Learning from International Best Practices

European Benchmarking Co-operation

2019 Water & Wastewater Benchmark

Contents

The European Benchmarking Co-operation

The European Benchmarking Co-operation (EBC Foundation) assists water- & wastewater utilities in improving their services through benchmarking and learning from each other.

EBC Foundation is structured as a foundation under Dutch law and governed by a Board composed of representatives from the water utility associations FIWA (Finland), Norsk Vann (Norway) and Vewin (The Netherlands), EurEau (the European Federation of National Associations of Water Services) and the Danube Water Program (a joint capacity building program of the World Bank and IAWD for the Danube region).

EBC Foundation annually organises benchmarking exercises for water- & wastewater utilities in Europe and beyond. Next to its core programme for Western Europe, EBC facilitates regional benchmarking programmes in close collaboration with local partners.

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 exchanges between different regional 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 uses 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. Six key performance areas are analysed to provide a balanced view on utilities' performance:

- Access
- Water quality
- Reliability
- Service quality
- Sustainability
- Finance & efficiency

Next to these key areas, EBC analyses context information and asset management indicators.

To secure the high-quality standard of the programme EBC's benchmarking team and the participating utilities closely work together on data collection, data quality control and performance reporting.

In the performance improvement step utilities meet their peers in the annual benchmarking workshops as well as during topic specific Knowledge Picnics where they exchange knowledge and best practices in technology, management and operations.

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

FIWA

EurEau

Norsk Vann

Vewin

Participants 2019 exercise

Belgium
- Brussels Waste Water
- De Watergroep
- Société wallonne des eaux
- VIVAQUA

Cyprus
- Water Board of Larnaca
- Water Board of Lemesos
- Water Board of Nicosia

Dubai
- Dubai Municipality

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

Germany
- Hamburg Wasser
- hanseWasser Bremen GmbH

Greece
- Athens Water Supply and Sewerage Company SA (EYDAP)

Italy
- Societa' Metropolitana Acque Torino S.p.A

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

Oman
- Public Authority for Water (DIAM)

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

Republic of Singapore
- Public Utilties Board

Romania
- APASERV Satu Mare S.A.
- Compania APA Brasov
- S.C. Apavital S.A. Iasi

Russian Federation
- Joint-stock company Mosvodokanal

Spain
- Aqualia Badajoz
- Canal de Isabel II
- Empresa Metropolitana de Abastecimiento Y Saneamiento de Aguas de Sevilla SA

Sweden
- Sydvatten AB
- 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

Facts & figures

Drinking water

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

70.559.524

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

Annual turnover of the participating drinking water utilities

€ 5.628.504.892

Annual investment by participating drinking water utilities

€ 1.775.332.289

Wastewater

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

44.030.363

Which equals to
9% of the **EU28 population!**

Annual turnover of the participating wastewater utilities

€ 2.949.976.732

Annual investment by participating wastewater utilities

€ 942.157.976

Foreword

In 2019, delegations from Abu Dhabi, Belarus, Poland and Japan visited the EBC office to learn about the benchmarking concept and EBC's activities in this field. Despite the different origins of the delegations and the different context in which utilities operate, the challenges discussed are often the same: inefficiencies, poor water quality, too much or simply not enough water, aging infrastructure and digitalisation to name just a few. The visits once more underlined that sharing good practices (and failures) among utilities can be very valuable to improve services. 2019 Brought us similar weather extremes as 2018, hence, the necessity to work together to face the increasing challenges becomes even more evident.

Oliver Loebel
Secretary General EurEau
Chair of the Board of
EBC Foundation

With two additional questionnaires, fully renewed performance assessment reports and the introduction of the Knowledge Picnic concept, EBC continues to support utilities in their improvement efforts. At the utility side we notice that in quite some cases the benchmarking results remain in the circle of a limited number of experts, while for effective follow-up actions they should be shared with senior management and relevant stakeholders. This calls for better internal communication of the benchmarking results, for instance with the help of EBC's renewed reporting tools.

Western Europe

43 Utilities from 18 countries participated in the 2019 benchmarking exercise for Western Europe (IB2018). Six of them (Aqualia Badajoz from Spain, Apaserv Satu Mare, Apavital Iasi and Compania Apa Brasov from Romania and Water Board of Larnaca and Water Board of Nicosia from Cyprus) are new to the programme or have returned after some years of absence.

From 13-15 November, 75 delegates representing 25 water utilities from 15 countries as well as guests from the European Investment Bank and

the Finnish water utility association FIWA, participated in EBC's annual benchmarking workshop. HSY (Helsingin Seudun Ympäristöpalvelut), the water- and wastewater utility of Helsinki, kindly offered to host and sponsor this year's workshop.
The workshop mainly focussed on three themes: resilience, energy efficiency and the Sustainable Development Goals. Delegates could choose from a wide pallet of break-out sessions and join plenary sessions to share and discuss best practices and common challenges. This year, the knowledge sharing did not stop above ground, as the 2nd day ended with a site-visit to the impressive Viikinmäki wastewater treatment plant: 16 hectares underground carved in the granite rock bottom.

Danube Water Program

In the past few years, with the assistance from EBC, more than 90 front-runner utilities and their national co-ordinators from ten countries in the Danube region were successfully trained in benchmarking and built up valuable experience in performance analysis and improving water services. Regrettably, in 2019 the collaboration between EBC and the Danube Water Program came to an end due to a lack of financial resources, resulting in reduced opportunities for utilities in the Danube region to benchmark and learn from each other at a European level.

EBC Knowledge Picnics

As a spin-off from the 2018 workshop in Athens, two 'Knowledge Picnics' were organised in 2019. On the initiative of MPWiK Wroclaw, the very first Knowledge Picnic took place in Wroclaw (Poland). On 5 April, 15 participants from four utilities gathered to discuss digital transformation within a water utility. On 13 September, on the initiative of VA SYD (Sweden) and Waternet (Netherlands), a second Picnic was organised in Malmö (Sweden). 17 Participants from seven utilities came together to discuss sustainability. The UN Sustainable Development Goals formed a central part in this discussion and acted as a guidance. Participants responded very positively to EBC's Picnic concept. The knowledge exchange events offer more time for detailed discussions and attract more relevant utility experts than it is possible during the annual workshop. The small size of the group makes people feel more comfortable to speak out and come forward with innovative ideas.
Two more Picnics are already planned for 2020: on Riothermia (hosted by VIVAQUA in Brussels, Belgium) and on SDG indicators (hosted by Canal de Isabel II in Madrid, Spain). And more are to follow!

