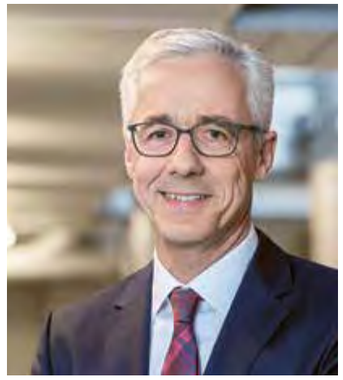
KOMPETENZZENTRUM
WasserBerlin

2018

Annual Report



Jörg Simon

Nicolas Zimmer

Core challenges for managing towns & cities are the future topics of climate, energy and resources. It will be necessary to configure urban infrastructures such as to meet these challenges in the future. Appropriate research will make it possible to determine the extent of support available from digitalisation, networking and other methods for the management of towns & cities.

It was many years ago that Kompetenzzentrum Wasser Berlin gGmbH (KWB) recognised the need to enhance infrastructure systems for the management of towns & cities. Since that time it has worked on numerous application-based research projects. The recovery of energy and resources from wastewater, the incorporation of wastewater treatment plants into the energy system, the management and the treatment of rainwater in order to improve city climates and in order to protect water resources are only some examples of the topics upon which Kompetenzzentrum Wasser Berlin has been specifically working – efficiently networked with national and international partners – to find appropriate solutions.

A forecasting system, available online since last summer, for predicting the quality of bathing waters – which has been extensively made use of by the population of Berlin – stands as a welcome and conspicuous example of the practical relevance of Kompetenzzentrum Wasser Berlin's research activities. The Sema-Berlin project is not as high-profile in media terms but is just as important for water-specific purposes. In this connection, an instrument for predicting the ageing of sewer structures has been developed and will be the subject of further optimisation over the next few years, in close collaboration with its operators.

Kompetenzzentrum Wasser Berlin is precisely on the right track with its research strategy. And that is a fact which is now impressively confirmed by the joint European project of "Digital Water City" (DWC) which Kompetenzzentrum Wasser Berlin has brought to Berlin, having successfully participated in the European research competition. Under the leadership of Kompetenzzentrum Wasser Berlin, the project will seek collaboration – over the next 3 years – between the cities of Paris, Milan, Copenhagen, Sofia and Berlin, with the joint development of digital solutions for the management of water resources in towns & cities.

For ourselves, Berliner Wasserbetriebe and Technologiestiftung Berlin, Kompetenzzentrum Wasser Berlin represents an indispensable foundation stone and cooperation partner in Berlin's research landscape. In our capacity as shareholders we believe that the research activities pursued by this creative research institute are precisely in touch with the needs of the present time.

We wish Kompetenzzentrum Wasser Berlin every success in the future!

Jörg Simon
Chairman of the Board of Berliner Wasserbetriebe
Board Member Berlinwasser Holding GmbH

Nicolas Zimmer
CEO Technologiestiftung Berlin

IMPRINT

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Regina Gnirss


Edith Roßbach

We are very glad of this opportunity to provide you with our Annual Report which illustrates our activities over the past year.

The focal point of our diverse activities in research, in communications and in networked operations continues to rest with the future-oriented topics of energy efficiency, climate resilience, infrastructure, water protection, resources and digitisation. Our activities are intended to contribute to the integration of water as a public service in smart city applications, and to improve the quality of life in towns & cities.

We are proud to inform you that in 2018 we again succeeded in putting project results into practical use, for example with an online tool for predicting bather water quality, or by removing trace organic compounds with ozone in combination with constructed wetlands at the Schönerlinde sewage plant. Our wide-ranging projects working towards efficiency in energy and resources have yielded directly usable results for optimising the closed loop management of water resources and of agriculture. In addition, several new and exciting projects have been accepted for public funding, for example such as the leadership of the “Digital Water City” project in the European research programme Horizon 2020. Overall, we can look back on 2018 as a successful year.

However, we didn’t go it entirely alone. One of our strengths is that we collaborate with major research associations and international partners, which means that we can always be up-to-date with the latest status of research thanks to continuous exchange of expertise and information. Consequently we are glad to have the opportunity of thanking all of our project partners with particular reference to the Berliner Wasserbetriebe and our shareholders for the productive collaboration we have enjoyed, not forgetting the support in terms of project sponsoring and funding that we have received from the European Union, the German Federal Ministry of Education & Research (BMBF), the German Federal Ministry for Economic Affairs and Energy, the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, the German Federal Environmental Agency (UBA), the German Federal Environmental Foundation (DBU), the Berliner Wasserbetriebe and from the Berlin regional authority. Particular thanks must go to the employees of Kompetenzzentrum Wasser Berlin, whose creativity and commitment underpin the success of Kompetenzzentrum Wasser Berlin.

In this Annual Report, we have expanded our description of project activities with several specific articles. We do hope that the motivation and the problem-solving strategies practised in our research activities – which previously could only have been read between the lines – are consequently more clearly perceivable. It is our first concern to demonstrate that we can contribute our ideas and problem-solving approaches for the benefit of future topics relating to the management of water resources.

Regina Gnirss, Edith Roßbach
Directors
Kompetenzzentrum Wasser Berlin

Who we are.

Kompetenzzentrum Wasser Berlin (KWB) is a non-profit water research centre based in Berlin, founded in 2001. Our shareholders are Berliner Wasserbetriebe and Technologiestiftung Berlin. According to our mission statement, our major concern is to advance scientific knowledge and to push research & development activities in the water sector. To this end, we design research projects relating to all issues of the water cycle and carry them out together with our partners from academia, business enterprises and public authorities. The results contribute to keeping cities liveable also in the future. Our network activities link water professionals on the national and international level. Our PR communicates up-to-date information regarding all kinds of water topics to the interested public.

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TECHNOLOGIE STIFTUNG BERLIN

The year 2018 in numbers

35 employees

69.000 external funding rate per employee

38 interns and student assistants

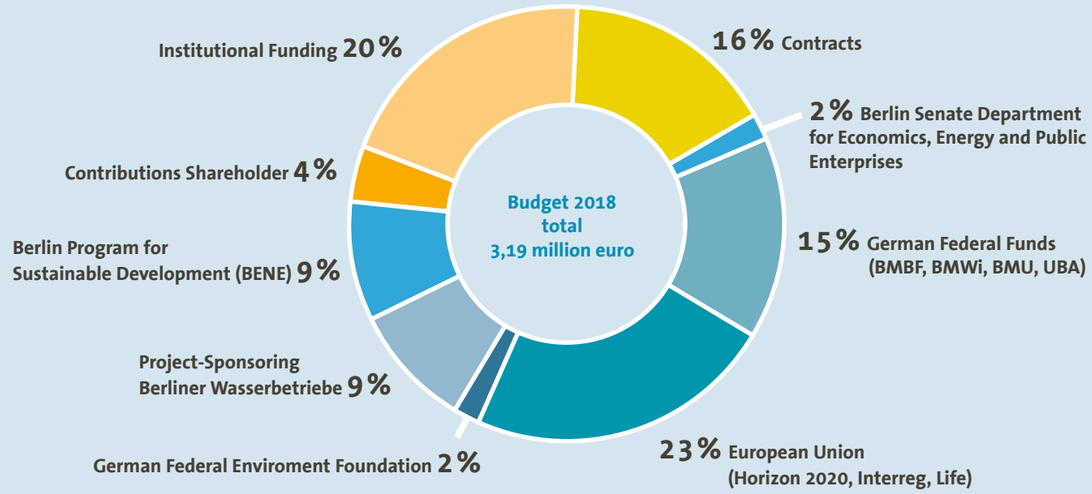
17 contributions to technical journals and conferences and monographs

32 projects with an overall volume of 8,6 million euro

6 technical conferences with 800 attendants

Participation in **9** scientific committees and professional associations

Berlin Long Night of the Sciences with **800** visitors



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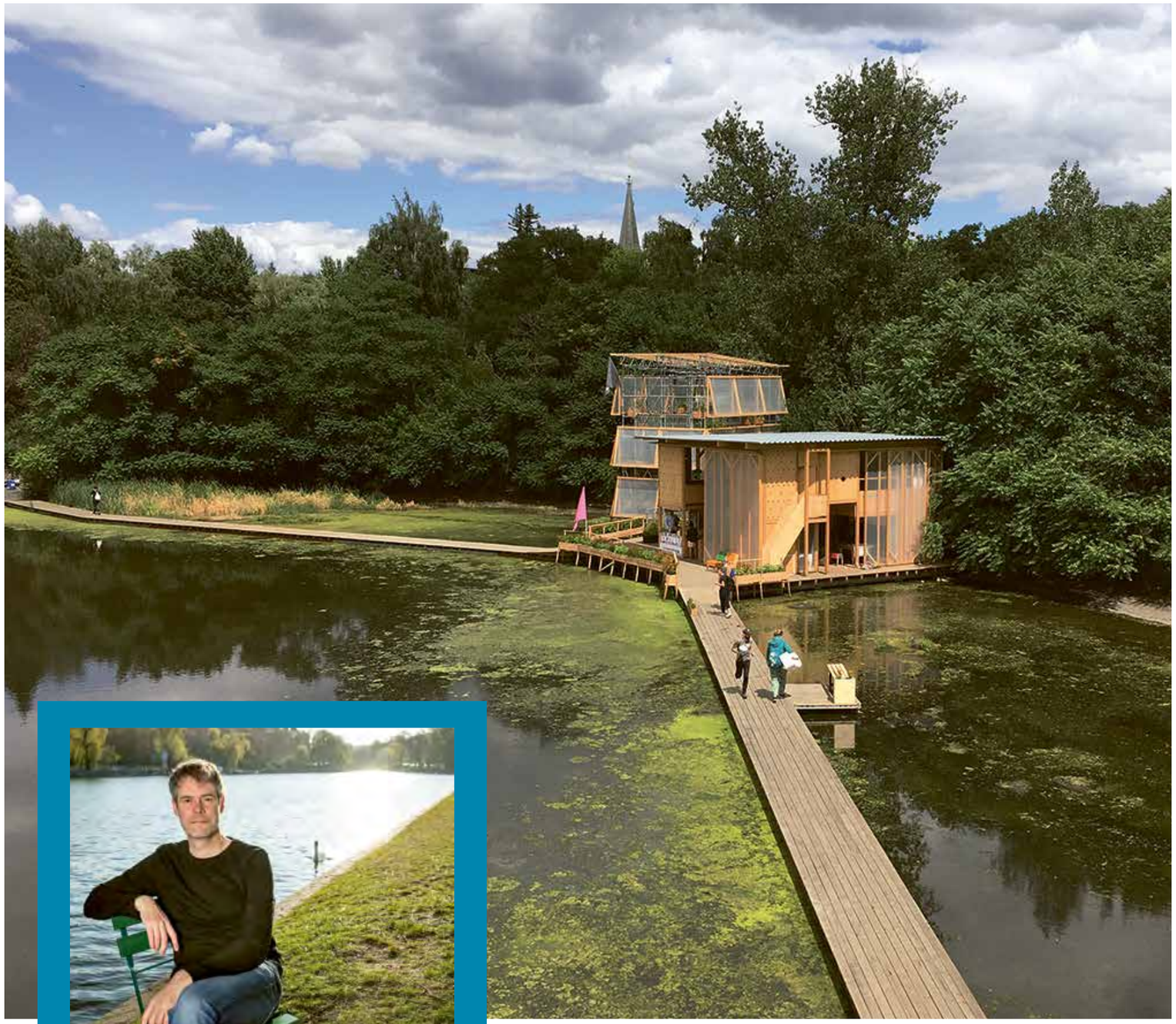


