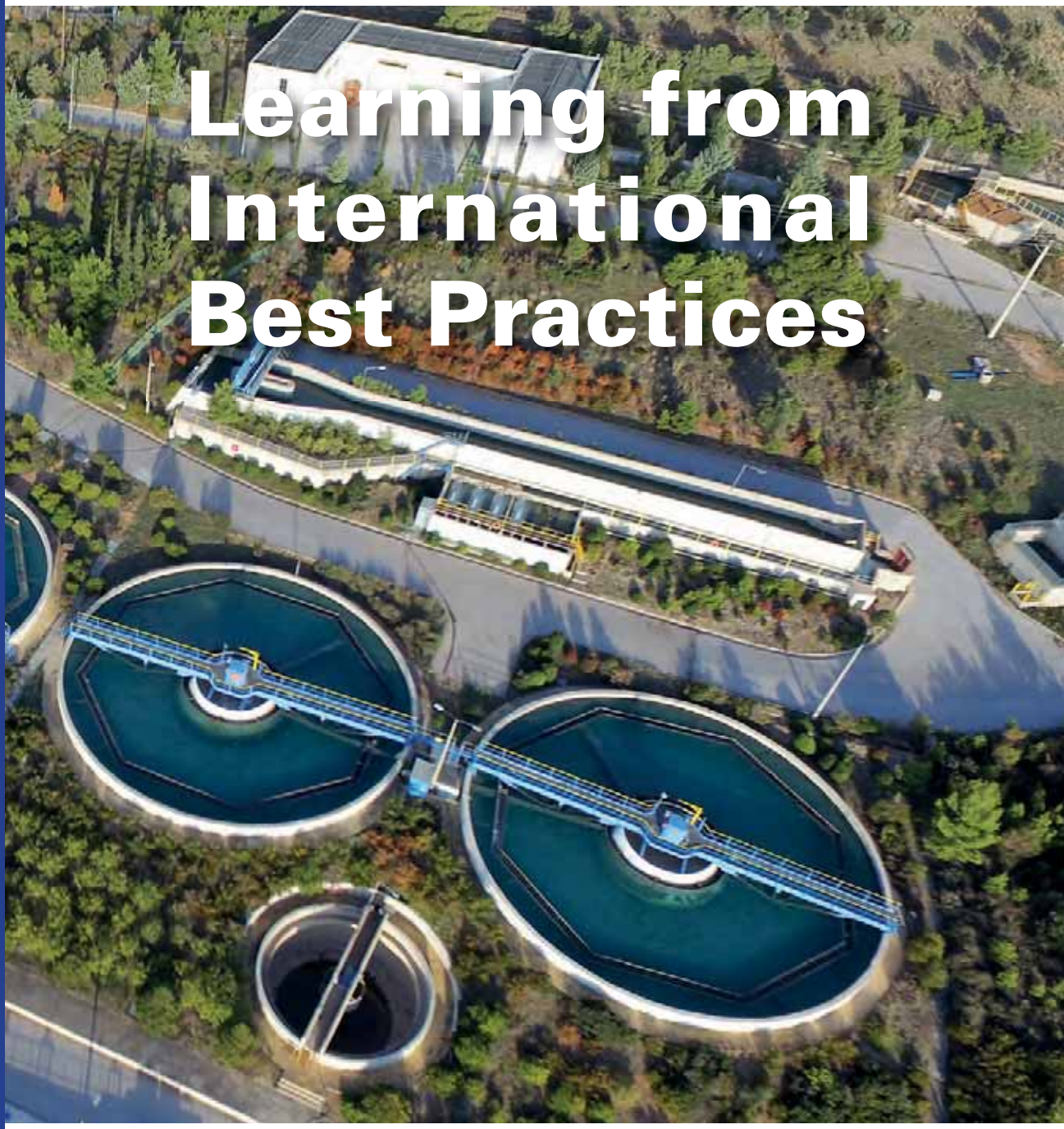
European
Benchmarking
Co-operation

Learning from International Best Practices



2018 WATER & WASTEWATER BENCHMARK

Participants 2018 exercise

Belgium
- Aquafin NV
- Brussels Waste Water
- De Watergroep
- Société Wallonne des eaux
- Vivaqua

Cyprus
- Water Board of Lemesos

Denmark
- VCS Denmark

Dubai
- Dubai Municipality

Finland
- Helsinki Region Environmental Services Authority, Water Services
- Turun Vesihuolto Oy

Germany
- Hamburg Wasser
- hanseWasser Bremen GmbH

Greece
- Athens Water Supply and Sewerage Company SA

Iraq
- Duhok Water Utility

Italy
- Società Metropolitana Acque Torino S.p.A.

Luxembourg
- Syndicat intercommunal pour l'Assainissement du Bassin de la Chiers
- Syndicat des Eaux du Sud

Norway
- City of Oslo, Agency for Water and Wastewater Services
- Municipality of Trondheim

Oman
- Public Authority for Electricity and Water

Poland
- Aquanet S.A.
- Miejskie Przedsiębiorstwo Wodociągów i Kanalizacji w m.st. Warszawie S.A
- MPWik S.A. W Krakowie
- Municipal Water and Sewage Company S.A. Wroclaw

Republic of Singapore
- Public Utility Board

Russia
- Joint Stock Company Mosvodokanal
- State Enterprise 'Vodokanal of Saint-Petersburg'

Spain
- Aqualia Jaén
- Canal de Isabel II
- Empresa Metropolitana de Abastecimiento y Saneamiento de Aguas de Sevilla S.A.

Sweden
- Sydvatten A.B.
- VA SYD

The Netherlands
- Brabant Water N.V.
- Evides Waterbedrijf N.V.
- N.V. Dunea
- N.V. PWN Waterleidingbedrijf Noord-Holland
- N.V. Waterbedrijf Groningen
- N.V. Waterleiding Maatschappij Limburg
- N.V. Waterleidingmaatschappij Drenthe
- Oasen N.V.
- Stichting Waternet
- Vitens N.V.

United Kingdom
- Bristol Water

United States
- Charleston Water System

Cover photo: EYDAP

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Learning from International Best Practices

2018 WATER & WASTEWATER BENCHMARK

DRINKING WATER

Total number of consumers supplied with drinking water by the participating utilities

73.109.591

Which equals to
14% of the **EU28 population!**

Annual turnover of the participating drinking water utilities

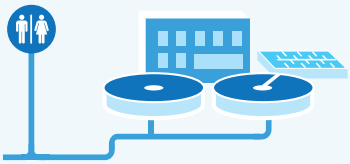
€ 5.276.841.344

Annual investment by participating drinking water utilities

€ 1.207.704.028

WASTEWATER

Total number of consumers connected to a WWTP operated by the participating utilities



54.613.362

Which equals to
11% of the **EU28 population!**

Annual turnover of the participating wastewater utilities

€ 3.289.614.563

Annual investment by participating wastewater utilities

€ 1.129.422.031

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Foreword

Ivan Ivanov
President of BWA-Bulgarian Water Association
Chair of the Board of EBC Foundation

2018 Proved to be a challenging year for water utilities across Europe, bringing cold snaps, heat stress and a severe drought to large parts of the continent. It once more underlined the importance of resilience, of improving the water infrastructure and of the necessity to share knowledge and experiences.

With extreme weather conditions in mind, EBC's diverse utility network has shown its value. When benchmarking with utilities from different countries, it is often recounted that the context and local circumstances might complicate performance comparisons. This is indeed something to keep in mind, but when done carefully, it shouldn't be a problem. On the improvement side of our programme this diversity in context and local circumstances shows to be a strong asset. For some utilities within our network the 2018 wet-, dry-, hot- and cold conditions may be extreme, but for others they are business as usual and already incorporated in the water infrastructure and business operations.

2018 Showed once more that within the EBC programme, we should focus even more on the improvement side of benchmarking. It's time to start turning data into action and solutions!