> *"The Knowledge Picnic is an ideal way to talk with intrinsically interested people about a specific topic. In our case we talked about SDG indicators for European water utilities, and it actually started an ongoing conversation between companies that want to connect their strategic goals to the SDG's.*
>
> Jorik Chen – Waternet, Amsterdam

Renewed assessment reports

In 2019, the individual company reports with the results of the performance assessment underwent a major upgrade. Previously, the

assessment results were presented in a static pdf document. From IB2018 onwards, this is replaced by an online presentation of the results, with an option to still download results in a pdf-format. This new approach offers a whole set of new possibilities for analysis, presentation of data and more interaction. The new set up was presented during the annual workshop in Helsinki and is very well received; internal communication about the assessment results has now become a lot easier.

2020: Are you in?

2020 promises to be an interesting year in many respects. Collaboration is key; the necessity is clear. The sector faces many challenges and opportunities, which we can face and valorise more easily and more efficiently if we cooperate and exchange knowledge and experience. Therefore, I would like to use this opportunity to encourage utilities across Europe to join EBC's benchmarking- and improvement programme. Participation in one of the Knowledge Picnics might be a good start to become part of a unique peer utility network that helps you moving forward! ●

> *"It was a pleasure to organise the Knowledge Picnic and a great way to learn from each other. Finding ways to measure how we contribute to sustainable development together was a lot of fun! All the engagement and feedback we got signified the importance of the SDGs on organisational level and it sparked an interest around the topic on a sector level.*
>
> Tsvetana Stoyanova – VA SYD, Malmö

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.

see map

In 2019 EBC organised its 13th international benchmarking exercise, welcoming 43 participants from 18 different countries. Four utilities are based in countries outside Europe (Oman, Singapore, Dubai and the United States). The 2019 exercise processed data from 2018. 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 2019 with an invitation to European water utilities to join EBC's benchmarking exercise.

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 detailed, individual company reports and for this brief 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 2019 benchmarking exercise improvements have been made in the set of questions and definitions of various indicators were clarified. Additional effort was put in improving the Climate Footprint and as of the IB2018 exercise EBC puts into operation a more comprehensive greenhouse gas (GHG) registration and a stricter application of the Greenhouse Gas Protocol (www.ghgprotocol.org). The adjusted registration closely aligns to the (core part of the) code of practice as applied by the Dutch water supply companies. Next to the methodological updates also the company reports underwent a major redesign, offering a whole range of new possibilities for analysis, presentation of data and learning.

On 14 and 15 November 2019, 75 representatives of the participating utilities gathered in Helsinki, Finland for EBC's annual benchmarking workshop, which was hosted and co-organised by Helsinki Region Environmental Services Authority HSY. The two-days event provided participants with a platform where they could exchange good practices and ideas for improvements. The workshop was organised around key themes like resilience, energy efficiency and sustainability/sustainable development goals. More than 20 break-out sessions were dedicated to discuss numerical results of the exercise (performance assessment) and

Utility representatives at the 2019 benchmarking workshop in Helsinki, Finland

best practices (performance improvement). Also, HSY organised a site visit to Viikinmäki wastewater treatment plant.
During the traditional workshop dinner, the Benchmarking Co-ordinator of the Year Award was handed to the team of Waternet (The Netherlands) and to the team of Bristol Water (United Kingdom). The EBC-team congratulates the winners of this year's award and encourages them to continue their good work!
Right after the benchmarking workshop, participants could make the last corrections in their dataset. Final reports were distributed mid-December.

Map

43 participants from
18 different countries.

- Belgium (4)
- Cyprus (3)
- Finland (2)
- Germany (2)
- Greece (1)
- Italy (1)
- Norway (2)
- Poland (4)
- Russian Federation (1)
- Romania (3)
- Spain (3)
- Sweden (2)
- The Netherlands (10)
- United Kingdom (1)

Outside Europe:

- Dubai (1)
- Oman (1)
- Republic of Singapore (1)
- United States (1)

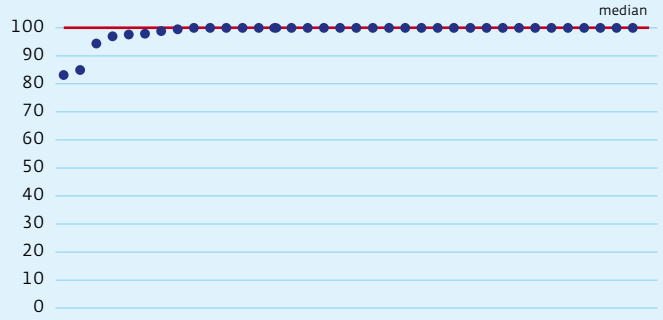
Drinking water

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 six performance areas: access, water quality, reliability, service quality, sustainability and finance & efficiency. This public report only shows a subset of the available performance indicators in the EBC programme, 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 2019 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.

Access

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 (%)

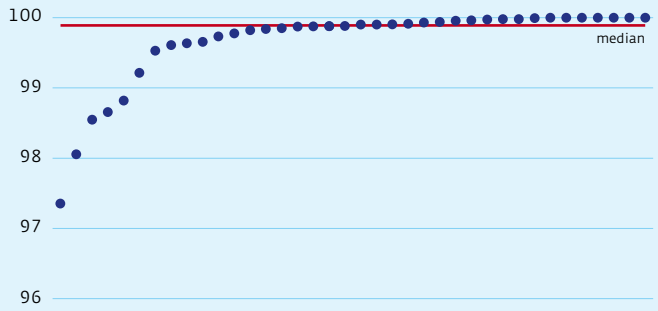


Water quality

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 99,89%. 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 customers expect 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 0 to 110,8 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 13 No. / 100 km.

In addition to mains failures the programme also looks at distribution losses and (at the advanced level) at customer minutes lost to assess reliability of the service. Utilities in the current EBC group face distribution losses between 0,5 and 67,9 m^3 per km mains length per day. The median value for the group is 9,6 m^3 / km / day.

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

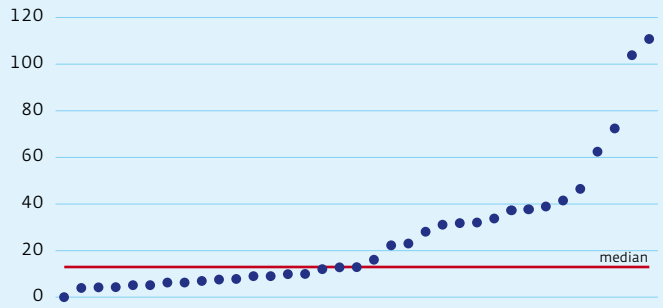
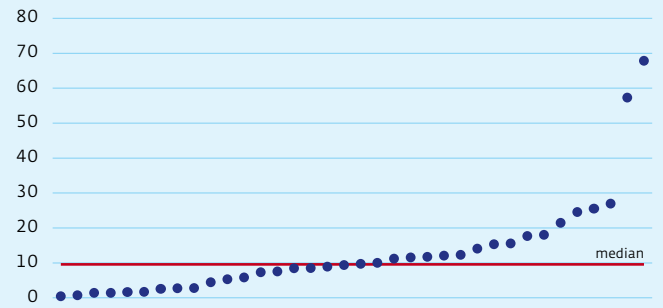


Figure 4: Distribution losses per mains length (m^3/km/day)



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, (short term) interruptions, (medium to long term) continuity and water quality. 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 0,84 complaints / 1000 properties. The emergence of social media has created a new channel of communication between consumers and utilities. Many water utilities are currently using social media to better inform their customers. Hence, through these new channels, mutual understanding is facilitated and formal complaints may be prevented.