Rain water retention basin in Berlin-Tempelhof with temporary project „Floating University“ in summer 2018

DR. ANDREAS MATZINGER,
born in 1974, studied environmental natural sciences at the Swiss Federal Institute of Technology (ETH) in Zurich and holds a doctorate in the field of freshwater research. Since 2007 he has been a research assistant at Kompetenzzentrum Wasser Berlin.

“Rainwater is valuable”

Andreas Matzinger is a scientist at Kompetenzzentrum Wasser Berlin. A conversation about heat islands in the city, the greening of building roofs and the question of how skilful water management can improve the quality of life in the city despite climate change.

The summer of 2018 was one of the hottest ever, and climatologists speculate that such temperatures could become the norm. How can Berlin protect itself against this?

Dr. Andreas Matzinger: It’s particularly important to make sustainable use of the available water in the city. Rainwater is a valuable resource. We should use it more for vegetation and thereby for cooling the air.

Many experts are calling for Berlin to become a “sponge city”. What does that mean?

The term was coined in China. There, in the course of rapid urban development, aspects such as drainage and sewerage were given too little consideration. Now the Chinese megacities are struggling with flooding and enormous water pollution. Therefore they want to keep water increasingly in the urban space, as if in a sponge. I think the term „sponge city“ is not a particularly fortunate one. In Berlin, we should rather strive to bring the situation closer to the natural water cycle.

What do you mean?

In the surrounding forests about 80 percent of the rainwater evaporates: it first seeps into the soil, is absorbed by plants and finally evaporates through the leaves. Only about 20 percent flows into the groundwater. In the city, on the other hand, up to 50 percent of the rainwater is discharged via channels into waterways such as the Spree or the Landwehrkanal. This is not just a waste, it also causes problems there.

Green roofing of office and production facilities in Berlin-Adlershof

50%

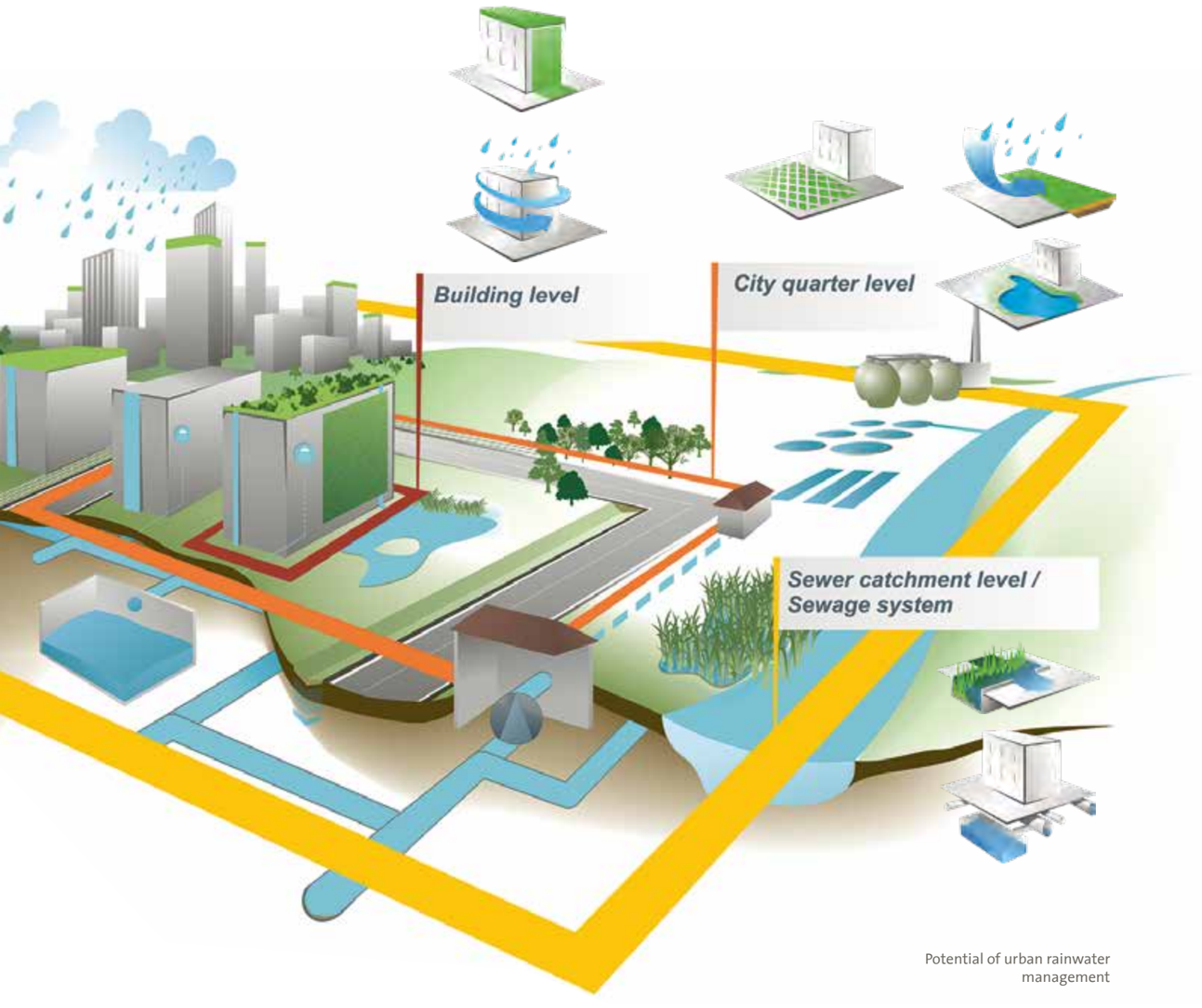
of the rainwater is discharged via channels into surface waters

Retention soil filter for rainwater treatment in Berlin-Adlershof

Artificial water body for rainwater storage at Potsdamer Platz, Berlin

Facade greening as an element of building greenery, university building of the Humboldt Universität zu Berlin

Roof greening of shopping centre at Alexanderplatz, Berlin



Potential of urban rainwater management

Why?

Suddenly huge amounts of water get into small rivers, the river sediment is churned up and living species are disturbed or washed away. If this happens too often, no ecological balance can be established there. And one more thing to remember: as a layman, you think rainwater is clean. What arrives in the surface waters, however, is an often heavily contaminated broth, not just from dog waste or cigarettes from the roadside gutter. A largely underestimated factor is chemicals from roofing membranes and facade paints, such as toxins to counter algae growth. Berlin emits as many pesticides per square meter as an intensively farmed agricultural area.

So should rainwater also be routed to sewage treatment plants?

In the centre of Berlin, roughly within the S-Bahn ring, rainwater and wastewater are collected in the same sewer. This means that the rainwater is also purified in the sewage treatment plant, so that fewer pollutants and microplastics get into the surface waters. However, this so-called combined sewer system also has disadvantages: heavy rainfall leads to the notorious overflows - and unpurified domestic sewage also spills out of sewer shafts into the surface waters. This can cause fish death at high temperatures in summer. And climate change is not just increasing average temperatures. Even extreme rainfall may become more frequent. In June 2017, it poured down for days in Berlin. In low-lying areas roads were flooded; the water was also running into some underground stations. This is another reason why it's so important to retain as much rainwater as possible and make it usable. Green roofs, for example, can absorb up to 70 percent of the annual rainwater there.

Why are only three percent of Berlin's roofs greened?

Three percent is already a good success! No other city in Germany has achieved as much. Even Hamburg, which is often referred to as a prime example, has achieved significantly less. But you're right: there is still room for improvement in Berlin. Up to 40 percent of roofs in the capital could be considered for greening. And green roofs not only cool the rooms below. On low school buildings they also help to stop the schoolyards heating up so much in the summer by evaporation.

Where is the rainwater to go if you have neither a garden nor a flat roof?

In avenues you can target the trees. Australia and the US have already had good experiences with this approach. Even toilet flushes can be operated with rainwater. For example, this was successfully implemented at the ufaFabrik cultural centre in Berlin-Tempelhof. You need extra water pipes for this. As a rough estimate, such an installation can also be expected in residential buildings in about ten years.

Within the Berlin S-Bahn ring it gets up to five degrees hotter in summer than outside it.

Right. In particular, the heat builds up on concrete open spaces such as Alexanderplatz, where shading is largely absent. Studies by the World Health Organisation (WHO) clearly show that a high level of heat stress damages health, especially in the elderly. We should therefore increasingly return green spaces to the city, because then the water is absorbed by plants, evaporates – and, together with shading, ensures cooling. In general, people should be able to experience water in public space with their senses.