Western Europe

44 Utilities from 20 different countries participated in the 2018 benchmarking exercise for Western Europe (IB2017). Six of them (Aqualia Jaén (ESP), Turku Water Works (FIN), Duhok Water Utility (IRQ), Syndicat des Eaux du Sud (L), VA SYD (SE), Dubai Municipality (UAE) are new to the programme or have returned after some years of absence.
From 14 - 16 November 2018, participants in the IB2017 benchmarking exercise gathered in Athens, Greece for the 12th edition of the annual benchmarking workshop. EYDAP, the water-

and wastewater utility of Athens, kindly offered to sponsor and host this year's workshop. Almost 90 representatives from across Europe and beyond, including guests from regional benchmarking hubs in the Danube region, the EIB and Aqua Publica Europea, participated in a lively, dynamic and inspirational atmosphere. Attendees could choose between several parallel sessions to discuss this year's benchmarking results, share good practices and common challenges with their colleagues. Special focus was on Climate Resilience and improvement. The workshop ended with a field visit to the Europe's largest wastewater treatment plant, Psyttaleia. After a short boat trip, the group was guided around the plant located on an island off the coast of Athens, with the enthusiasm known to the water sector.

Danube water Program

In 2018, the Danube Water Program continued its capacity building activities for the water sector in the Danube region.

In total, 53 utilities from the Danube region were involved in a utility benchmarking effort that was facilitated by local partners, EBC Foundation and DWP. In November the regional hubs for Albania & Kosovo and for Ukraine organised their annual workshops, the regional hubs for Bulgaria and the wider Danube Region will follow early 2019.

Next to the existing benchmarking hubs under the Danube Water Program, in 2018 the first benchmarking exercise of the wider Danube Region Hub was carried out. The Danube Region Hub offers an additional benchmarking programme for utilities that would like to share good practices and experiences with colleagues from across the wider Danube region. In total 18 utilities participated in this first cycle which concluded with a CEO dinner during the Danube Water Conference in Vienna in May 2018.

EBC Knowledge Picnics

At the annual benchmarking workshop for Western Europe, EBC introduced a new concept for sharing knowledge and experiences: the knowledge picnic. In short expert meetings (small groups of max. 10 to 15 people), hosted by one of the participating utilities, experiences/ best practices around one specific process/theme will be discussed.

The benchmarking results can help identifying the relevant topics for these picnics, determine improvement potentials and signal the best performers to share best practices with.

The first knowledge picnic will be hosted by MPWIK Wroclaw (PL) early 2019 and focusses on the digital transformation in a water utility.

Benchmarking certificates

To stimulate continuous improvement of water services, EBC Foundation wishes to acknowledge utilities for their benchmarking- and improvement efforts.
In this context, as of 2018 EBC grants Benchmarking Certificates to qualifying utilities, depending on the period of engagement and the way benchmarking- and improvement activities are carried out and 'internalised'. After each benchmarking cycle EBC will issue certificates to qualifying companies. Recipients are entitled to display the Certificate 'droplet' on their website.

Letter of Intent with IGWP

On 30 October 2018, the Polish Waterworks Chamber of Commerce (IGWP) and EBC signed a letter of intent to work together on benchmarking- and improvement activities for the Polish water sector.
IGWP brings together 490 of the largest companies in the Polish water and waste water market. Since 2009 it conducts a national benchmarking programme that needs to be adapted to current needs. From this perspective, EBC and IGWP will jointly search for the best possible way to offer up-to-date benchmarking services to Polish utilities, in particular to the smaller sized ones. A 'benchmarking light' version is one of the options that is currently explored.

Refreshed website & data entry

In 2018 EBC launched a refreshed version of its website www.waterbenchmark.org.
The layout underwent a metamorphose, navigation was changed and content was updated and restructured. The data entry also underwent a major facelift and new functionality was added. All changes were made in order to make the website and the data entry even more user friendly.
With the launch of the refreshed website and data entry, EBC completed the process of upgrading its digital environment.

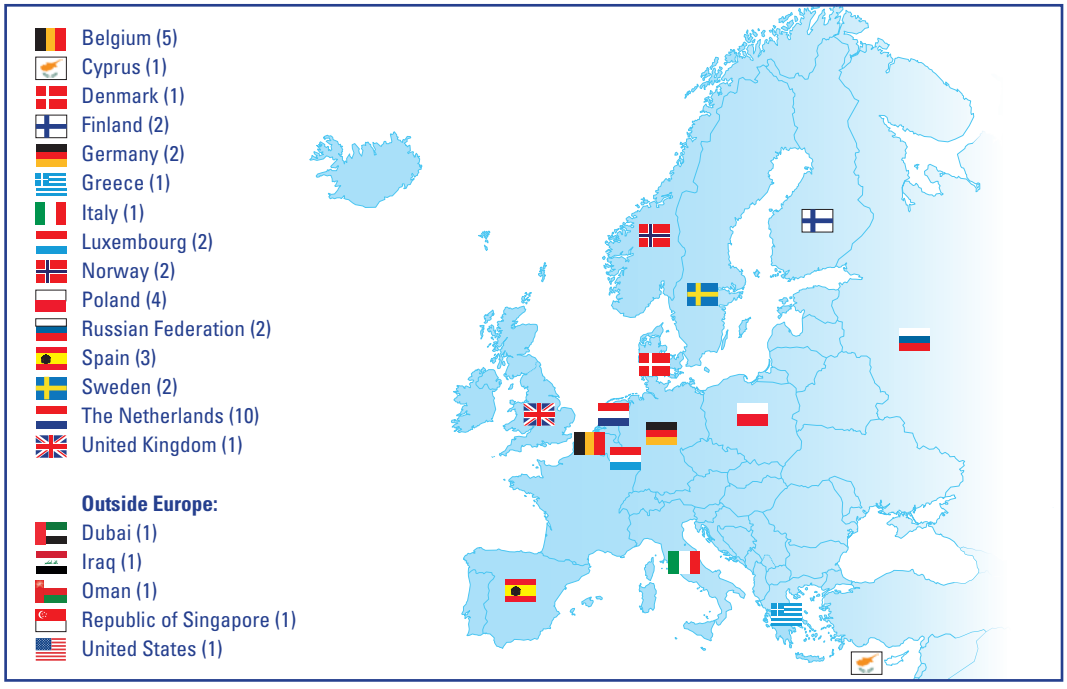
2019: Are you joining?

2019 promises to be an interesting year. We will launch our first knowledge picnics and focus even more on improvement. Of course we depend on the enthusiasm, knowledge and experiences of our participants to make the programme a real success. A more diverse group will bring more knowledge and opportunities to learn and improve. Therefore, I would like to use this opportunity to encourage utilities across Europe to join EBC's benchmarking and improvement programme and become part of this unique peer utility network!

Introduction

Since 2007, the European Benchmarking Co-operation (EBC) operates an international benchmarking programme for European water- & wastewater utilities, with the objective to improve their services. This publication briefly reports on EBC's core programme for Western Europe.

In 2018 EBC organised its 12th international benchmarking exercise, welcoming 44 participants from 20 different countries. Five utilities are based in countries outside Europe (Oman, Singapore, Iraq, Dubai and the United States). The 2018 exercise processed data from 2017. The project was coordinated by EBC and supported by ABF Research in Delft, the Netherlands.



EBC offers three levels of participation (basic, standard and advanced) to make the benchmarking programme accessible to all type of water utilities, no matter if they are used to advanced data collection, or just begin with basic data collection. During the data collection process, participants are supported by EBC through an expert helpdesk assuring a high quality of the data.
The benchmarking process started early 2018 with an invitation to European water utilities to join EBC's benchmarking exercise.

Utility representatives at the 2018 benchmarking workshop in Athens, Greece

The data collection started in May, using the benchmarking platform www.waterbenchmark.org. As always, EBC paid a lot of attention to the data quality. After the initial collection phase, with several checks online, the submitted data were subject to three rounds of analysis and correction, resulting in a validated data set which was used for the final company reports and this public report. Data entry results that could not be verified by the EBC team were deleted from the dataset for the public report.

Like every year, in the 2018 benchmarking exercise improvements have been made in the set of questions and in the reporting. Definitions of various indicators were clarified and a new data entry tool was launched.

On November 15th and 16th, 2018, almost 90 representatives of the participating utilities and delegations from the regional benchmarking programmes gathered in Athens, Greece for EBC's annual benchmarking workshop, which was hosted and co-organised by EYDAP S.A., the Athens Water Supply and Sewerage Company. The two-days event provided participants with a platform where they could exchange good practices and ideas for improvements. In total, over 20 sessions were dedicated to discuss numerical results of the exercise (performance assessment) and best practices (performance improvement). Also, EYDAP organised a site visit to Europe's largest wastewater treatment plant at the island of Psyttaleia.