Sustainability

Sustainability is a key point of the agenda of many water utilities. It can be approached and measured in various ways. The EBC programme applies 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 determines social sustainability of the drinking water services by means of the indicator affordability, showing the water bill as a share of household consumption expenditures. In the current EBC group this ranges from 0,19% to 0,92%, with a median of 0,4%.

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

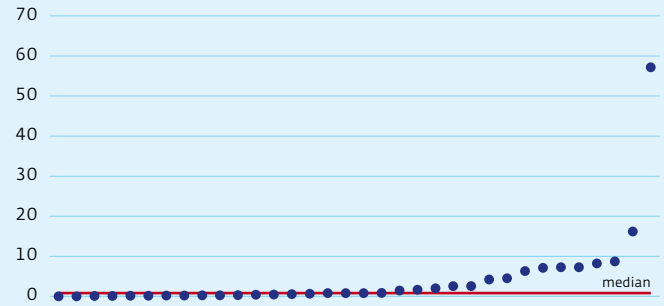
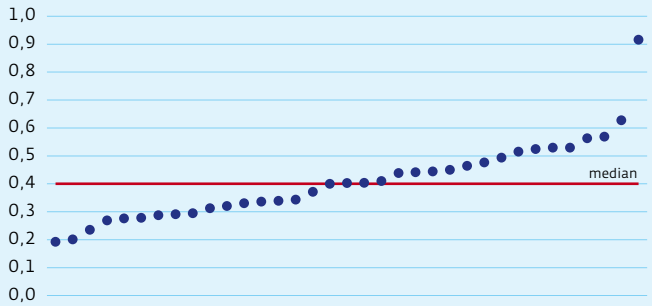


Figure 6: Affordability based on household consumption expenditures (%)



Environmental sustainability

At advanced level the EBC programme determines 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 by pumps 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 resulted in a median electricity usage for pumping of 0,49 kWh / m^3.

The EBC programme analyses the greenhouse gas emissions at scope 1, scope 2 and scope 3 level to determine the climate footprint of the drinking water service, expressed in kg CO_2 equivalent per m^3 drinking water sold. The companies participating in this years' benchmarking exercise show a range of scores from 0,11 kg till 0,58 kg CO_2-equivalent per m^3 drinking water, with a median value of 0,14 kg CO_2-eq./m^3.

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

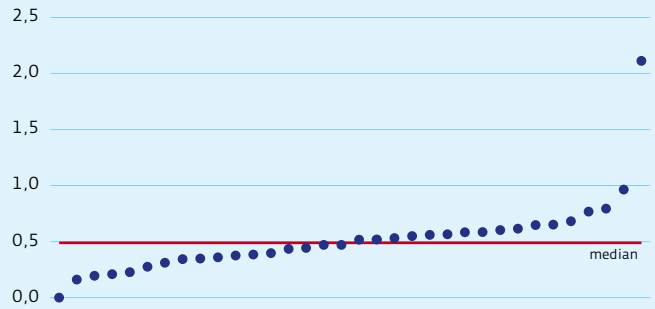
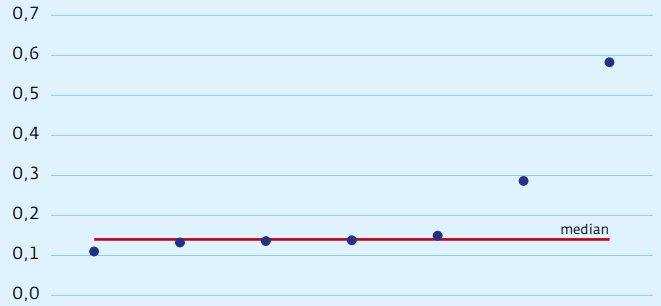


Figure 8: Climate footprint per m^3 drinking water sold (kg CO_2-eq./m^3)



Economic sustainability

Next to making sure that water is available and affordable for consumers and next to limiting the environmental footprint of the activities, water utilities need to make sure that their activities are economically sustainable.

First of all this requires that sales revenues cover the 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 1,03.

Furthermore, the infrastructure needs to be kept fit for future use. Utilities renovate or replace mains to keep the network in good condition. The percentage of mains rehabilitation is the share of the network that has been renovated or replaced because the condition of the mains deteriorates. Higher percentages of main rehabilitation can be caused by a higher average network age. All utilities in the current EBC group rehabilitate between 0 and 1,2 % of their network. The median value is 0,46 % / year.

Figure 9: Total cost by sales coverage ratio

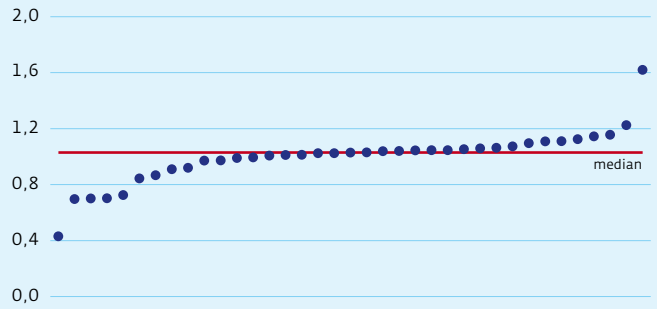
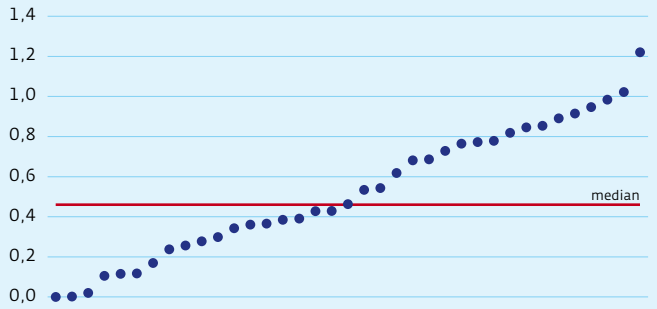


Figure 10: Mains rehabilitation (%/year)



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 1,11 € / m3 (excluding VAT).

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 0,3 to 5,76 fte per 1000 properties with a median value of 0,9 fte / 1000 properties.