Do you dream of Paradise Gardens on Alexanderplatz?

Often simpler measures help. Perhaps you know the concrete pool on Potsdamer Platz. It is fed exclusively by rain. In summer, people sit on the edge and bathe their feet in the cool water.

But what's to be done if it does not rain for months, like last summer?

Wherever possible, we should use water several times over. So-called grey water – i. e. slightly polluted wastewater from baths, showers or washing machines – can be treated and used, for example, as process water in buildings or perhaps even for irrigation. There is still a lack of larger scale applications and there is still a need for research, for instance on pollutant levels. But grey water is always available, and especially in hot summers, when the plants in parks are endangered by drought, people shower even more often than usual. ■

Wastewater as a resource

Treated wastewater to support landscape water balance

“Everything supposed to be green is dried up and brown!”- The astronaut Alexander Gerst was shocked when he saw the drought in Germany in summer 2018. Kompetenzzentrum Wasser Berlin is working on local solutions to a global problem.

At 19.3 degrees Celsius, the temperature in Germany was about three degrees Celsius above the value of the years from 1961 to 1990, according to the German Meteorological Service. Thus, the summer of 2018 was the second hottest since regular measurements began in 1881 - and also the second driest. Rainfall was only 54 percent of average, at about 130 litres of rain per square metre. In agriculture, damage ran into the billions.

In future, climate change will probably lead more often to what was previously considered an extreme summer in the Federal Republic of Germany. One consequence of this is water stress. International comparisons speak of this when 20 or more percent of the available water resources is used. From this scale, environmental risks and economic difficulties increase significantly. Kompetenzzentrum Wasser Berlin is working on a series of projects to prevent this water stress. Waste water plays an important role here. It is itself a reusable resource from which other valuable materials can also be obtained. Based on new research results, it can create regional water cycles that improve local life and help mitigate climate change.

The critical areas of water, agriculture and conventional energy production are inseparable.

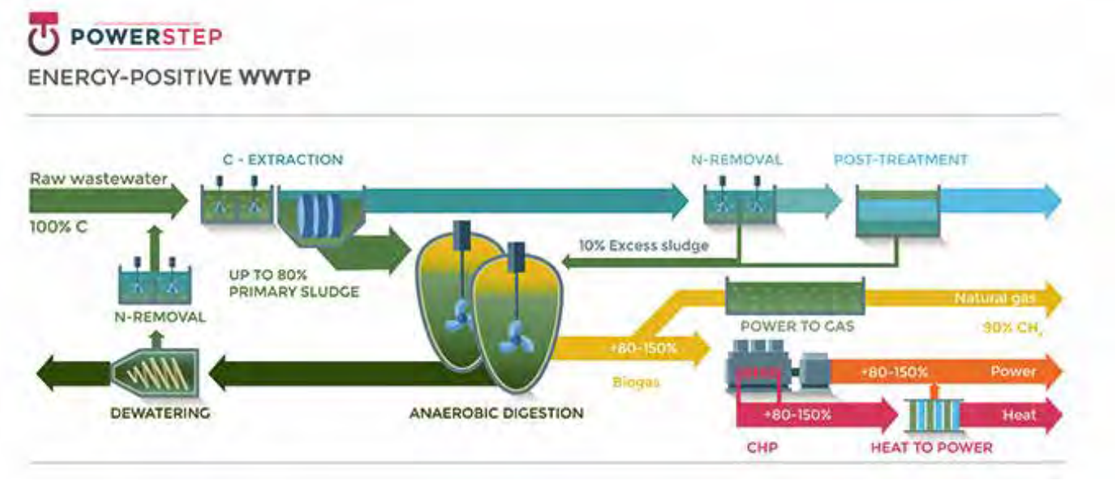
Agriculture needs and consumes the most

The biggest consumption of our global freshwater resources is down to agriculture. In addition, more than a quarter of energy worldwide is used in the production and supply of food. “The critical areas of water, agriculture and conventional energy generation are inseparable,” says engineer Dr Ulf Miehe. “We take that into consideration in the way we conduct our work and arrive at new, integrated solutions.“ The European Commission proposed new rules in 2018 to facilitate the re-use of water for agricultural irrigation. This should help farmers make the best use of purified wastewater so as to reduce the shortage of water, whilst protecting the environment and consumers at the same time. “The minimum requirements formulated by the EU will promote the re-use of water in agriculture, even if there are still reservations in some Member States,” says the Kompetenzzentrum Wasser Berlin divisional manager for process innovation. “Using different approaches, our research projects are delivering the know how to release hitherto untapped potential in the future.”

The AquaNES project, for example, demonstrates the advantages of combining natural and technical water treatment processes in real operation at 13 test sites worldwide. The natural systems are bank filtration, groundwater recharge and constructed wetlands, which are combined with different technical pre- or post-treatment processes. The project involves 30 partners from Europe, Israel and India. “We are bringing various methods together in Berlin, on the one hand ozonation with a natural post-treatment for the elimination of trace substances at the Schönerlinde site,” explains Miehe. “On the other hand, at the Tiefwerder Waterworks location, we are examining the combination of bank filtration with nanofiltration for sulphate and trace substance removal.” In addition to the work in Berlin, Kompetenzzentrum Wasser Berlin is coordinating a work package on combinations of sewage treatment plants or retention ground filters with various technical systems. The trial sites are located in Germany, Great Britain and Greece. “Here we are testing with a view to practicality,” says Miehe, “to see how plants like this can comply with the various limit values in the EU Member States.” The results of the project, which is ending in 2019, are already being included in the planning of the large-scale ozonation system at the Schönerlinde sewage treatment plant.

Sewage treatment plants to power plants

In 2018, the POWERSTEP project was devoted to the energy aspect - and in a big way. The initial situation is that Europe’s sewage treatment plants use as much energy as two large-scale power plants produce. Here, the organic fraction of urban wastewater in Europe contains a chemical energy totalling 87,5 MWh hours per year, which corresponds to the output of twelve large power plants. “Recent studies show that wastewater treatment plants can become a renewable energy source through innovative methods without compromising purification,” says engineer Dr Christian Remy, research assistant at Kompetenzzentrum Wasser Berlin. POWERSTEP has demonstrated novel concepts like this for every significant process stage on an industrial scale. “On this basis, with the technologies currently available, sewage treatment plants can be designed that even deliver energy.” This is made possible, among other things, by improved carbon extraction, new methods of removing nitrogen, power-to-gas technology in conjunction with an intelligent power grid and efficient use of waste heat.



Beyond 2018, Kompetenzzentrum Wasser Berlin will be examining new process variants during ongoing operations within the scope of E-VENT. The project will optimise energy use at the Berlin sewage treatment plants. Even before this, measures were being taken to save energy. In addition, the plants use the biogas produced during the treatment process to generate power and heat. Even so, the average annual electricity consumption of all six Berlin sewage treatment plants still amounts to more than 90,000 megawatt hours, which in the same period leads to greenhouse gas emissions of 40,000 tonnes. “On the test bench are alternative methods to remove nitrogen and carbon, as well as to increase the biogas yield in the sludge treatment,” says Remy. “For some of the options we are looking at, data are already available from previous Kompetenzzentrum Wasser Berlin projects, which will be transferred to the process conditions of the large-scale sewage treatment plants as the next step. We are currently testing two promising methods under real conditions.”

Sustainability means that things run smoothly

The central theme in the water industry, as in agriculture, is to operate in cycles. In organic farming, for example, an attempt is made to minimise the consumption of finite resources. Sustainability here means closing regional nutrient cycles as far as possible, which has so far not proved sufficiently successful. This is especially true of the nutrient phosphorus, an essential component of many fertilisers. “A lot of progress can be achieved here with the recovery of nutrients from biogenic, wastes such as sewage sludge,” says Remy. The project nurec4org, completed in 2018, looked at the extent to which phosphorus-containing products that can be produced using currently available recycling processes are accepted in organic farming and are licensable. The Kompetenzzentrum Wasser Berlin researchers gained scientific knowledge which is now being made available to German and European licensing bodies. “The European regulation governing organic farming can be modified on this basis,” says Remy. “Farmers, trade and science were involved in the investigations as key players.”

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90,000

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Kompetenzzentrum Wasser Berlin researchers have also kept their eye on the future. The EU project SMART-Plant, which will run until 2020, is testing existing technological approaches to resource recovery in wastewater treatment plants on a large technical scale. Seven pilot systems are being optimised at five sewage treatment plants throughout Europe over a period of more than two years and tested under real conditions, along with two technologies for processing recyclable materials. Biopolymers (e.g. for the production of biodegradable synthetic materials), cellulose, plant nutrients and fertilisers were recovered and processed into commercially usable end products.

“It will take a few more years until it is widely used in practice,” says Remy. “But with these tried and tested solutions, which are energy efficient and ecologically efficient, we can close the value-added chain - and thus achieve recycling.” ■

Heat management at a WWTP in Copenhagen (above)

Site visit of a constructed wetland for wastewater treatment for waterreuse, AquaNES project, Antiparos, Greece (Ulf Miehe, Regina Gnriss)

First surf, then swim

„Flussbad Cup 2017“ in the Kupfergraben, branch of River Spree in central Berlin

Hardly a metropolis in the world has as many natural bathing waters to offer as Berlin. A website provides information about the water quality of the bathing areas.

The Havel, Spree and Dahme widen in many places to areas as large as the Wannsee, the Großer Müggelsee or the Grunewald Lakes. In some places, though, the rivers are so narrow that you can even swim to the opposite bank easily. This dammed up chain of rivers and lakes is a Berlin speciality. The water quality is good - usually. During heavy rainfall, however, pathogens can get into the water and then trigger gastrointestinal infections in bathers. Now, anyone and everyone can obtain information about health risks like this from the new web application www.badegewaesser-berlin.de before jumping into the water.