During the traditional workshop dinner, the Benchmarking Co-ordinator of the Year Award was handed to the team of MPWIK Warszawie (Poland) and to the team of PAEW (Oman). The EBC-team congratulates the winners of this year's award and encourages them to continue their good work! During dinner also the first EBC benchmarking certificate was awarded. This certificate intends to acknowledge the organisations that are seriously working on continuously improving their service.

Right after the benchmarking workshop, participants could make the last corrections in their dataset. Final reports were distributed mid December.

DRINKING WATER

Drinking water

This section contains an overview of this year's performance assessment on drinking water services. Data of other services that the participating companies may have provided (i.e. wastewater or gas distribution) are excluded from the analysis. In EBC's benchmarking programme, the indicators are divided into five performance areas: water quality, reliability, service quality, sustainability and finance & efficiency. The current public report only shows a subset of the available performance indicators for the drinking water service to illustrate key findings. In the ideal situation the group of participants that compares performance would be the same over time. The group of utilities that participated in the 2018 exercise however differs from the one in previous years. Hence, the current group level results cannot be compared with those of previous years. In the individual company reports, participants can however track changes both in their own and in their peers' performance.

Service coverage

The percentage of resident population served by utilities of the current EBC group is high. Most utilities in the group serve 100% of the total resident population. The median value for the group is 100%.

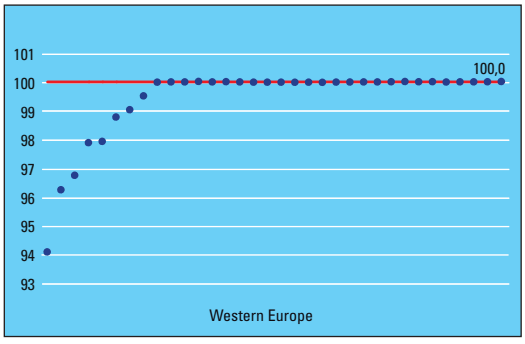


Figure 1:
Population coverage (%)

Note:
Each data point represents the score of a participating utility. The horizontal line shows the median value. According to the programme's Code of Conduct performance comparisons in this public report do not show participants' names. Note that the number of data points varies per figure, because not all participating utilities have submitted a full dataset.

Water quality

Water quality is generally seen as the most important aspect of the drinking water service. Consumers need safe and clean water as a basic commodity. To assess the water quality of the participating utilities, EBC measures the percentage of quality tests in compliance with national regulatory standards. Since the standards for water quality differ between countries, test compliance does not allow for an absolute comparison. However, the variation between standards is limited, since the majority of the participating utilities originate from Europe, where the national standards are based on the European Drinking Water Directive.
Water quality compliance is very high across the current EBC group. Most companies score

close to 100% and the median value is 99,93%. It is worth mentioning that a non-compliant test does not necessarily mean an imminent health risk for the consumer. It can for example be a non-hazardous flaw (i.e. an abnormal colour). Furthermore, many regulatory standards contain a safety margin, so that a case of non-compliance does not necessarily mean public health is at risk.

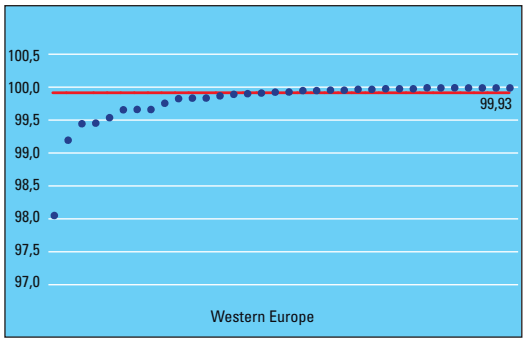


Figure 2:
Quality of supplied water (%)

Reliability

Reliability also is an essential performance indicator for a water utility. The customer expects a continuous supply of safe and clear water. EBC uses mains failures as an indicator of reliability. Mains failures are breaks and leakages of mains pipes, valves and fittings leading to interruption or low-pressure supply. Results of reliability vary widely within the current EBC group with values ranging from 3,4 to 77,2 failures per 100 km. Factors that may influence the mains failure rate include the network condition, soil condition, traffic load and water pressure. It is also worth mentioning that an improvement in monitoring failures may (at first) cause an increase in mains failures, as not in all cases failures are currently properly registered. The median value is 11,7 No. / 100 km.

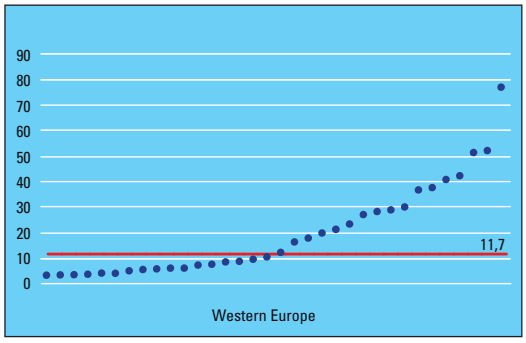


Figure 3:
Mains failures (No./100km)

In addition to mains failures the programme also looks at distribution losses and (at the advanced level) at customer minutes lost. Utilities in the current EBC group face distribution losses between 0,7 and 56,5 m^3 per km mains length per day. The median value for the group is 10,8 m^3 / km / day. Failures may also occur without the customer noticing.

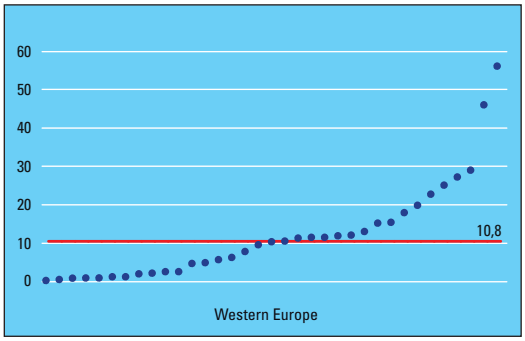


Figure 4:
Distribution losses per mains length (m^3/km/day)

Service Quality

If the service of a water utility is not up to the required standard of the customer, the customer can file a complaint. Hence the number of complaints filed by utilities' customers is an adequate measure for service quality. EBC measures service complaints. These complaints are related to the actual supply of drinking water, including water pressure, (medium to long term) continuity, water quality and (short term) interruptions. Complaints on billing are also measured but not taken into account in this indicator. The majority of the current EBC group scores very well with a median value of 0,76 complaints / 1000 properties.
The emergence of social media also created a new channel of communication between consumers and utilities. Many water utilities are increasingly using social media to better inform their customers. Hence, through these new channels, mutual understanding is facilitated and formal complaints may be prevented.

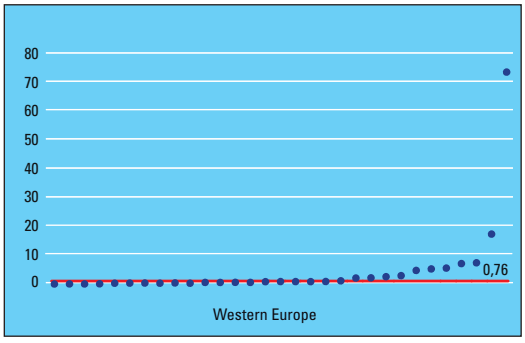


Figure 5:
Service complaints per connected property (complaints/1000 properties)

Sustainability

Sustainability is a key topic for many water utilities. It can be approached and measured in various ways. The EBC programme uses the widely recognised Triple Bottom Line approach, which investigates social, environmental and economic sustainability.

Social sustainability

Water is a basic necessity, and customers usually do not have viable alternatives to their local water supplier. This unilateral reliance leaves it to the utility to make sure its product is affordable. Hence, EBC measures social sustainability of the drinking water services by showing the water bill as a share of household consumption expenditures. In the current EBC group this ranges from 0,20% to 0,61%, with a median of 0,42%.

Environmental sustainability

The EBC programme measures environmental sustainability through several indicators, which include electricity use for water production, energy recovery, inefficiency of use of water resources, the reuse of treatment residuals and climate footprint. Figure 7 shows the electricity used in the abstraction, treatment and distribution of water, per m^3 that is produced. The use of electricity is influenced by the type of water resources, geography and treatment processes. Pumps are the most voracious consumers of electricity, which makes their efficiency an important factor in the reduction of electricity use. This benchmarking exercise shows a median electricity usage for pumping of 0,51 kWh/m^3.