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

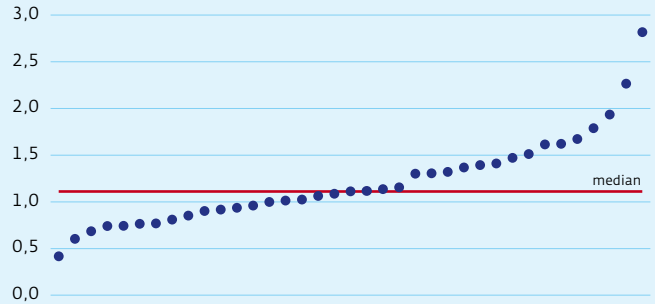
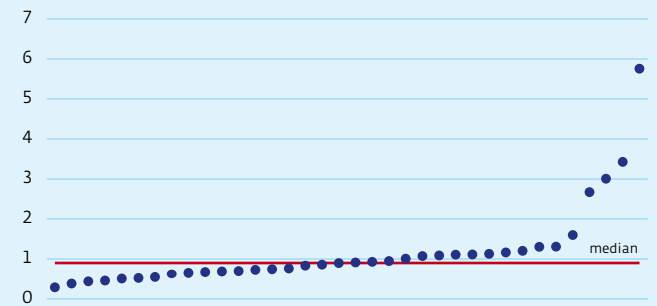
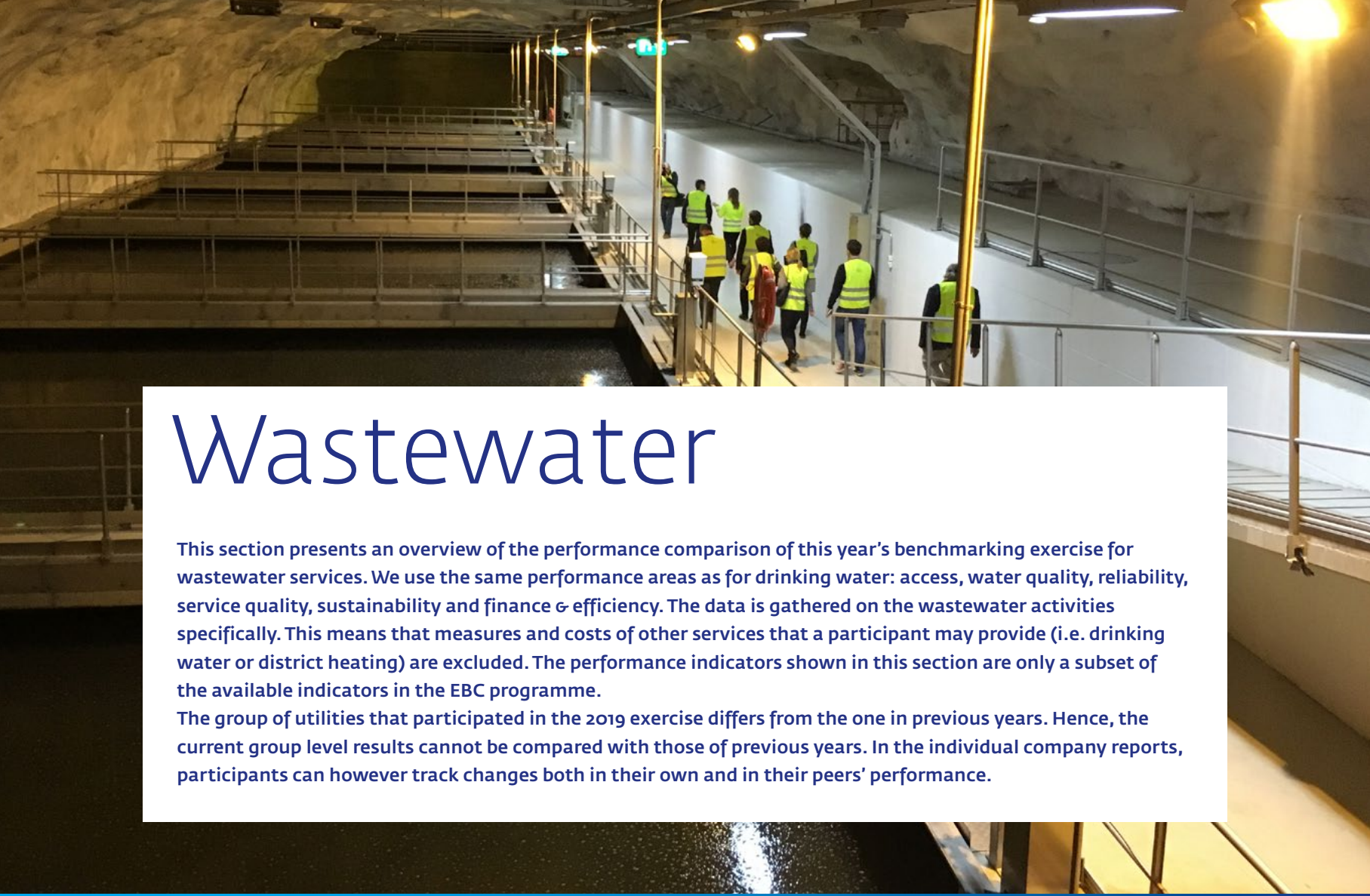


Figure 12: Personnel intensity (fte/1000 properties)





Wastewater

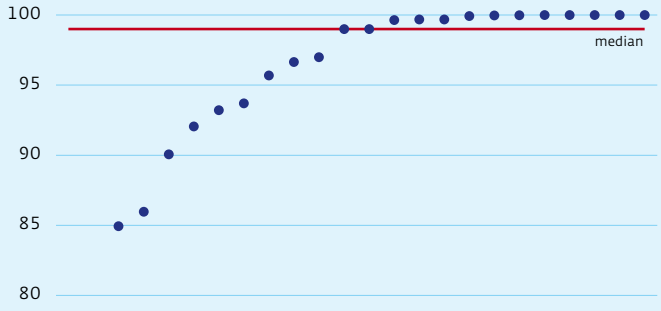
This section presents an overview of the performance comparison of this year's benchmarking exercise for wastewater services. We use the same performance areas as for drinking water: access, water quality, reliability, service quality, sustainability and finance & efficiency. The data is gathered on 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 in the EBC programme.

The group of utilities that participated in the 2019 exercise 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.

Access

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%.