River bathing areas in the city centre

“River bathing areas in the city centre in particular can be a problem in extreme weather events such as heavy rain,” explains Dr Pascale Rouault, Head of the Urban Systems Unit at Kompetenzzentrum Wasser Berlin. Here, rainwater flows through the sewage system into the wastewater treatment plant along with domestic wastewater. “But if it rains very heavily, this may overburden the capacity of the sewage system and the wastewater treatment plant. So that streets and cellars do not flood, everything flows through combined sewer overflows into the waterways.” In rainy years this can happen up to 30 times; in particularly dry years like 2018 only a few times. It is true that river water purifies itself by natural processes. “But that may take a few days under certain circumstances. In the meantime, dirty mixed water may flow into rivers and lakes.” Specifically at the bathing areas near the city on

nearly
50,000
visitors to the website

the northern Unterhavel there is then a risk of catching an infection while swimming. The southern bathing areas of the Unterhavel, on the other hand, are less likely to be affected by microbiological pollution from the city area; here, dilution, currents, wind or solar radiation eliminate the risk.

The State Office of Public Health and Social Affairs (LAGeSo) tests the water quality regularly - in most places every 14 days, and in especially sensitive areas of the Unterhavel weekly. Then it takes another two days until the results are available. “The LAGeSo can therefore only warn the population if the danger has perhaps already passed,” says Rouault. This gap is being closed by the bathing water quality forecasting system developed by Kompetenzzentrum Wasser Berlin in the context of the nationwide FLUSSHYGIENE project, which complements the regular measurements of the State Office. The Spree-Havel system in Berlin was one of four reference areas in the three-year research project funded by the Federal Ministry of Education and Research (BMBF). The forecasting tool has been in use since July 2018 at the two bathing areas Kleine Badewiese and Grunewaldturm on the northern Unterhavel. “It is a statistical model that is fed with data which are already collected daily in any case,” reports Rouault. Berliner Wasserbetriebe supplies the rainy weather data, the Senate Department for the Environment the information about how much water is flowing in the Unterhavel per second. “We bring this data together and create an added value.” The data are automatically imported, prepared and used by Kompetenzzentrum Wasser Berlin to generate forecasts for the respective day for both bathing areas. The forecasting

River Spree at Island of Youth in Berlin

Automatic sampler for microbiological control of the forecast model on River Havel in Berlin

It is a statistical model that is fed with data which are already collected daily in any case.

tool was calibrated on the basis of extensive long-term recordings by LAGeSo. “A comparison with special tests shortly after rain has shown that our computer calculations are very accurate,” emphasises Rouault. The LAGeSo is still responsible for the information regarding the water quality. “This is also useful because our early warning system provides information about short-term contamination, but the LAGeSo has longer-term information about possible blue-green algae infestation, for example, and thus can assess all the safety risks.”

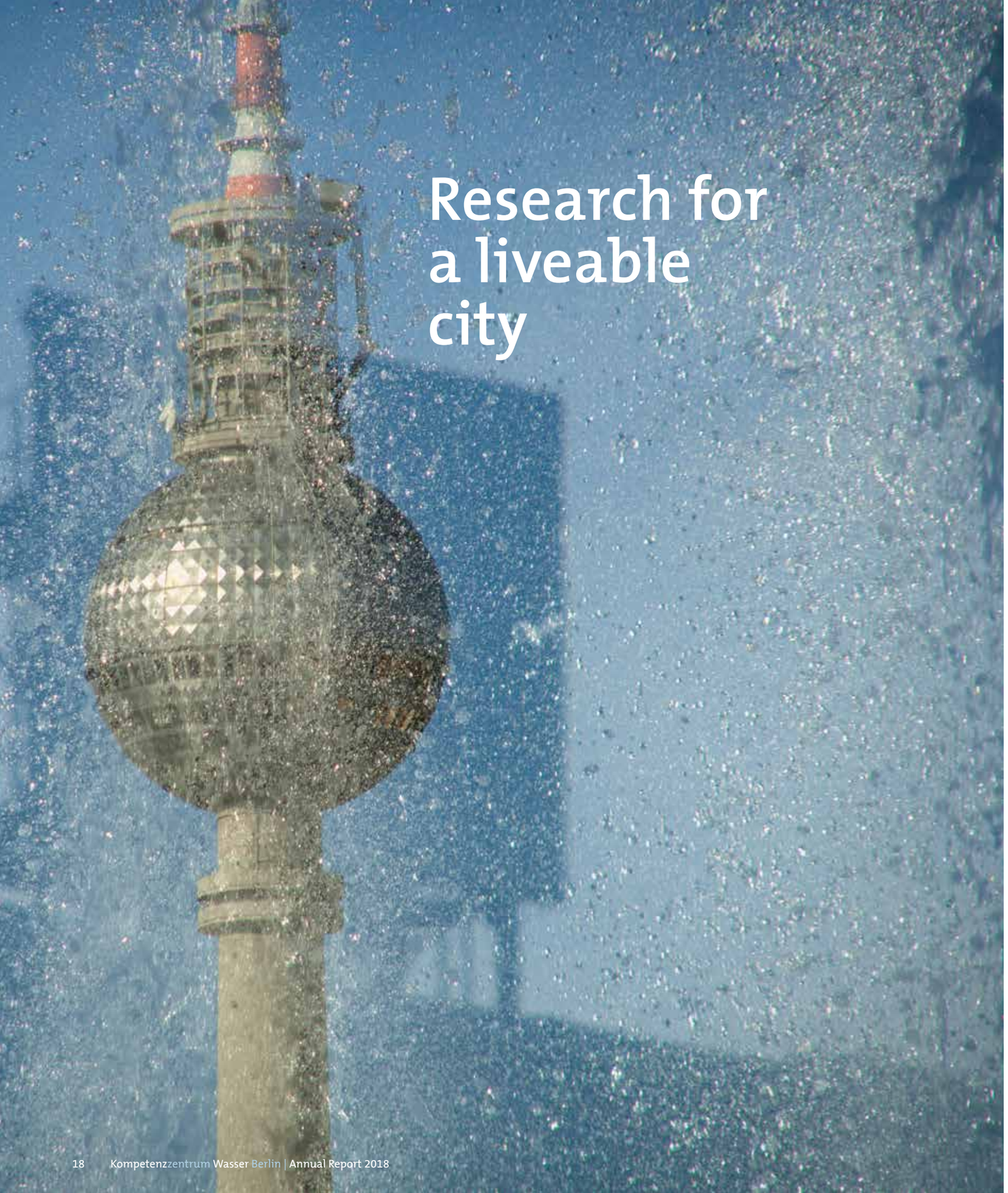
Already nearly 50,000 hits

Anyone and everyone can benefit directly from the research results and obtain up-to-date information about the water quality of the 39 official swimming areas in Berlin via the new web application. Coloured markings indicate whether or not the water is suitable for bathing on the respective day. In addition, the site provides more information about the respective bathing area, such as whether it has disabled access, whether there are toilets, parking facilities, or a restaurant.

“In July and August 2018, we had almost 50,000 visits to the site, most of them from smartphones.” Kompetenzzentrum Wasser Berlin, LAGeSo, Berliner Wasserbetriebe (BWB) and the Technologiestiftung Berlin (TSB) jointly developed the web application, which is optimised for smartphones. The fact that people can always obtain up–to-date online and mobile information about where they can swim without health concerns is in line with Berlin’s self-image as a smart, liveable metropolis, said Berlin Health Senator Dilek Kolat at the launch of the site. The Technologiestiftung also relied on publicly available data for its implementation. “It demonstrated at the same time how useful the Berlin Open Data strategy is,” says Rouault. Berlin committed itself in the E-Government Act of 2016 to making certain data accessible and more usable. Open data are intended to create more transparency and enable new business models at the same time.

The new early warning system also complements the EU Bathing Water Directive. This Directive does formulate minimum requirements for the quality of bathing water and stipulates that the population must be warned in case of temporary contamination, but it does not give any limits for daily assessments. The water quality in general is only classified once a year on the basis of data from the previous four years. “Our daily forecasts could clarify the directive,” says Rouault. Kompetenzzentrum Wasser Berlin has already been able to present its approach both in the Federal/Länder Bathing Water Working Group as well to experts from the EU Commission who are engaged in the potential revision of the Bathing Water Directive.

The Federal Environment Agency (UBA) is also interested. As a scientific authority, it deals with infection risks in bathing waters and has supported Kompetenzzentrum Wasser Berlin in the development of the early warning system. “The new forecasting model is a significant gain, especially from the consumer›s point of view, “ says Camilla Beulker , Head of the Department for Drinking and Bathing Water Hygiene at UBA. Especially in urban areas with highly frequented bathing areas, it makes an important contribution to preventive health protection. ■



Research for a liveable city

Our research activities contribute to improving the quality of life in our cities.

The research unit **“Urban Systems”** addresses all issues relating to rainwater and wastewater as well as to sewer network operation.

The research unit **“Process Innovation”** focuses on technical challenges in terms of water and wastewater treatment.

The research unit **“Groundwater”** deals with issues connected to drinking water production and well management.

Our projects are strongly based on topics of the future which are essential for the development of smart city concepts and consequently contribute to integrating water as a medium of public interest in Smart City approaches.

ENERGY EFFICIENCY:

Processes for water supply and particularly for wastewater treatment require a lot of energy. We are looking for technical solutions which contribute to reducing energy requirement and consequently the emission of greenhouse gases.

CLIMATE RESILIENCE:

Heat waves, droughts and floods are impacts of climate change which will affect urban life. Urban water infrastructure systems have to be adapted to these changes. We work on the appropriate concepts.

INFRASTRUCTURE:

Wells, sewers, wastewater treatment plants, rain basins are essential for the proper operation of water supply, wastewater treatment and water protection, since they are the essential components of water management structures. With our research we support the responsible operators in coping with their tasks.

WATER PROTECTION:

According to § 1 of the German Federal Water Act, waters shall be protected as part of the natural environment, as the basis of human life, as a habitat for animals and plants, and as a usable good. With our research we support operators of water management systems in the implementation of these stipulations.