Figure 6:
Affordability based on household consumption expenditures (%)

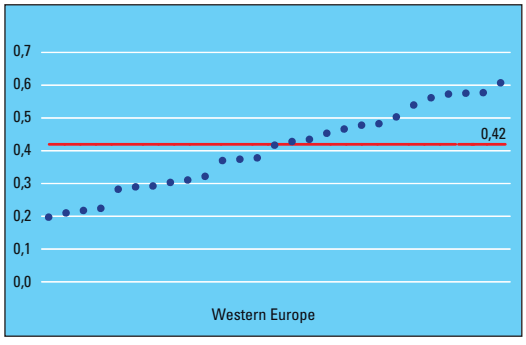
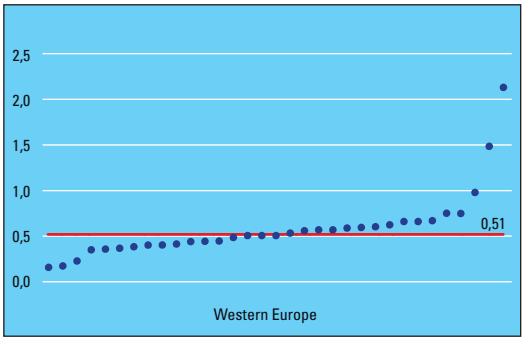


Figure 7:
Electricity use for production and distribution per m^3 water produced (kWh/m^3)



In terms of the climate footprint, scope 1, scope 2 and scope 3 indicators are analysed within the EBC programme. In the current report scope 2 is highlighted. Scope 2 emissions are emissions from the generation of purchased energy for own use by the utility.
The participants of this years' benchmarking exercise show a range of scores from -0,09 kg till 0,36 kg CO_2-equivalent per m^3 drinking water, with a median value of 0,1 kg CO_2-eq./m^3.

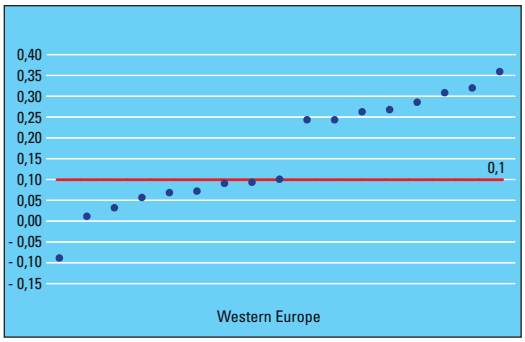


Figure 8:
Climate footprint scope 2 per m^3 direct revenue drinking water (kg CO_2-eq./m^3)

Economic sustainability

While making sure that water is ample available to the public, and taking their environmental footprint into account, water utilities need to make sure their activities are economically sustainable.
The percentage of main rehabilitation is the share of the network that has been renovated or replaced because the conditions of the mains deteriorates. Utilities renovate or replace mains to keep the network fit for future use. Higher percentages of main rehabilitation can be caused by a higher average network age. Virtually all utilities in the current EBC group rehabilitate between 0,03 and 1,5% of their network. The median value is 0,72% / year.

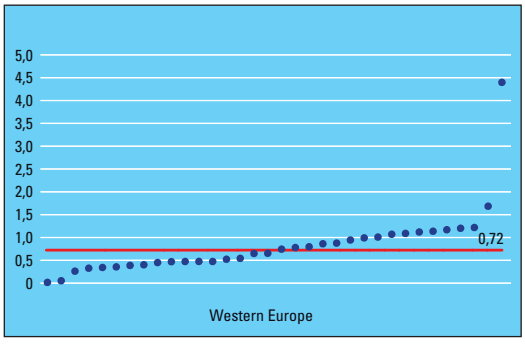


Figure 9:
Mains rehabilitation (%/year)

Economic sustainability also means collecting sales revenues to cover total costs by a ratio of 1 or more. About two third of the EBC participants meet this criterion. With a ratio below 1, utilities will have to rely on other sources of income (e.g. subsidies, reserves or income from other activities). These utilities are less sustainable on the long run. The median value for the current EBC group is 1,07.

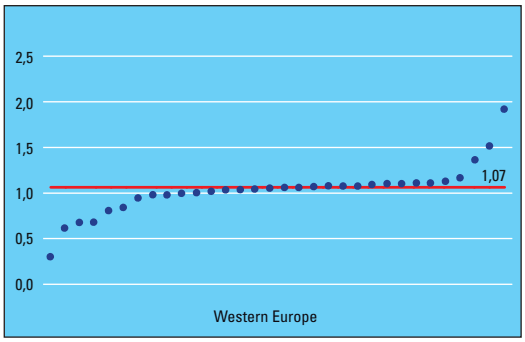


Figure 10:
Total cost by sales coverage ratio

Finance and efficiency

The EBC performance assessment framework contains an extensive set of indicators on finance and efficiency. This set includes total cost, running cost, personnel intensity and charges. Since water utilities are committed to provide water of the highest possible quality at the lowest possible price, water charges are an important financial performance indicator. Average water charges for direct consumption are calculated by dividing total direct revenues by the sold volume. Many utilities have a tariff structure with a fixed connection fee and a variable rate per unit sold. As a result the price per m^3 a household actually pays will often depend on its consumption. The median price of water for the current EBC group is €1,12/m^3.

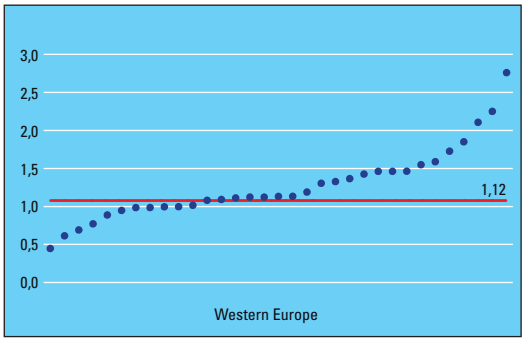


Figure 11:
Average water charges for direct consumption (€/m^3)

Personnel intensity is a relevant performance indicator on the efficiency side. It is measured as the number of full-time employees (fte) per 1000 properties. The scores on this indicator are computed using a standard 40 hour full-time working week. In the current EBC group the personnel intensity ranges from 0,31 to 12,47 fte per 1000 properties with a median value of 0,83 fte / 1000 properties.

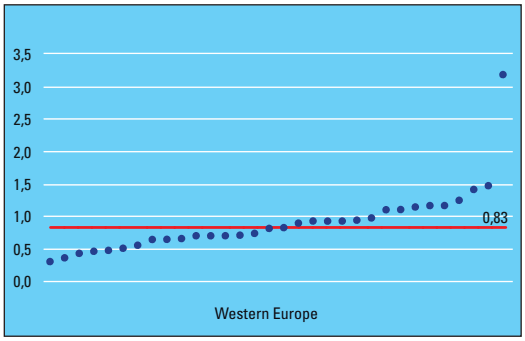


Figure 12:
Personnel intensity (fte/1000 properties)

WASTEWATER

Wastewater

This section presents an overview of the performance comparison of this year's benchmarking exercise for wastewater services. We use the same performance areas as for drinking water: water quality, reliability, service quality, sustainability and finance & efficiency. The data is gathered on the wastewater activities specifically. This means that measures and costs of other services that a participant may provide (i.e. drinking water or district heating) are excluded. The performance indicators shown in this section are only a subset of the available indicators.

The group of utilities that participated in the 2018 exercise however differs from the one in previous years. Hence, the current group level results cannot be compared with those of previous years. In the individual company reports, participants can however track changes both in their own and in their peers' performance.

Service coverage

The percentage of resident population in the service area of utilities in the current EBC group that is connected to the sewer system managed by those utilities is high. The median value is 99%.