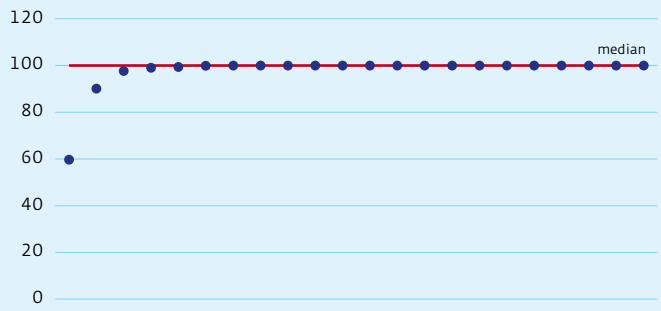
Figure 13: Resident population connected to sewer system (%)



Wastewater quality

For hygienic and environmental reasons the wastewater that is collected by a utility (often mixed with stormwater) needs to be treated. The treated water should be in compliance with discharge consents to minimize the negative impact 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: WWTP compliance with discharge consents (%)



Reliability

To assess wastewater reliability EBC uses 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 sewer blockages vary widely within the current EBC group: between 2 and 664 blockages per 100 km sewer, per year, with a median value of 15 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 2,3 with a median value of 0 No. / 100 km sewer.

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

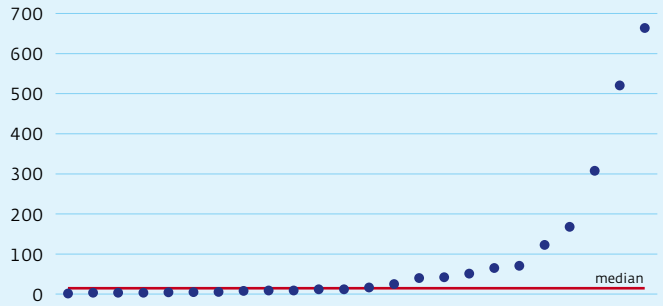
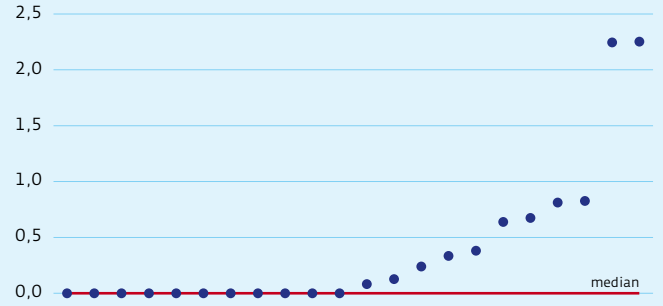


Figure 16: Flooding from combined sewers (No./100 km sewer)



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 0,71 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 usually faced with complaints regarding pollution, odour and rodents.

Sustainability

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

Social sustainability

The EBC programme determines the social sustainability of wastewater services by means of the indicator affordability, defined as the share of the wastewater bill in household consumption expenditures. This indicator accounts for differences in wealth between nations. The EBC group of current participants shows a profound range from 0,09% to 0,78% with a median value for this indicator of 0,34%.

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

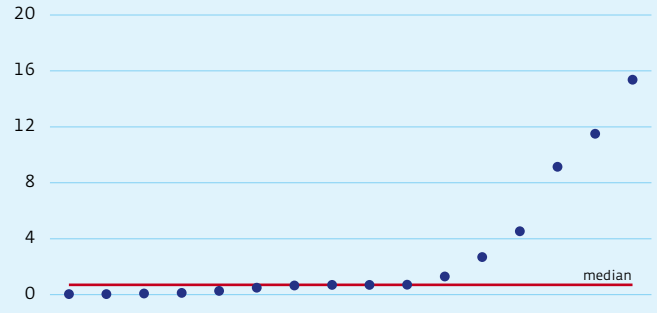
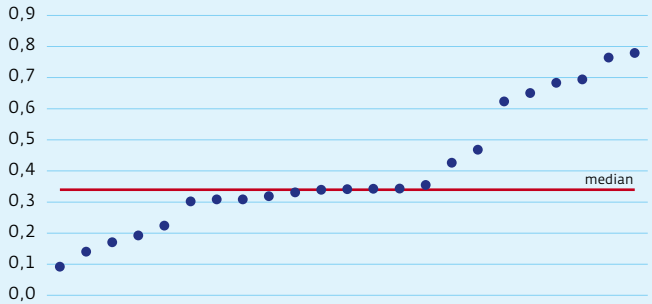


Figure 18: Affordability based on household consumption expenditures (%)



Environmental sustainability

EBC's benchmarking programme determines environmental sustainability through 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 utilised in a sustainable way or the frequency of use of overflow devices to surface water. In this report we reveal the results for the energy consumption of the wastewater treatment plants as well as results for the climate footprint analysis.

The energy consumption of the majority of participants is distributed between 9,9 kWh and 68,8 kWh per population equivalent served. The median value for the current EBC group is 29 kWh / p.e. served by WWTP. The energy consumption of the wastewater treatment plants can differ depending on the level of treatment, which in its turn depends on the local discharge consents.

The EBC programme analyses the greenhouse gas emissions at scope 1, scope 2 and scope 3 level to determine the climate footprint of the wastewater service, expressed in kg CO_2 equivalent per population equivalent. In this report the (most significant) scope 2 is highlighted: the emissions from the generation of purchased energy for own use by the utility. Utilities in the current EBC group report values between 0 and 19,3 kg CO_2-equivalent per population equivalent. The median value for the entire group is 7,5 kg CO2-eq./p.e.

Figure 19: WWT energy consumption (kWh/p.e. served by WWTP)

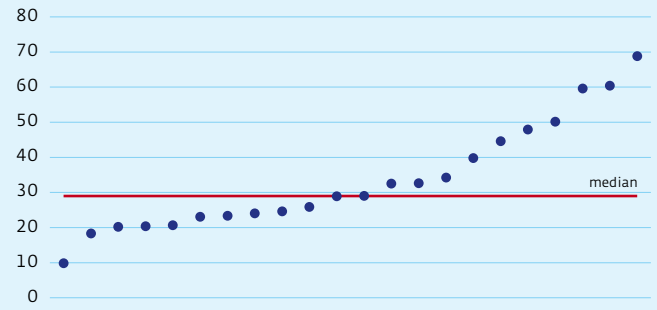
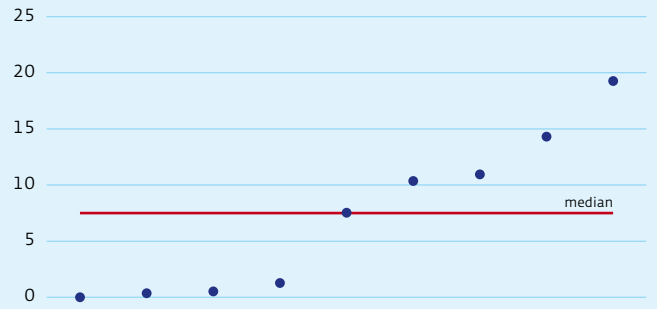


Figure 20: Climate footprint scope 2 per population equivalent served (kg CO_2-eq./p.e.)