RESOURCES:

The areas of water, agriculture and conventional energy production are inseparably linked. We are working on solutions closing the loop between the energy and water cycles.

DIGITISATION:

Digitisation has covered almost all areas of our private and economic life. In many of our projects, we use and develop digital systems: process control and optimisation; collection, evaluation and interpretation of measurement data; model development for the prediction of water quality; tools for predicting sewer ageing. From mid-2019, we will further intensify these activities as part of the EU project “Digital Water City”, which will be managed by Kompetenzzentrum Wasser Berlin.

Demonstrating synergies in combined natural and engineered processes for water treatment systems

Demonstrating Synergies in Combined Natural and Engineered Processes for Water Treatment Systems (AquaNES)

www.aquanes-h2020.eu

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Duration 06/2016 – 05/2019
Project Volume 10,7 million euro; KWB: 551,000 euro
Financing EU Horizon2020
(Grant Agreement No. 689450)

Partners
Kompetenzzentrum Wasser Berlin in a consortium of 30 partners from Europe, Israel and India, coordinated by the University of Applied Sciences and Arts Northwestern Switzerland

Horizon 2020
European Union Funding for Research & Innovation

Processes for water and wastewater treatment systems can be substantially improved through the systematic combination of engineered and natural components. The EU-funded project AquaNES operates 13 pilot plants in Europe, Israel and India to demonstrate the benefits of these combinations on a technical scale. Two demonstration sites are located in Berlin. One scheme combines ozonation processes with natural posttreatment constructed wetlands for elimination of trace organic compounds and pathogens in wastewater effluent (also in comparison to technical filters). At the second site, the combination of bank filtration and capillary nanofiltration (NF) is demonstrated for removal of sulphate and trace organic compounds during drinking water production. Besides its activities in Berlin, Kompetenzzentrum Wasser coordinates a work package related to constructed wetlands with test sites in Germany, the UK and Greece.

OBJECTIVES

- Technical demonstration of combined natural and engineered processes (cNES - combined natural and engineered systems) for water and wastewater treatment
- Improved elimination of micropollutants and pathogens in WWTP effluent (WWTP Schönerlinde)
- Removal of sulfate and micropollutants during drinking water production (WWTP Tiefwerder)
- Development of design guidance for cNES and identification of new market opportunities

RESULTS

Drinking water production (WWTP Tiefwerder):

- Application of capillary NF resulted in removal of 70% sulfate and 90% EDTA for anoxic bank filtrate containing iron and manganese.
- The technology is easily scalable and easy to operate and applicable without pre-treatment.
- Favorite applications for capillary NF is partial flow treatment or single well water treatment to prevent shutdown in case of specific contamination.

Wastewater treatment (WWTP Schönerlinde):

- The combination of ozonation and constructed wetlands for polishing of WWTP effluent is suitable to remove organic and microbial contamination.
- While micropollutants are mostly reduced during ozonation, complementary mechanisms of both technologies increase disinfection safety, e.g. in regard to spore-forming microorganisms.

Demonstration of constructed wetlands installed in containers

Clear water from pharmaceuticals – reducing pharmaceutical emissions into the Baltic Sea region

Emissions of active pharmaceutical ingredients (API) into the aquatic environment and the Baltic Sea are a topic of growing interest. Within CWPharma, decision-making tools will be developed and recommendations given to support politics, administrations, and municipalities tackling this issue systematically. Besides an intensive monitoring to identify relevant APIs and their entry paths, technical and non-technical measures will be evaluated in order to reduce the overall API emissions.

Kompetenzzentrum Wasser Berlin is responsible for the work package relating the assessment of technical measures, which has a special focus on advanced wastewater treatment with ozone.

OBJECTIVES

- Monitoring to identify relevant entry paths of APIs and evaluation of technical and non-technical measures to minimize the entry of APIs into the Baltic Sea.
- Evaluation of pilot- and full-scale ozonation plants and post-treatment options in Kalundborg (DK), Linköping (SE), and Berlin (D) including ecotoxicity tests, impact on APIs/transformation products as well as process control options
- Preparation of guidelines for policy makers, water authorities and municipalities on how to plan, start, operate and control advanced wastewater systems

RESULTS

- An extensive monitoring programme, including sampling at wastewater treatment plants, rivers, and estuaries into the Baltic Sea, was conducted in Mecklenburg-Western Pomerania (Germany).
- Obtained results provide a valuable input in terms of the identification of relevant entry paths of pharmaceuticals into the aquatic environment.
- A substance specific formation/decrease of transformation products due to ozonation was observed at the Berlin pilot.
- It strongly depends on the operational setpoint (applied ozone dose) of the ozonation which transformation products will primarily be formed by the ozonation.

CWPharma – Clear Water from Pharmaceuticals - Reducing Pharmaceutical Emissions into the Baltic Sea Region

www.cwpharma.fi/en-US

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Duration 10/2017 – 10/2020
Project Volume 3,7 million euro; KWB: 321,100 EURO
Financing EU-INTERREG
(Baltic Sea Region, #R055 CWPharma) , Berliner Wasserbetriebe

Partners
Kompetenzzentrum Wasser Berlin (Associated Partner) in a consortium with 15 partners and 18 associated organisations from 7 Baltic Sea states

Interreg Baltic Sea Region

EU STRATEGY FOR THE BALTIC SEA REGION FLAGSHIP

Sample drawing in Baltic sea catchments

MeReZon

MeReZon – Tertiary Wastewater Treatment with Ozone

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Duration 08/2017 – 07/2019
Project Volume 217,000 euro
Financing German Federal Ministry of Education and Research (BMBF), Programme KMU Innovativ

Partners
TriOS Mess- und Datentechnik GmbH (coordinator); Kompetenzzentrum Wasser Berlin; Berliner Wasserbetriebe (associated partner)

Federal Ministry of Education and Research

Reliable online-measurements and process control schemes for ozonation plants

Advanced wastewater treatment with ozone for the elimination of trace organic compounds is expected to become increasingly common in the near future. Against this background, a fully developed strategy for controlling or regulating schemes is required in order to avoid under- or over-dosages particularly in the event of a varying content of ozone depleting substances in the wastewater.

In practice, such closed-loop process control schemes, e.g. working with reduction of UV254, have been tested in isolated cases only.

Furthermore, the online measurements applied have to meet the demands of the plant operators in terms of a stable and reliable operation.

UV-VIS-Sensors installed in the ozone pilot plant

OBJECTIVES

- Investigation of the reliability of different photometric online measurements (UV254, UV-VIS-spectra) at an ozonation pilot for the treatement of WWTP effluent
- Development of an innovative process control scheme facilitating a stable and adequate ozone dosing

RESULTS

- Particularly in the effluent of the ozonation pilot a strong fouling (e.g. organic deposits) occurs on the sensors. Without an automatic cleaning system a notable shift in the measured data can be observed after some hours.
- Fouling on the online sensors was best prevented by an automatic brush cleaning; good results were also achieved by an ultrasonic cleaning system.
- The newly developed process control scheme for an optimal ozone dosing is currently being tested under real conditions.

Fast test methods on organic micropollutant behavior in engineered and natural barriers of the urban water cycle

The design of advanced processes for the removal of trace organic contaminants (TrOCs) from wastewater can be complex and expensive. Due to local varying boundary conditions, a standardised process design is not always available so that comprehensive pilot tests have to be performed first.

OBJECTIVES

- Development and validation of simple and fast lab-tests to support the planning of full-scale plants for TrOC elimination
- KWB focused on the usage of ozone for TrOC elimination
- Tests should provide a prediction of the achievable TrOC elimination as well as the formation of unwanted oxidation by-products such as bromate. Possible methodical influences during the conduction of the lab-tests should be taken into account.

RESULTS

- Investigation of methodical influences showed that comparable results regarding TrOC elimination can be achieved with different setups of the lab-tests (e.g. batch or semi-batch), however, bromate formation was partly different.
- Impacts of suspended solids on ozone-induced TrOC eliminations was found to be small; also influences of temperature and pH were found to be small or non-existent but both affect the ozone consumption profiles.
- Validation of the lab-tests with an ozonation pilot showed a good agreement regarding the TrOC elimination.
- Lab-tests have been conducted with samples from 18 domestic wastewater treatment plants; the obtained ranges of the elimination for different TrOCs as well as the reduction of the indicator parameter UV254 can be used as a reference.

TestTools

TestTools – Development and validation of fast test methods on organic micropollutant behavior in engineered and natural barriers of the urban water cycle

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Duration 08/2015 – 03/2018
Project Volume 775,000 euro;
KWB: 238,000 euro

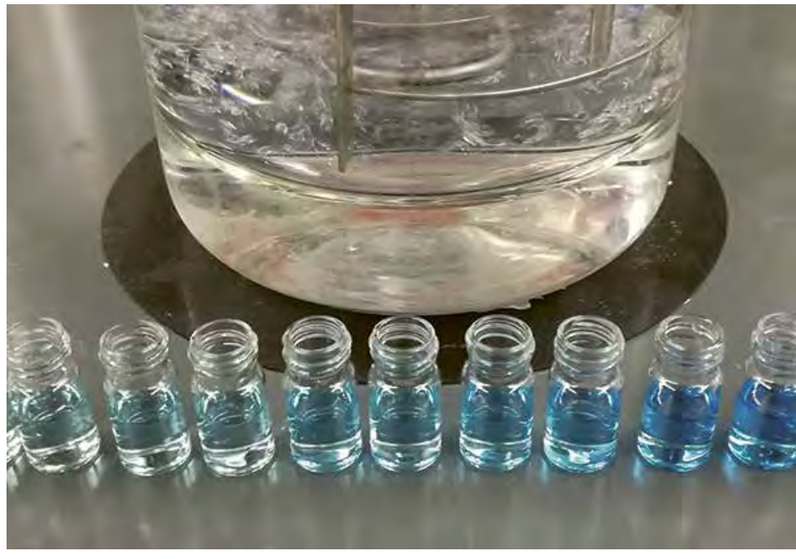
Financing German Federal Ministry of Education and Research (BMBF), part KWB co-financed by Berliner Wasserbetriebe

Partners
Technische Universität Berlin (Koordinator), Berliner Wasserbetriebe

Federal Ministry of Education and Research

Berliner Wasserbetriebe

Quantification of soluted ozone by using decolouration of Indigoblue



Efficient carbon, nitrogen and phosphorus cycling in the European agri-food system

In the EU project Circular Agronomics, processes in circular economy are developed and optimised in order to improve their efficiency. The project focuses on food and agricultural waste and wastewaters. Valuable substances such as phosphorus, nitrogen and carbon are recovered and thus, made available for a demand driven application in agriculture. Simultaneously, new processes are investigated in order to reduce severely emissions of greenhouse gases and ammonia. Those investigations are conducted at six study sites in Spain, Germany, Austria, Italy, the Netherlands and Czech Republic. In this frame, the Kompetenzzentrum Wasser Berlin leads the work package “carbon and nutrient valorization from food-waste and food-processing-wastewater”.