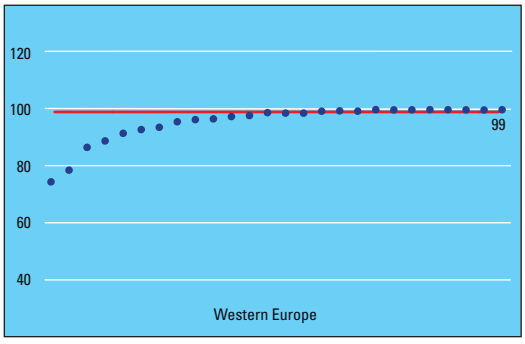


Figure 13:
Resident population connected to sewer system (%)

Wastewater quality

The wastewater (possibly mixed with storm water) that is collected by a utility needs to be treated. The treated water needs to be in compliance with discharge consents to minimize the negative effect on the environment. These consents vary between and within countries, which means the same percentage can have different meaning for the different utilities. The compliance within the current EBC group is generally high with a median value of 100%.

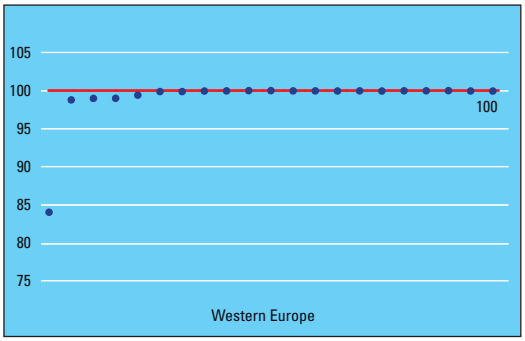


Figure 14:
Wastewater treatment plant compliance with discharge consents (%)

Reliability

To assess wastewater reliability the EBC is using sewer blockages as the main indicator. These blockages include all occurrences under the company's responsibility, whether they are due to collapse, root ingress, grease or debris. Utilities within the current EBC group strive to improve monitoring. This may (at first) result in an increase in the detection rates, as not all blockages are currently properly registered. However, eventually this should improve the service of the water companies. Utilities can also reduce blockages by educating customers (especially in the case of blockages caused by grease). The results on sewage blockages vary widely within the current EBC group between 0 and 317 blockages per 100 km sewer, per year, with a median value of 11 No. / 100 km sewer.

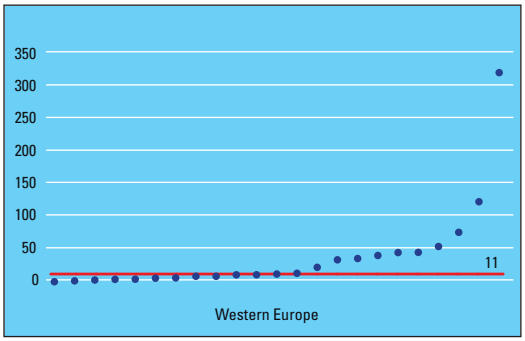


Figure 15:
Sewer and connection blockages (No./100 km sewer)

Also the number of flooding incidents from combined sewers show large variations within the current EBC group. The number of flooding incidents per 100 km sewer vary for the vast majority of utilities in the current EBC group between 0 and 4 with a median value of 0,1 No. / 100 km sewer.

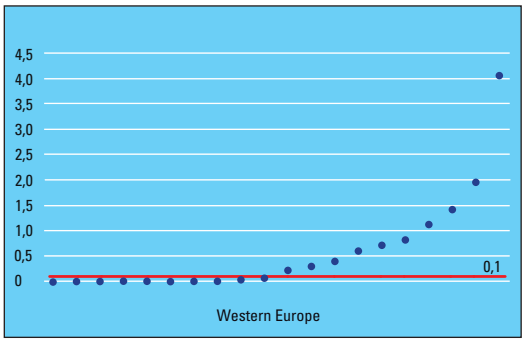


Figure 16:
Flooding from combined sewers (No./100 km sewer)

Service Quality

Service quality for wastewater services is measured using the same indicators as for drinking water. The customer can file a complaint if the service of a wastewater utility is not up to the required standards. The majority of the current EBC group scores very well with a median of 0,72 No. / 1000 inhabitants / year.

Different types of complaints are occurring in different part of the wastewater chain. For instance, blockages and flooding complaints occur more often in the collection and transport mains (network), while the treatment facilities are often faced with complaints due to pollution, odour and rodents.

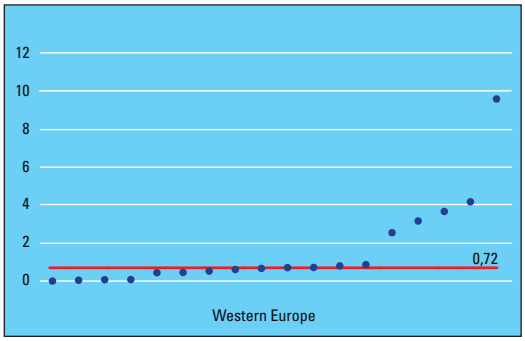


Figure 17:
Total complaints (No./1000 inhabitants/year)

Sustainability

Similar to drinking water services, the wastewater services are benchmarked on sustainability using the Triple Bottom Line approach which takes into account social, environmental and economic sustainability.

Social sustainability

The EBC programme measures the social sustainability of wastewater services by calculating the share of the wastewater bill in household consumption expenditures. This measure gives a good impression of the affordability of the wastewater services, accounted for differences in wealth between nations. The EBC group of current participants show a profound range from 0,12% to 0,88% with a median value for this indicator of 0,36%.

Environmental sustainability

EBC's benchmarking programme measures environmental sustainability with several indicators. Examples are the electricity used for treating wastewater as well as generating electricity from it, the percentage of the sludge generated in the treatment process that is utilized in a sustainable way or the frequency of use of overflow devices to surface water. In the current report we reveal the results for the energy consumption of the wastewater treatment plants as well as results for the climate footprint scope 2.

The energy consumption of the majority of participants is distributed between 16,1 kWh and 59,4 kWh per population equivalent served. The median value for the current EBC group is 29,9 kWh / p.e. served by WWTP. The consumption of the wastewater treatment plants can differ depending on the level of treatment, which in turn depends on the local discharge consents.

Figure 18:
Affordability based on household consumption expenditures (%)

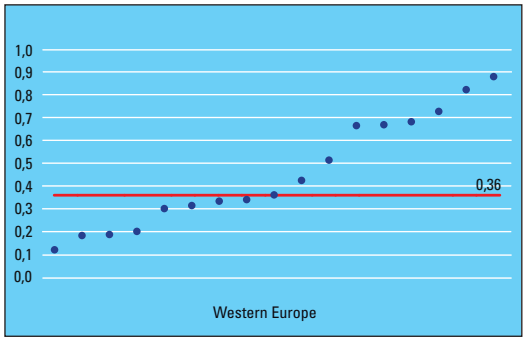
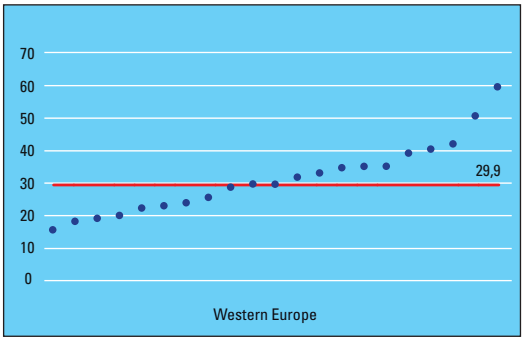


Figure 19:
Wastewater treatment plant energy consumption (kWh/p.e. served by WWTP)



In terms of the climate footprint, scope 1, scope 2 and scope 3 indicators are analysed within the EBC programme. In the current report scope 2 is highlighted. Scope 2 emissions are

emissions from the generation of purchased energy for own use by the utility. Utilities in the current EBC group report values between -7 and 19,3 kg CO_2-equivalent per population equivalent. The median value for the entire group is 11,5 kg CO_2-eq. / p.e.

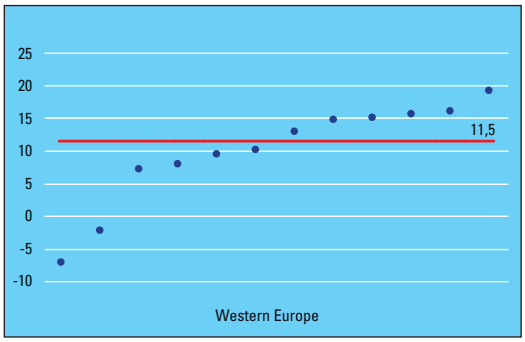


Figure 20:
Climate footprint scope 2 per population equivalent (kg CO_2-equivalent per p.e.)