Economic sustainability

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

First of all, this requires that the total costs are covered by the revenues. The indicator total cost by sales coverage ratio identifies 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 0,32 till 1,44, with a median value of 1,02.

Furthermore, the infrastructure needs to be kept fit for future use. Utilities renovate or replace sewers to keep the network in good condition. The percentage of sewer rehabilitation is the share of the network that has been renovated or replaced because the condition of the sewers deteriorates. 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 0,47 % / year.

Figure 21: Total cost service coverage ratio

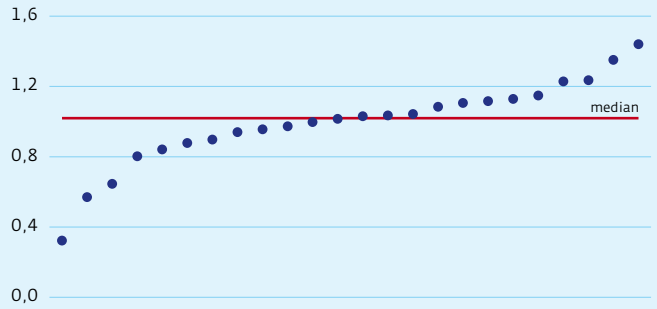
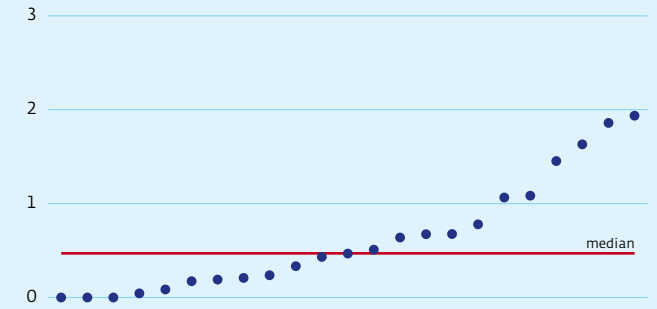


Figure 22: Sewer rehabilitation (%/year)



Finance and efficiency

Like with drinking water utilities, finance & 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 6 times higher than the average of the three lowest (€ 278 versus € 46 per property). The median value for the current EBC group is 153 € / property. Corrected for differences in purchasing power the gap between highest and lowest charges reduces to 4,8.

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.

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 0,19 to 3,83 fte per 1000 properties with a median value of 0,74 fte / 1000 properties.

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

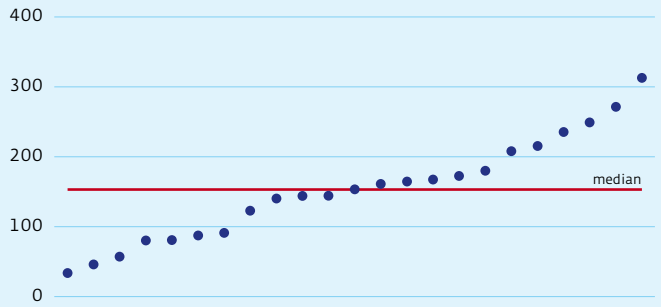
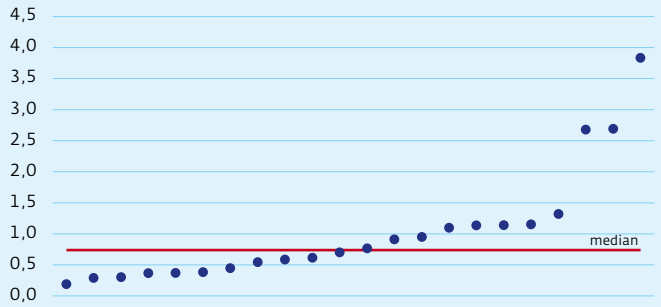


Figure 24: Personnel intensity (fte/1000 properties)



Good practices

Hamburg's approach to stormwater management

Metropolitan cities such as Hamburg face growing challenges due to increasing quantities of stormwater runoff. This development is a consequence of increasing surface sealing caused by densification and an altered intensity and frequency of rainfall in the wake of climate change. Especially during extreme events, the design criterions for the capacity of the sewer systems are exceeded. Sewer overflow and flooding of streets and properties with tremendous damage can be the consequences.

www.hamburgwasser.de

Julia Döring

Dr. Franziska Meinzinger

Hamburg's approach to these challenges mainly consists of three fields of activity. The first field is the reduction of combined sewer overflows. For this goal, HAMBURG WASSER already started programmes for water protection 30 years ago, during which amongst others the capacity of the combined sewer network were substantially increased. The last protection programme ends in the beginning of 2020 and in the course of the different programmes, HAMBURG WASSER was able to reduce the combined sewer overflows at crucial points to a level of less than one per year on average.
The second field of activity is the reduction of flooding due to cloudbursts and a third field is the re-establishment of a near-natural water cycle.

Especially for the last two fields HAMBURG WASSER and the State Ministry for Environment and Energy started the project "RISA" (RainInfraStructureAdaption) in 2009 [1]. The results of the project phase from 2009 - 2015 were summarized in the so-called "RISA Structure Plan, Stormwater 2030". This document acts as a guideline for water sensitive urban development and an integrated stormwater management in Hamburg. RISA is by now an ongoing process in Hamburg and is getting more and more integrated into regional, city and transport planning. Within the framework of RISA, HAMBURG WASSER and the State Ministry for Environment and Energy also initiated pilot projects to analyse chances and opportunities of new strategies with regard to stormwater management such as multifunctional public spaces.

Project Examples For Cloudburst Management

The multifunctional use of areas represents a promising strategy for the future handling of stormwater during heavy rainfall events. The idea of this concept is to use public spaces for the retention of excess water in the occasion of a cloudburst while the areas provide a different function for the rest of the year. HAMBURG WASSER implemented three projects with multifunctional spaces and gained experience in the successful interaction of municipal stakeholders.

One of these projects is "Ohlendorffs Park". This public park provides retention space for excess stormwater and is filled via an emergency flow path (Fig. 1). The stored water can infiltrate in the park without causing damage [2].

Another project in Hamburg is a sporting facility in Hamburg-Billstedt, the "Hein-Klink-Stadion", which is currently under construction. In future, surplus stormwater will divert from the main sewer through a discharge pipe to an infiltration structure below the field (Fig. 2) [3]. Additional water can be retained on the surface of the sporting facility in the case of extreme cloudbursts. The retention under as well as on the sports field makes it possible to alleviate the flooding problem in the downstream catchment area.

Figure 1: Illustration of the emergency flow path and the retention space in the "Ohlendorffs Park" during dry weather (left) and during extreme cloudburst events (right). Source: osp urbanelandschaften.