Efficient Carbon, Nitrogen and Phosphorus Cycling in the European Agri-food System (Circular Agronomics)

www.circularagronomics.eu

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Duration 9/2018 – 8/2022
Project Volume 7,0 million euro; KWB: 598,440 euro
Financing: EU Horizon2020
(Grant Agreement No. 773649)

Partners
IRTA Institut de recerca i technologia agroalimentaries (coordination), Pondus Verfahrenstechnik GmbH, Institute of Agricultural and Urban Ecological Projects affiliated to Berlin Humboldt University (IASP), Kompetenzzentrum Wasser Berlin, Wageningen University, Teagasc – Agriculture & Food Development Authority, Rural Investment Support for Europe Foundation, and 11 further partners & 27 associated partners

Horizon 2020 European Union Funding for Research & Innovation

Objectives

- Review of the “best available techniques”
- Elaboration of new concepts for carbon and nutrient valorisation
- Investigations in a vacuum degasification pilot plant for ammonia recovery and the production of ammonium sulphate
- Evaluation of nutrient valorisation using life cycle assessment
- Dissemination and exploitation of the results, e. g. by simulation games with different actors
- Elaboration of concept studies for interested biogas plant operators

RESULTS

- Support of the German partner Pondus Verfahrenstechnik GmbH in developing the vacuum degasification pilot plant. The construction of the pilot plant is currently ongoing.
- For the life cycle assessments, the goals and scopes are currently being defined for five technological systems: manure acidification and drying, microfiltration of digestate liquor for fertigation, carbon recovery from whey, nitrogen depletion and recovery from different waste streams and phosphorus recovery from soybean wastewater.

Consortium of the Circular Agronomics project at the kick-off meeting in Barcelona

Test field of the Humboldt University IASP in Berge near Nauen: Parcels with different fertilised rye

Material recovery from wastewater

Domestic wastewater contains many valuable raw materials, which have not been tapped so far. Organic matter can be converted into biogas for energy recovery, or can act as a carbon source for bioplastic production by specialised bacteria. Plant nutrients nitrogen and phosphorus can be recovered to substitute mineral fertiliser needs in agriculture. Cellulose fibres can substitute structural material in bio-composites or construction material, or can also be used as biofuel. Overall, the systematic recovery of these raw materials would be of advantage in ecological and economic terms and enable the realisation of circular economy in the water sector. However, this approach needs proven technical solutions for resource recovery and a full value chain to reach economic viability and real product valorisation.

SMART-Plant - Scale-up of low-carbon footprint material recovery techniques in existing wastewater treatment plant

www.smart-plant.eu

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Duration 6/2016 – 05/2020
Project Volume 9,7 million euro; KWB: 291,000 euro
Financing EU Horizon2020
(Grant Agreement No: 690323)

Partners
Kompetenzzentrum Wasser Berlin in a consortium of 25 partners from Europe and Israel, coordinated by the University of Ancona (IT)

Horizon 2020 European Union Funding for Research & Innovation

Objectives

- Industrial-scale demonstration of technical processes to recover valuable materials from municipal wastewater such as biopolymers, cellulose, plant nutrients and fertilisers
- Demonstration of entire value chains including downstream processing of recovered materials into marketable products
- Development and evaluation of new business models for the operation of recovery processes and marketing of recycling products
- Assessment of environmental benefits and risks of value chains for recycling products

RESULT

- Recovery of cellulose, PHA, and plant nutrients from wastewater was successfully demonstrated in industrial scale
- Recycled materials are suitable for downstream processing into marketable products such as bio-composites, fertiliser or biofuels
- Viable business models build on income from product sales, but also on cost savings in WWTP operation
- LCA shows environmental benefits of recycled products compared to conventional production, also in combination with potential energy savings in WWTP operation

Production of Biopolymers at wastewater treatment plant Manresa, Spain

Towards a Next Generation of Water Systems and Services for the Circular Economy

Towards a Next Generation of Water Systems and Services for the Circular Economy (NextGen)

www.nextgenwater.eu

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Duration 7/2018 – 6/2022
Project Volume
Total Volume: 11,4 million euro
KWB:527,000 euro
Financing EU Horizon2020,
Programme “Water in the context of circular economy”
(Grant Agreement No: 776541)

Partners
KWR Watercycle Research Institute (Koordinator), Fundacio CTM, FHNW University of Applied Sciences and Arts Northwestern Switzerland, Cranfield University, Strane Innovation SAS, European Science Communication Institute, Kompetenzzentrum Wasser Berlin, Wastewater Association Brunswick (AVB) and 22 other partners.

The demand for water continues to grow – from water use in industrial processes and agriculture to intensity of urban demand. Therefore, the consortium of the project NextGen aims to develop innovative technological systems and circular economy related concepts in the water sector.

NextGen is coordinated by the Dutch Water Cycle Research Institute KWR. It unites 30 partners out of 11 European countries from economy, small and medium-sized enterprises as well as research institutes. In 8 different countries, innovative technologies will be investigated in 10 case studies. Hereby, topics such as water reuse, nutrient recovery and energy production play a crucial role.

In Germany, a special focus is put on full-scale investigations in order to recover nutrients from wastewater and to enhance energy production from sewage sludge using anaerobic digestion in combination with a thermal-pressure hydrolysis.
In this context, the Kompetenzzentrum Wasser Berlin collaborates closely with the Wastewater Association Brunswick (AVB).

OBJECTIVES OF KWB

- Development of a technology evidence base for knowledge collection and transfer for “NextGen technologies” related to water reuse, material and nutrient recovery as well as energy recovery
- Evaluation of specific technologies using life cycle assessments and risk analyses
- Optimisation of the heat management in biogas production with an additional thermal pressure hydrolysis
- Accomplishment of “Communities of Practise” in order to increase the acceptance of recyclates and to analyse the optimal fertilizer design with farmers
- Analysis of the regulatory framework for the recovery of water

RESULTS

- In order to describe and evaluate the performance of the NextGen technologies, scale-independent key performance indicators (KPIs) were defined for each technology. Currently, data for the baseline of the KPIs are collected.
- System descriptions, system goals and scope for four initial case studies have been defined.
- The first “Community of Practise” is in preparation. It will take place in Brunswick at the wastewater treatment plant, where a full-scale nutrient recovery unit is currently constructed. The operation of the NextGen recovery units will probably start in May 2019.

Under construction: plant for nutrient recovery as struvite from sludge liquor (left: precipitation reactor for struvite; right: settler (for the sedimentation of the struvite crystals); located at the wastewater treatment plant in Brunswick

Full-scale plant for nutrient recovery in the end phase of its construction: (left in the back of the picture: ammonia stripping unit; in the front, left reactor: settler for struvite crystals; right: CO2 stripping unit)

LCA study to compare fertiliser production from rock phosphate with P-recovery from the wastewater stream

Phosphorus is essential for life and an indispensable component of many fertilisers. The European and national legislation calls for the recovery of phosphorus from the wastewater stream in the medium term. Due to the lack of reliable data it has remained unanswered so far to what extent P-recovery can be considered appropriate in ecological and economic terms.

OBJECTIVES

- Collection of new data with regard to different available methods of fertiliser production
- Systematic LCA of fertilisers produced from fossil or renewable resources
- Practical assessment of fertiliser production in economic and ecological terms

RESULTS

- Cadmium was identified as a primarily problematic substance for conventional phosphate fertiliser production.
- In terms of phosphogypsum, which is a by-product of the production of phosphate fertiliser, it turned out that its storage on heaps is problematic in some countries, since phosphate emissions from gypsum heaps into water bodies lead to local environmental damage, in particular to the aquatic environment.
- The recovery of phosphorus from sewage or sewage sludge ash can contribute to environmental relief, its technical implementation however, has to consider the entire process chain of wastewater management.

PHORWÄRTS

PHORWÄRTS - LCA Study to compare fertiliser production from rock phosphate with P-recovery from the wastewater Stream

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Duration 09/2016 –, 08/2018
Project Volume 172,000 euro
Financing German Federal Environment Agency
(UBA) UFOPLAN FKZ 3716 31 330 0

Partners
Proman Management GmbH

Assortment of phosphorus recyclates

Nutrient recovery from bio-based waste for fertiliser production

Fertilisers play an important role as nutrient suppliers in agriculture. Their production strongly depends on primary resources, such as phosphate rock, sylvite, crude oil and natural gas. The main objective of the NEWFERT project which was started in 2015 is to (partly) substitute these primary resources by renewable raw materials and strengthen circular economy in the fertiliser industry.