Economic sustainability

Like with drinking water utilities, wastewater utilities need to make sure their activities are economically sustainable.

The percentage of sewer rehabilitation is the share of the network that has been renovated or replaced because the condition of the sewers deteriorates. Utilities renovate or replace sewers to keep the network fit for future use. Higher percentages of sewer rehabilitation can be caused by a higher average network age. The median value for sewer rehabilitation for the current EBC group is 0,4 % / year.

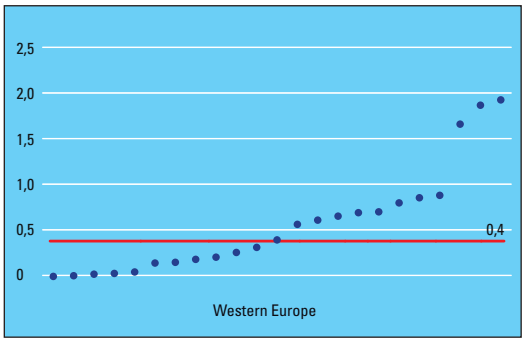


Figure 21:
Sewer rehabilitation (%/year)

Total cost by sales coverage ratio is an important measure for economic sustainability. With this ratio, one can identify if a utility is able to recover its costs from its sales revenues. These revenues consist of all charges to the customers for the collection, transport and treatment of

wastewater. With a ratio below 1, utilities will have to rely on other sources of income like subsidies, reserves or income from other activities. More than half of the EBC participants score above 1, making these utilities more likely to be economically sustainable on the long run. The scores range from 0,37 till 1,45, with a median value of 1,04.

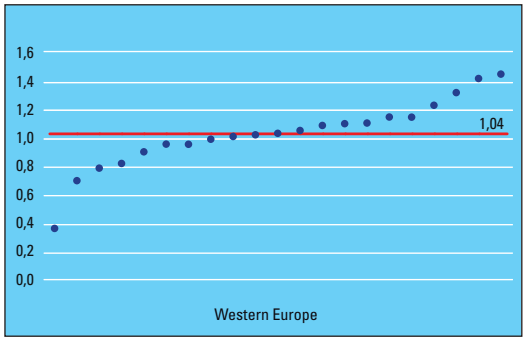


Figure 22:
Total cost service coverage ratio

Finance and efficiency

Like with drinking water utilities, finance and efficiency is a highly relevant topic for wastewater utilities. There is a high variance between the EBC participants for the amount spent on sewage services per connected property. The average of the 3 highest charges registered is over 4 times higher than the average of the three lowest (€ 281 versus € 60 per property). The median value for the current EBC group is € 175 / property. Corrected for differences in purchasing power the gap between highest and lowest charges reduces to 6,8.
Cost reduction (and, consequently, lower charges) are an important goal for most wastewater utilities. Hence this indicator is a great example of where exchange of best practices could be beneficial for utilities.

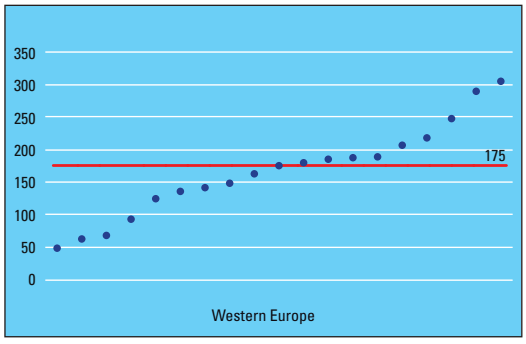


Figure 23:
Average charges per connected property (€/property)

Personnel intensity is a relevant performance indicator on the efficiency side. It is measured as the number of full-time employees (fte) per 1000 properties. The scores on this indicator are computed using a standard 40 hour full-time working week. In the current EBC group the personnel intensity ranges from 0,21 to 1,32 fte per 1000 properties with a median value of 0,57 fte / 1000 properties.

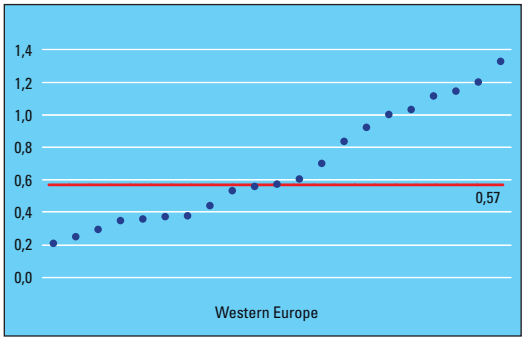


Figure 24:
Personnel intensity (fte/1000 properties)

GOOD PRACTICES

Good practices

Operational Excellence: Engaging with Customers & Stakeholders on Performance

James Holman
Head of Economic Regulation

www.bristolwater.co.uk

Alex Smethurst
Regulatory Policy Advisor

Bristol Water was founded in 1846. Today we employ more than 550 staff and provide drinking water services to approximately 500,000 properties (1.2 million people) across a region of 2400 km^2. The company was set up by local entrepreneurs as a private sector enterprise, but with a social purpose of bringing clean, fresh water to serve all of the people, not just the wealthy areas. That purpose continues today - we are proud of our history and role as an integral part of our local community.

Customers' expectations of our performance and contribution to society are increasing. Services are resilient and customers rarely experience service failures, or understand the social and environmental challenges we face. In response, we have changed how we engage with our customers and stakeholders to be more proactive and transparent, and hold an open dialogue with all of our customers (not just those who contact us when things go wrong). Our engagement involves a range of activites, including surveys, focus groups, workshops; open days, face to face engagment through daily operations and attendance at local events and festivals; social media; face to face interaction through daily operations; and publishing informative reports and including comparative information. In developing our latest business plan we engaged with more than 37,000 of our customers.

Benchmarking data, informed by relevant key performance indicators that customers prioritise, can be used to help our customers to participate in decisions about our services, if it is presented in an accessible format that is simple, transparent and engaging.

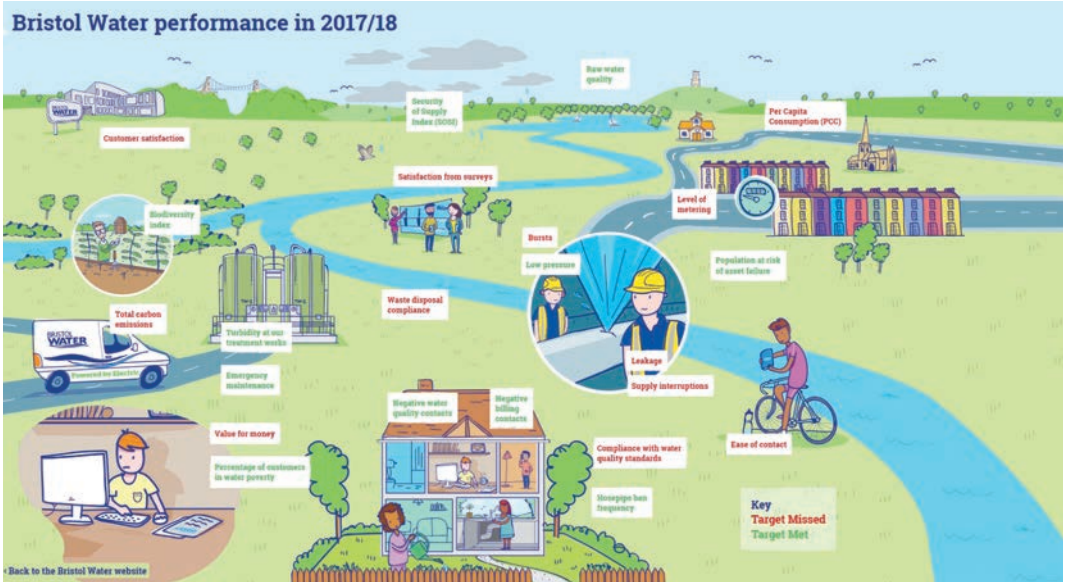
Ultimately we are building trust and a connection with the communities we serve, which provides resilience when we respond to unusual events such as extreme weather.