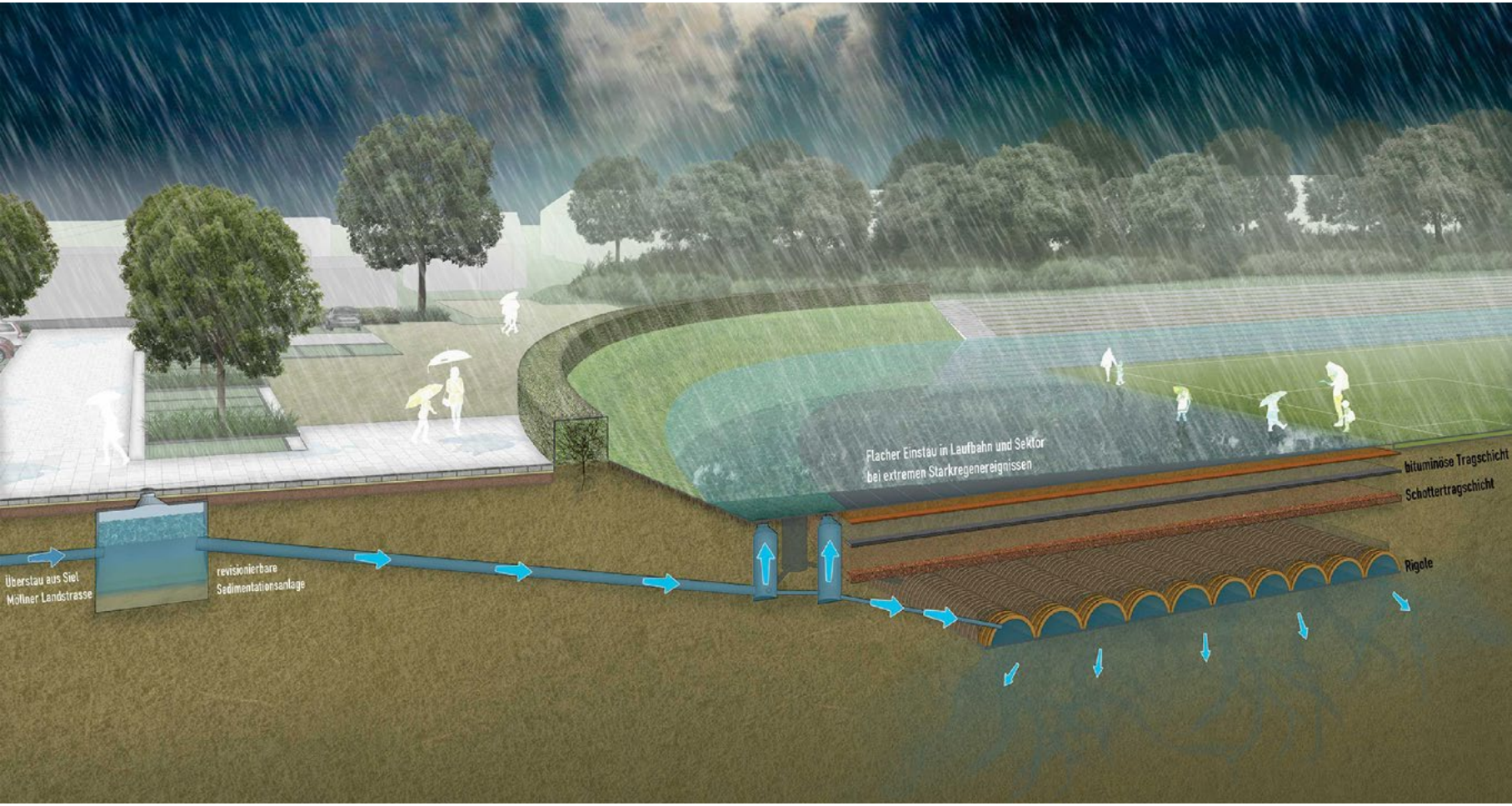


Figure 2: Illustration of the retention on and under the "Hein-Klink-Stadion" during extreme events.
Source: Naumann Landschaftsarchitektur.

Project Example For Water Sensitive Urban Design

Further RISA projects with a focus on decentralised stormwater management were implemented in the Hamburg urban area, particularly in cooperation with schools.

In 2019, HAMBURG WASSER inaugurated the new stormwater management system of the School 'Rellinger Straße', which is a prime example for water-sensitive development in dense urban areas. Green roofs, swales, infiltration structures and a playable drainage channel help to retain a large part of the stormwater on the property (Fig. 3). By evaporating and infiltrating into the ground, the stormwater contributes to the improvement of the microclimate. In addition, school children can experience the stormwater management in their schoolyard and develop their understanding of the natural water cycle.

Figure 3: The water-sensitive school yard of the School Rellinger Straße with green roofs, swales, infiltration structures and a drainage channel. Source: Naumann Landschaftsarchitektur.

Another Field of Action: Stormwater Quality

In addition to the challenge of increasing quantities of stormwater runoff, attention must also be paid to the quality of stormwater. For this purpose, HAMBURG WASSER has developed a map, which shows the estimated pollution for each stormwater catchment area in Hamburg based on a GIS-analysis of land use and other parameters affecting the pollution of the runoff.

Based on this map, a prioritisation of the catchment areas with regard to their need for treatment was carried out and an overall strategy for stormwater treatment was developed for the entire urban area of Hamburg.

In this context, the construction of centralised and decentralised stormwater treatment plants is increasingly coming into focus. In 2019, HAMBURG WASSER built a first constructed wetland for a stormwater catchment as a centralised treatment plant (Fig. 4).

Figure 4: Constructed wetland for the treatment of a stormwater catchment in Hamburg. Source: HAMBURG WASSER.

Summary

Facing the challenges of increasing stormwater runoff HAMBURG WASSER focuses on three main fields of activity: Reduction of combined sewer overflow, reduction of flooding due to cloudburst and the re-establishment of a near natural water cycle. The project RISA (RainInfraStructureAdaption) and its ongoing activities are the cornerstone for dealing with the future challenges of stormwater management. Within the framework of RISA different pilot projects, e.g. for multifunctional use of areas, are implemented, analysed and translated into long-term implementation strategies.

In addition to quantity, the quality of stormwater runoff plays an increasingly important role. With the help of a GIS-based map (the so-called "emission potential map"), all stormwater catchment areas in Hamburg were prioritised according to their need for treatment of the runoff. In this context, HAMBURG WASSER is focusing on supporting the city's strategy for water protection by the construction of new centralised and decentralised stormwater treatment plants.