NEWFERT – Nutrient recovery from bio-based waste for fertiliser production

www.newfert.org

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Duration 07/2015 – 12/2018
Project Volume
Total volume: 2,4 million euro
Funding EU:: 1,2 million euro
KWB: 250,250 euro
Financing Horizon 2020 (Grant Agreement No. 668128)/Bio-based Industries

Partners
Fertiberia SA (coordination), Kompetenzzentrum Wasser Berlin, Universidad de Leon, Drage & Mate International SL, Institut national de recherche en sciences et technologies pour l'environnement et l'agriculture (IRSTEA), Proman Management GmbH

OBJECTIVES

- Development of viable and cost-effective nutrient recovery schemes for phosphate, potassium (and nitrogen) to be used for the production of a new generation of fertilisers.
- Upgrade of existing quality standards for fertilisers

RESULTS

- Bio-acidification of pig manure and co-substrate were successfully tested. Thereby 50 % of the influent P could be recovered in form of struvite with relatively moderate efforts.
- Several promising renewable raw materials (e.g. struvite and olive waste ashes) were successfully integrated into conventional fertiliser production on lab-scale.
- The integration of renewable raw materials into conventional fertiliser production can be associated with environmental benefits and can be realised cost neutral.
- However, currently no sufficient amount of these raw materials is available to fully meet the resource demand of the fertiliser industry.

Sand and bone meal before mixing to NPK-fertiliser

Closing the nutrient loop by further development of recycled fertilisers

The joint project CLOOP aims to demonstrate that mineral nutrient recyclates recovered from the wastewater path, such as phosphorus, can achieve higher agricultural yields than conventional fertilisers. This is crucial for sustainable water pollution control and for an efficient use of resources.

Against this background, the project focuses on testing a new generation of fertilisers which are actually recovered from the wastewater path and, unlike conventional fertilisers, feature high plant availability and low water solubility at the same time. They include struvite and two variations of a product which are generated from sewage sludge ash. These recyclates are tested under a variety of climatic conditions on agricultural land in Germany, Australia and Brazil.

Within the joint project, the Kompetenzzentrum Wasser Berlin is responsible for the selection and procurement of secondary fertilisers from sewage treatment plants. Furthermore Kompetenzzentrum Wasser Berlin also leads the work package "Evaluation and Life Cycle Assessment".

OBJECTIVES

- Development of nutrient recyclates from wastewater path into next-generation fertilisers
- Improving the efficiency of fertiliser use in agriculture
- Evaluation of the entire process chain from recovery to fertiliser use

RESULTS

- The screening of possible wastewater and sludge treatment options in terms of cost reduction of phosphorus recovery has shown that the upgrade of wastewater treatment plants to enhanced biological phosphorus removal (EBPR) is a possible approach.
- Via fermentation of return sludge, EBPR can be realised with low COD-concentrations in the influent.
- The separation of sludge treatment and disposal for primary and excess sludge is another approach. However, this results in lower energy yields via anaerobic digestion and higher sludge amounts.

CLOOP

CLOOP – Closing the nutrient loop by development of nutrient recyclates AshDec and Struvite into next-generation fertilisers

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Duration 11/2017 – 10/2020
Project Volume 353,359 euro
Financing German Federal Ministry of Education and Research (BMBF)

Partners
Outotec GmbH & Co KG (coordination), Bundesanstalt für Materialforschung und –prüfung, Kompetenzzentrum Wasser Berlin, Universität Bonn, The University of Queensland (Australia), Universidade de Sao Paulo (Brazil)

Intermediate substances during manufacturing of grannulated Phosphorous recycling products from sewage sludge ash

Nutrient recyclates for organic farming

The focus of organic farming is on “Circular Economy”. Closing regional nutrient cycles is therefore one of the corner stones to ensure sustainable agriculture.

The use of nutrients recovered on the spot from bio-based renewable wastes such as phosphorus for example, offers the opportunity to promote the transformation towards sustainable agriculture and circular economy. For ecologic farming however, the only allowed mineral source is fossil based phosphate rock. But its fertilising efficiency is not very high and contamination with the toxic elements Cadmium and Uranium may occur.

OBJECTIVES

- Examining to what extent phosphorus-containing products will be acceptable and can be approved for organic farming
- Introducing the scientific findings to the corresponding german and european approval bodies
- Creating the basics for amendment of the european regulations for organic farming (EC 889/2008).
- Involving farmers, trading companies and scientific institutions

RESULTS

- Acceptance criteria for the use of recyclates were identified with stakeholders in organic farming.
- Struvit meets these criteria quite well and achieves high acceptance rates by organic farmers.
- Approval dossiers for the revision of EC 889/2008 have been prepared by the legislator.

nurec4org – Nutrient Recyclates for Organic Farming

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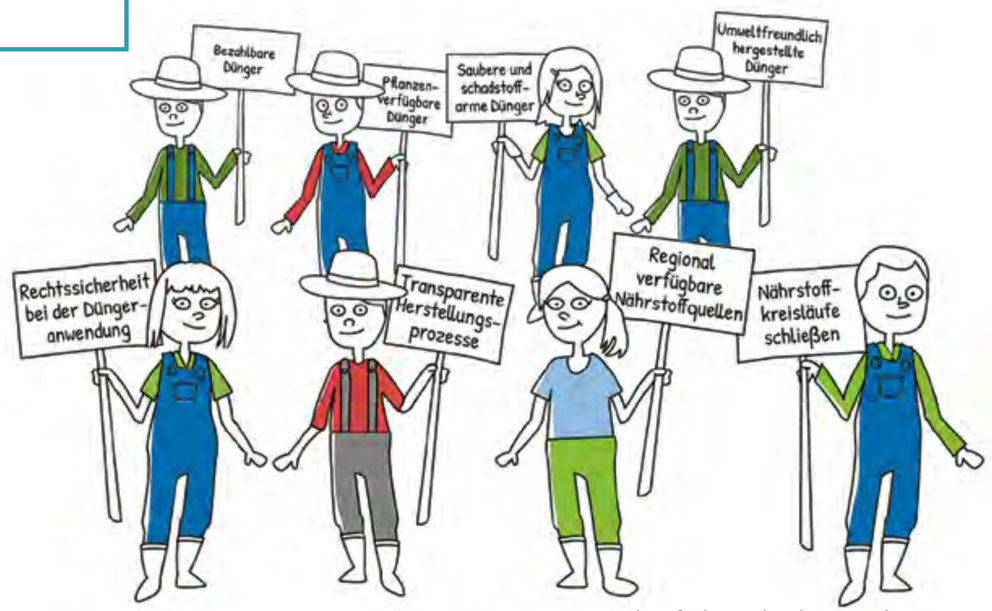
Duration 01/2017 – 03/2019
Project Volume
Total volume: 354,000 euro
KWB: 178,000 euro
(Funding: 133,000 euro)
Financing Deutsche Bundesstiftung Umwelt (DBU)

Partners
Bioland Beratung GmbH; Institut für Agrar- und Stadtökologische Projekte an der Humboldt-Universität zu Berlin (IASP)

sponsored by DBU Deutsche Bundesstiftung Umwelt



Screenshot of video on phosphorus recycling

Large-scale implementation of tertiary treatment and phosphate recovery in Lidköping, Sweden

The Lidköping Innovation Wastewater Eco-Hub (LIWE) is planning a new local wastewater treatement plant with the focus on enhanced TrOC removal through ozonation and simultaneous phosphorus recovery. The project is being financed by the EU Life programme.

Kompetenzzentrum Wasser Berlin consults Lidköpings municipality in terms of implementation and operation of an ozonation plant for tertiary wastewater treatment and phosphorus recovery from sewage sludge. In addition, Kompetenzzentrum Wasser Berlin will test the suitability of fluorescence sensors for process control and monitoring of the ozonation process and will train the local staff.

OBJECTIVES

- Elimination and significant reduction of emerging pollutants and pathogens (pharmaceuticals, hormones and microplastic particles) in the effluent of the Lidköping sewage treatment plant
- Phosphorus and nitrogen recovery from the wastewater path and direct reuse of these resources by local industrial and agricultural enterprises and the municipality

RESULT

- On-site consulting of Lidköping municipality regarding ozonation and struvite recovery

Lidköping Innovation Wastewater Eco-Hub (LIWE):

Large-scale implementation of tertiary treatment and phosphate recovery in Lidköping, Sweden

www.blogg.lidkoping.se/angensarv

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Duration 07/2018 – 06/2023
Project Volume Total 7,581,807 euro
KWB: 97,691 euro
Financing EU Life (LIFE17 ENV/SE/000384), Gemeinde Lidköping (SE)

Partners
Municipality of Lidköping (SE), University of Lund (LTH), Kompetenzzentrum Wasser Berlin, Federation of Swedish Farmers (LRF)

LIWE life

Lidköpings kommun

Design sketch of a new wastewater treatment plant in Lidköping

POWERSTEP

Energy from wastewater

POWERSTEP – Full scale demonstration of energy positive sewage treatment plant concepts towards market penetration

www.powerstep.eu

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Duration 07/2015 – 06/2018
Project Volume 5,2 million euro, KWB: 984,658 euro
Financing Horizon 2020 (Grant Agreement No. 641661)

Partners
Kompetenzzentrum Wasser Berlin (coordination) in a consortium with 15 partners from Germany, the Netherlands, Belgium, Switzerland, Austria, Denmark and Sweden

Horizon 2020 European Union Funding for Research & Innovation

The organic components of municipal wastewater contain a high potential of chemical energy which remains to a large extent untapped in conventional wastewater treatment processes. In the European context, this corresponds to 87,5 MWh per year which is equivalent to the output of 12 large-scale power stations. At the same time, the energy consumption of contemporary WWTPs corresponds to the output of more than 2 large-scale power stations.