By focusing on our customers' priorities, we are at the same time helping to align them with our management decision-making. This helps to strengthen customer and stakeholder trust in our company and our long-term direction of travel to meet the expectations of society. We have found that our customers then feel that they have a stake in our company (they talk about 'owning' our business plan) and are supportive of our proposals. Having established this trust and ownership, we could engage with customers on topics that went beyond our basic service. This included our investment in community organisations, recreational opportunities at our reservoirs and resource efficiency, all measures we want to take to tackle long term challenges such as climate change. Our approach also allowed us to build support for making sure our services are as inclusive as possible, including our wide range of social tariffs which have allowed us to eliminate water poverty in Bristol.

Continuous, on-going customer engagement helps us to understand our customers' priorities and expectations for our performance. We know that water quality, reliability of supply and affordability are what matters most to customers, so we make sure that this is reflected in the information that we provide. When we experience significant events like a major supply interruption or water quality problem, we publish case studies to let customers

know what happened and how we responded. Collating feedback at the time and shortly after these events is important to help us identify what is important to customers. Social media allows us to provide regular updates during incidents, which reduces the number of customers that need to contact us. Social media is also really important in keeping traditional media outlets and regulators aware of the effectiveness of our response.

In 2017 we launched our interactive performance graphic, which is based on performance information and KPIs that we formally report on in our Annual Performance Reports and Mid-Year Performance Reports. The performance graphic is an example of presenting performance and comparative information in a customer-friendly format, showing each aspect of our performance. It presents the most up-to-date performance information and signposts our customers to other sources of information on our performance, on our own website or for comparative information on other websites such as the UK Water Industry dashboard www.discoverwater.co.uk.
We also engage regularly with our Bristol Water Challenge Panel, which represents a range of our stakeholders. We present our annual and mid-year performance data to them, and the findings of audits we carry out to assure the quality of our information. The Challenge Panel publishes its own report, and provides comments in our reports, so that customers can have confidence in our performance and data.



The benefits of this approach are clear, and in the 2018 UK Customer Satisfaction Index Bristol Water was rated as having the best customer satisfaction of any water company and the most trusted utility in the whole UK. Our plans for the next few years take this even further. We are establishing a 'social contract', which gives a formal role for the challenge panel and our customer engagement forums in holding Bristol Water to account for the benefits of our activities to society, and agreeing steps we should take if community satisfaction or customer trust in our activities starts to weaken.

Good practices

Digital Transformation in the Municipal Company

Piotr Słomianny, CFO/CIO
MPWiK S.A. we Wrocławiu
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Tomasz Konieczny
Director of R&D and Investment Division

Jerzy Zarówny
Manager of Maintenance Department

The Municipal Water and Sewage Company (MPWiK S.A.) in Wroclaw is a joint stock company owned by Wroclaw Municipality. MPWiK S.A. operations cover water treatment and supply to the consumers as well as wastewater collection and treatment. MPWiK S.A. serves a population of over 700,000 in the city of Wrocław and the neighbouring regions. Apart from the core operation, the company started to follow the path of digital transformation and put emphasis on the development of innovative solutions dedicated for the industry.

The key success factor for the digital transformation in MPWiK S.A. was to create an open environment for innovation and development. The organisational culture of MPWiK S.A. is defined as one that strives toward success and is based on five pillars, which are: strong leadership, curiosity and open mindedness, innovation and creativity, learning from mistakes and rewarding success. Following that, many activities were taken to enhance the digital transformation, e.g. the implementation of project management or the employees ideas and suggestions portal. The next key success factor is the cooperation between departments. Usually, the need for improvement and enhancement of running operational activities

emerges from technical departments, which also play a crucial role in the later process of new technologies implementation, sharing their first-hand knowledge and extensive experience. Once a new idea in the field of digital transformation is created, the supporting divisions are engaged and three parties lead the process of implementation: the IT department, which delivers and maintains the newest technologies; the R&D department (New Technologies Center), which is responsible for researching best practices/methodologies and up-to-date scientific knowledge; the business sector that contributes its know-how and specific business needs.

Establishment of foundations

MPWiK S.A. started its transformation almost 10 years ago with the implementation of integrated systems such as ERP (Enterprise Resource Planning), CRM (Customer Relationship Management) and GIS (Geographic Information System). After that, other professional systems like Business Process Management System, Enterprise Content Management System and Online Customer Service were put in place to improve the customer service quality. At some point, the multiplicity of the IT systems held a risk of excessive complexity and consequently inefficient management. In order to overcome this issue, communication standards between systems were introduced and the Enterprise Service Bus system was implemented. At the same time the development of the Tableau system started, which is

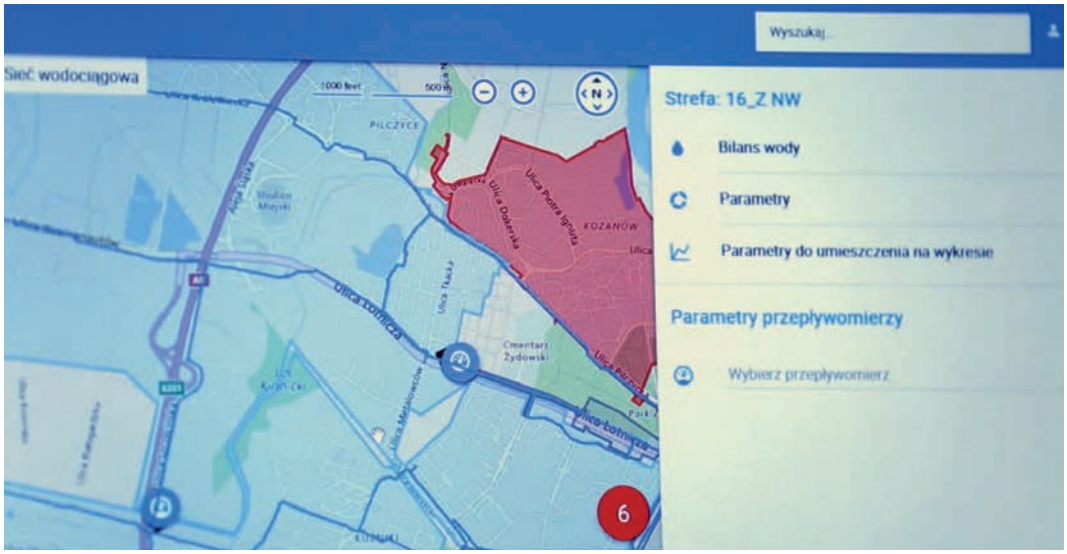
used to visualise the efficiency of MPWiK's processes. Today, over two hundred indicators in the form of dashboards and charts are used on a day-to-day basis by the managers and leaders.

The next milestone of the digital transformation in MPWiK S.A. was reached by introducing mobile technology to employees that work in the field. Thanks to the implementation of cloud technologies and the Field Force Automation system, each employee in the field has access to digital maps, a list of tasks and all the needed information on their tablets.
After nearly 10 years of systematic approach to the integrated IT, OT and business policy, the digital transformation is now influencing each aspect of the core operation of MPWiK S.A. in Wroclaw. The latest breakthrough in the field of digital transformation was achieved with the introduction of the central data repository for production data. Currently, over 200,000 variables (e.g. data from water production, water and flow meters, weather monitoring, noise loggers and others) are stored and easily accessible in the central repository. The introduction of this system was the starting point for the new data-handling and decision-making approach in MPWiK S.A.

Innovative projects

In 2016, MPWiK S.A. teamed up with the Polish company Future Processing and Microsoft to create and develop a system called SmartFlow, designed to tackle the problem of hidden leakages. SmartFlow is an IT application used for monitoring the water supply system in Wroclaw based on the International Water Association methodology. The sensors built into the waterworks around the city collect and transmit information about water distribution which is then analysed, processed and visualized by the SmartFlow application. In case of any anomalies, the location of a possible leakage is presented on a map of the city, making it easier for engineers to locate and repair it. The system effectively deals with hidden leakages and should any failure occur it would be quickly attended to so that it no longer generates major losses. The main benefits of the SmartFlow system are tangible water savings through earlier detection of leakages, faster reaction to anomalies and better management of the water supply system.