References

1. RISA. Strukturplan Regenwasser 2030, Zukunftsfähiger Umgang mit Regenwasser in Hamburg, Ergebnisbericht des Projekts RISA – RegenInfraStrukturAnpassung. Herausgeber: Hamburger Stadtentwässerung AöR (HSE) und Behörde für Umwelt und Energie (BUE), Hamburg, Juni 2015
2. Meinzinger et al. RISA-Pilotprojekt Ohlendorffs Park – Flächenmitbenutzung als Maßnahme zur Überflutungsvorsorge. gwf-Wasser|Abwasser 04/2018
3. Schleifenbaum et al. Multifunktionale Nutzung eines Sportplatzes für die Überflutungsvorsorge – Das Hein-Klink-Stadion in Hamburg-Billstedt. Korrespondenz Wasserwirtschaft 2019 (12) Nr. 8

Participants' experiences

Waterbedrijf Groningen

Waterbedrijf Groningen is responsible for supplying drinking water to the population of the Province of Groningen in The Netherlands. It started its activities in 1879.

www.waterbedrijfgroningen.nl

Peter Veenstra
Head Finance & Control Department
N.V. Waterbedrijf Groningen

As head of the Finance & Control Department of the Dutch Water Company Groningen (N.V. Waterbedrijf Groningen) I was invited to join the International Benchmarking Workshop held in Helsinki in November 2019. N.V. Waterbedrijf Groningen is responsible for water production and delivery in Groningen, a northern province of the Netherlands.

For me this event was an excellent way to learn more about the dynamics, context and development of water production and distribution, since I joined the 'world of water' only recently.

Besides this learning opportunity it also appeared to be a perfect way of networking.

I noticed that the benchmarking workshop was very well prepared and thought through. I strongly believe that sharing knowledge and intensive cooperation between water companies can be of strategic added value for water companies. This workshop is a good platform to also connect to international developments and techniques. I found it refreshing that participants had different professional backgrounds which gave meetings a more multidisciplinary approach. Many of the

> *"This workshop is a good platform to also connect to international developments and techniques.*

participants recognized the fact that we all can be very busy with our day to day operations, but the EBC workshop gives the opportunity to take some distance and reflect on your own organisational performance and its strategic context. I was impressed by the broad scope, the quality and insights which the (new) set-up of the international benchmarking report provides. The international benchmarking report gives you a good starting point to compare and start or continue strategic discussions within your own water company.

Besides the valuable plenary sessions, the content of the programme of the workshop included a wide variety of themes on resilience, energy efficiency, sustainable development goals, strategic hands-on training related to the EBC reporting tool. Personally I also enjoyed the event because it was a nice way to get to know people from different backgrounds and cultures. Above all I will never forget the hospitable and friendly reception by our Finnish friends of HSY and discovered a bit of Helsinki! ●

> *“Personally I also enjoyed the event because it was a nice way to get to know people from different backgrounds and cultures.*

Upgrading the Company Report

From Static- to Interactive Reporting

The Company Report is a major deliverable of the programme. In 2019 this document underwent an important upgrade. It switched from static to interactive and tends to give more analysis and guidance then before.

Previously the Company Report was presented as a pdf document. As of IB2018 this static document is replaced by an online presentation of the results, of course with the possibility to download the information as a pdf. This new approach offers new possibilities for analysis, presentation of data and more interaction with the user.

The new report becomes available after the dataset is final. When logging in to the platform the user finds a so called performance overview circle.

> *"It was "love at first sight"! Easy to move around, giving the option of choosing the comparison area (hoping it will get even wider), many time-saving links to the database.*
>
> Katerina Konstantopoulou – EYDAP, Athens

This circle includes six performance areas in order to present a balanced view on the performance of a utility. The Performance Overview circle shows the relative position of a utility compared to its peers, based on 11 Key Performance Indicators presented in the outer circle. These KPI's provide a first picture of the overall performance of the utility.

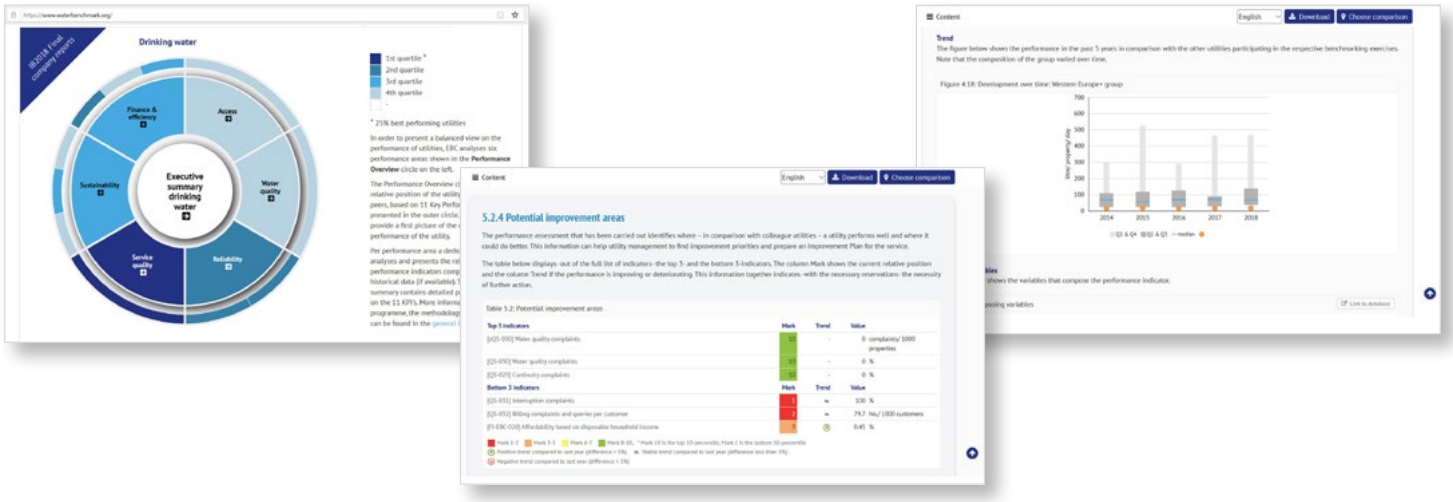
For each performance area a dedicated chapter analyses and presents the relevant performance indicators in comparison with peers and historical data (if available). Next to extensive peer comparisons for the current

year of analysis, performance trends (for the last five years) are shown with boxplots. Also, the variables used to calculate the Performance Indicator (the so-called composing variables) are shown for a quick check in case of possible outliers.

New in the reports is an overview of the possible most significant improvement areas. With the necessary reservations of course, because contextual information is not taken into account, this indicates where to focus on to improve the service. Also new is a short paragraph which provides contextual information that helps understanding and interpreting the current performance.

The new company report was very well received by the participants. Feedback will be taken into account and will be used to further improve the experience and usability of the company report for IB2019. ●

> *I like the new online report exceptionally well. The varied choices to the data with a link to the database offer more comfortable and more efficient analysis possibilities of the produced achievements.*
>
> Uta Kirschling – hanseWasser, Bremen



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 m3 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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