One of the latest projects run in cooperation with the business sector is predictive maintenance of the sewer sludge drying installation. Up until now, the regular maintenance was based on the reactive approach in which actions were taken after the problems



occurred. In complex and large-scale installations, minor or small undetected anomalies usually lead to extensive damages and expensive repairs. The other option to the reactive approach is predictive maintenance where problems should be eliminated before they have a chance to appear. Due to this, MPWiK S.A. and a Polish company Elmodis have started cooperating on the proof-of-concept pilot to develop a tool for predictive maintenance of the sewer sludge drying installation. The prediction system covers a wide range of technical aspects such as mathematical modelling, expert systems, cloud technology and artificial intelligence. As a result, based on the detailed measurements of various parameters, the implemented algorithms can diagnose the first symptoms of faults such as bearing wear, rotor weighting or changes in impedance of motor windings. The prediction is like a detailed diagnosis and early detection of failures that bases on the first symptoms.

Results

The digital transformation in MPWiK S.A. was beneficial in many aspects. The most important achievements by far are: increased efficiency; increased overall satisfaction with MPWIK S.A. services; adoption of the predictive rather than reactive approach; higher quality of data; extending the reporting systems to all employees; building a basis for predictive maintenance as the next step in the digital transformation.

PARTICIPANTS EXPERIENCES

Participants' experiences

Turun Vesihuolto Oy

Anders Öström
M.Sc. (Tech), M.Eng
Customer Service Manager
Turun Vesihuolto Oy
Finland

www.turunvesihuolto.fi

Turku is a city located in the Southwestern part of Finland, just about 150 kilometres from the capital Helsinki. Water services for the city of Turku are provided by three different companies. 'Turun Vesihuolto Oy' (Turku Region Water Supply Ltd) serves drinking water and collects wastewater for a little less than 200.000 citizens.

'Turun Seudun Vesi Oy' (Turku Region Water Ltd) is a wholesale water supplier, producing artificially infiltrated groundwater for the whole region including Turku, the biggest city in the area. Finally, 'Turun Seudun Puhdistamo Oy' (Turku Region Wastewater Treatment Ltd) provides wastewater treatment services to the region. Stormwater networks are managed by the municipality. All companies are municipally owned, by many of the cities in the region – Turku Water Works is the only one owned 100% by the city of Turku.

In the EBC programme, we are concidered as a returning city. We took part once before, and 2018 was our second time after a longish break. Overall, the experience was great, and the program was very good. I was happily surprised to see how much time was dedicated to sharing good practices during the workshop in Athens. That's a big plus – this is how we get most out of the experience anyway. We heard a lot of interesting presentations of the participating cities, and the most profoundly astonishing theme was the climate change and it's effects on the water utilities in Europe.

Many utilities seem to be facing the same question, which is – what to do with smart water meters. This is the case for us too. In recent years, there has been a lot of developement

and pilots of smart meters, but also a lot of hardships still to overcome, for a complete and functional system. A lot of open questions too, like do we need to measure at the same time pressure, temperature, noise… and if we do, how long the batteries will function.
The significant thing to consider in Finland is that usually there is only one main meter per building, which means, for example, that in Turku city there are only around 15.000 cold water meters total. The amounts and challenges are totally different in those utilities that take care of individual household meters – like EYDAP.

The data collection was very comprehensive, and I have to say, not easy to fill in completely. Although we didn't get all the data this time, we will improve in the future and try to get more and more data, so that we better benefit from the benchmarking. Then it is possible to dive deeper, and get insights how certain results are achieved. Then we can evaluate our own operations to see if there are ways to improve. This is why such large and heterogenic benchmarking group is great, because there can be so much different variations how to do things in the water sector.

Participants' experiences

VA SYD's experience with EBC: Beginning of a (benchmarking) journey

Tsvetana Stoyanova
Business Controller
VA SYD, Sweden

www.vasyd.se

Joining EBC in 2018 marked the beginning of a journey for VA SYD. We have, admittedly, had a long history of benchmarking – participating in the 6-cities group, Swedish Water Statistics Collection, etc. Cooperation is not something new to us either, given that we are built around the idea of regional cooperation and are a growing municipal association for providing water, wastewater and waste services.

For the first time, however, both of these key focus areas have extended our strategy beyond the boundaries of VA SYD, Skåne and Sweden. Water is our planet's most valuable resource and we need to make the challenges of our sector known to the rest of the world, because most of these challenges cannot be solved on a local level. More than ever, we need to learn from each other and EBC is a great way to do that. Systematically checking performance against peers and continuous improvement is a key benefit of the programme, which we have yet to experience, since it takes more than a year to implement the necessary changes and see the results. However, using benchmarking to monitor and follow-up VA SYD's strategic goals is only a part of the reasons to join EBC.

One of the immediate benefits of the programme we experienced already at the Orientation workshop. It was the interaction with other utilities and the knowledge exchange that really moved us and we started using examples of other utilities' experiences to inspire our colleagues in our planning. Every time you meet another utility, you have to start with the most basic of questions to get to know each other, and you quickly discover just how different the entire system can be and how broad responsibility the water sector has. It makes you rethink your organisation. After all, questioning your reality is a crucial element of innovation and making a real change.

Therefore, we look forward to continuing our benchmarking journey and are particularly enthusiastic about EBC's new initiative of 'knowledge picnics'. They certainly have the potential to bring utilities even closer together to find innovative solutions and shape the future of water systems. VA SYD would be proud if our knowledge exchange leads to exciting new developments and increased sustainability, not only for the water sector, but also for society as a whole.

Endnotes

1) **Share of (waste)water bill in household consumption expenditures** is the percentage that the average (waste)water charges per property represents of the calculated household consumption expenditures.

2) **Average water charges** are calculated by dividing a company's revenues (direct revenues, residential, non-residential, or revenues from exported water), by the number of m^3 of authorized consumption, connected properties, or exported water (direct, residential or non-residential respectively).

3) **The total costs** are the sum of capital and running costs. Capital costs are defined as net interest plus depreciation, while running costs include personnel costs plus operational costs (external services, energy costs, purchased merchandises, leasing and rentals, levies and fees, exceptional earnings/losses, other operating costs).

4) **Average wastewater charges** are calculated by dividing a company's revenue (fees for collecting, transporting and treating the wastewater), by the number of properties connected to the sewer system managed by the utility (in apartment buildings, each household/property is counted separately).

Colophon

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Photo's
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EBC

The European Benchmarking Co-operation

The EBC Foundation is a not-for-profit benchmarking initiative that facilitates water- & wastewater utilities in improving their services through benchmarking and learning from each other. EBC Foundation is governed by a Board, consisting of representatives from DANVA (Danish water utility association), Danube Water Program (joint capacity building program of the World Bank and IAWD for the Danube region; Austria), EurEau (European federation of national water utility associations), Norsk Vann (Norwegian water utility association) and Vewin (Dutch water utility association).
EBC Foundation annually organises benchmarking exercises for water- & wastewater utilities in Europe and beyond. Next to the core programme for Western Europe, EBC facilitates regional benchmarking programmes in the Danube region in close collaboration with the local national water associations. Participation in EBC's benchmarking programme is on a voluntary basis. The programme is aligned with the IWA & AWWA benchmarking framework and applies the IWA Performance Indicator System. This provides a standard for exchange between the different programmes.

What does EBC's benchmarking programme offer?

EBC offers a learning-orientated utility improvement programme. It consists of two consecutive steps: performance assessment and performance improvement. To serve both large and small utilities, experienced and less experienced ones, EBC has developed a Performance Assessment Model with three different levels of detail: basic, standard and advanced. While at the basic level only elementary statistics and performance indicators are investigated, the advanced level offers quite detailed indicators for deeper analysis. Participants can choose the benchmarking level that matches their aspirations and availability of internal information. Five key performance areas are analysed to provide a balanced view on utilities' performance:

- Water quality
- Reliability
- Service quality
- Sustainability
- Finance & Efficiency

Next to these key areas, EBC analyses the carbon footprint and asset management.

To secure the high-quality standard of the programme, the EBC benchmarking team and the participating utilities closely work together on data collection, data quality control and data reporting.
In the performance improvement step, utilities meet their peers in the annual benchmarking workshop where they exchange knowledge and best practices in technology, management and operations.

DANUBE WATER PROGRAM
IAWD
Smart policies, strong utilities, sustainable services

DANVA
The Danish Water and Wastewater Association

EurEau

Norsk Vann

Vewin