OBJECTIVES

- Development of novel treatment concepts using the potential of the chemical energy contained in wastewater as an additional source of renewable energy
- Demonstration of the concepts under real conditions without compromising the treatment performance
- Enhanced carbon extraction from wastewater to increase biogas yield
- Implementation of energy-efficient innovative nitrogen removal processes
- Energy recovery from waste heat as well as innovative process water treatment

RESULTS

- Successful implementation and long-term testing of all technologies implemented in the 6 case studies
- Energy-neutral or even energy positive WWTPs are possible using state-of-the-art technology combinations
- Successful final event during the environmental exhibition IFAT 2018 in Munich
- Publication of the POWERSTEP Policy Brief at national and European Level
- POWERSTEP interview with Dominique Ristori, Director-General of DG Energy, European Commission
- POWERSTEP listed under the TOP10 ranked H2020 projects
- POWERSTEP-Pitch under TOP 3 at the Investors Café organised by EASME in Brussels

POWERSTEP General Assembly at the headquater of Berliner Wasserbetriebe

E-VENT

Less energy consumption and CO_2 emissions of WWTPs

Evaluation of process options for the reduction of energy consumption and greenhouse gas emissions of Berlin Sewage Treatment Plants (E-VENT)

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Duration 03/2017 - 04/2020
Project Volume 893,000 euro
Financing Berlin Programme for Sustainable Development (BENE, project no. 1158-B5-O) and Berliner Wasserbetriebe (BWB)

Partners
Kompetenzzentrum Wasser Berlin (management), Berliner Wasserbetriebe, Technische Universität Berlin

EUROPÄISCHE UNION
Europäischer Fonds für regionale Entwicklung

Senate Department for Urban Development and the Environment | be Berlin

Berliner Wasserbetriebe

Berlin's wastewater treatment plants rank among the largest energy consumers within the municipal facilities. Corresponding energy efficiency measures have been implemented already, and the biogas resulting from the treatment process is used for electricity and heat production. Nevertheless, the average annual power consumption of Berlin's six WWTPs exceeds 90,000 MWh which leads to a significant contribution to the associated greenhouse gas emissions (40,000 t CO_2.eq/a).

OBJECTIVES

- Energy-related optimisation of the activated sludge process through new options for nitrogen removal and carbon extraction: Laboratory and pilot tests relating to granulated sludge
- Improvement of the biogas yield during sewage sludge treatment through the use of thermo-chemical hydrolysis and thermo-pressure hydrolysis

RESULTS

- Sludge disintegration can increase biogas yield of excess sludge by up to 30 % and improve dewatering considerably
- Correlation between hydrolysis temperature and formation of refractory COD has been confirmed in lab trials
- Activated Granular Sludge Pilot Reactor: Installation and operation for more than 8 months under real conditions at WWTP Stahnsdorf
- Activated Granular Sludge Pilot Reactor: Installation of the greenhouse gas analyser and continuous measurements since february 2019

Pilot reactors for thermo-pressure hydrolysis with sewage sludge (right)

Results of laboratory and pilot tests with granulated sewage sludge (b.l.)

Creating synergies between municipal sewage systems and waste management

REEF 2W – Increased Renewable Energy and Energy Efficiency by Integrating, combining and empowering urban wastewater and organic waste management systems

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Duration 06/2017 – 06/2020
Project Volume 2,3 million euro, KWB: 212,000 euro
Financing EU-INTERREG (CE946), Berliner Wasserbetriebe

Partners
Kompetenzzentrum Wasser Berlin (Associated Partner)

The potential of municipal waste management systems in terms of increasing energy efficiency and renewable energy production has not yet been tapped.

The REEF 2W project, funded by the EU INTERREG Central Europe (CE) programme, is therefore designed to develop and implement solutions for public infrastructures providing for synergies between the relevant public infrastructures of the municipal solid waste chain with wastewater treatment plants.

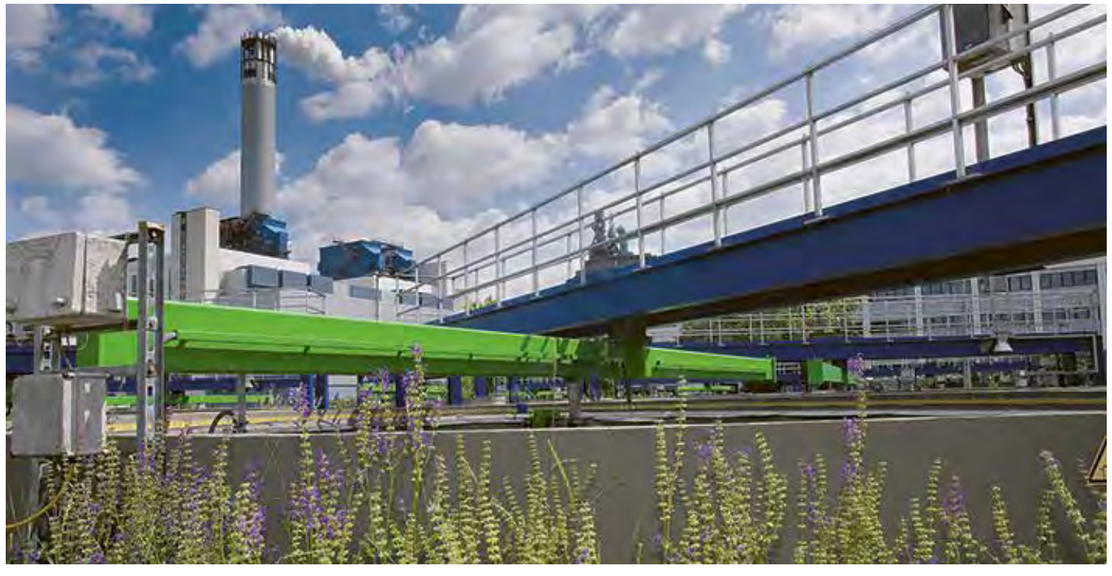
OBJECTIVES

- Conducting case studies relating to different eligible process combinations at wastewater treatment plants (e.g.: co-digestion, biogas treatment, sludge treatment)
- Development of a decision making tool for operators regarding the use of new technologies optimising wastewater treatment plants

RESULTS

- Integration of the LCA in the overall REEF2W decision making tool
- Development of an energy model for a wastewater treatment plant in Berlin for comparison of different scenarios using biogas-upgrading technologies
- Development of an economic model for a wastewater treatment plant in Berlin for comparison of different scenarios using biogas-upgrading technologies
- Successful REEF2W workshop presenting the tool to operators and policy makers and to future REEF2W trainers

Wastewater treatment plant Berlin-Ruhleben



Optimised materials and methods for microplastic particle removal from the water cycle

The increasing use of plastic components in all areas of life entails the undesired immission of these substances into the aquatic environment. Small plastic particles (microplastic) discharged from domestic wastewater and urban areas can get into the water cycle. The OEMP project was dedicated to further develop materials and methods which can help to retain the entry of microplastic particles (MP) emerging from diverse pathways of the urban water cycle.

Within the project network, Kompetenzzentrum Wasser Berlin's task was to investigate the technical options of microplastic particle removal in sewage plant effluent on industrial scale. Furthermore, an urban material flow analysis for microplastics was prepared.

OBJECTIVES

- Evaluation of micro plastic content from different pathways of the urban water cycle
- Further development, analysis and validation of materials and technical options to reduce the micro plastic content in the water cycle.

RESULTS

- The Mecana Pilot (pile cloth media filter) can retain particles > 25 µm by about 65 – 96 %, the Invent Pilot (mesh screen filter) by about 85 – 98 %. The retention of smaller particles is clearly lower for both Pilots.
- The composition of plastic particles varies depending on the entry path. First results show that PE comes in equal parts from sewage and rainwater runoff, while the rainwater runoff as source of the polymers Polystyrene (PS) and Polypropylene (PP) dominates. With regard to the entry quantities, the rainwater runoff of the separation system clearly dominates (except for PE).

Pile cloth media filtration pilot unit at WWTP Berlin-Ruhleben

OEMP

Optimised Materials and Methods for Microplastic Particle Removal from the Water Cycle (OEMP)

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Duration 4/2016 – 9/2018
Project Volume 1,4 million euro, KWB 70,000 euro
Financing German Federal Ministry of Education and Research (BMBF), KWB with co-financing by Berliner Wasserbetriebe

Partners
GKD - Gebr. Kufferath AG, Technische Universität Berlin (coordination), Bundesanstalt für Materialprüfung (BAM), German Federal Environment Agency (UBA), INVENT Umwelt- und Verfahrenstechnik AG, Kompetenzzentrum Wasser Berlin

SPONSORED BY THE
Federal Ministry of Education and Research

Implementation of sponge city concepts in China

In cooperation with partners from China, the joined project KEYS aims to promote the demand-based implementation of stormwater management measures (Sponge City) in China. Model regions are the cities of Shenzen and Beijing, both of which have been designated as 'pilot Sponge Cities'. The project was developed in close cooperation with the Chinese Ministry of Science and Technology (MOST).

OBJECTIVES

- Investigation of advanced and "smart" components of stormwater management (SMART SPONGE CITIES) allowing for the protection against flooding and the retention of pollution loads
- Implementation of eco-sensitive and particularly energy-efficient wastewater treatment methods featuring new approaches like deammonification, aerobic granular sludge technology and membrane processes
- Development of integrated approaches and methods facilitating the identification and reduction of pollution loads from urban catchments into surface waters.

RESULTS

- Initiation of technical meetings with Chinese partners in November 2018
- Transfer of stormwater management measures to the climate situation in China
- Technical planning for the investigation of membrane plants at a sewage treatment plant in Shenzhen

Implementation of Sponge City Concepts in China (KEYS)

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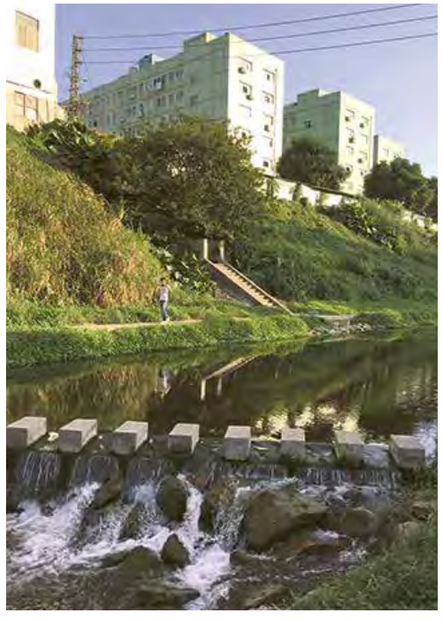
Duration 8/2018 – 7/2021
Project Volume KWB: 420,740 euro
Financing German Federal Ministry of Education and Research (BMBF), Funding Programme „CLIENT II - International Partnerships for Sustainable Innovations"

Partners
Institute for Sanitary Engineering and Waste Management of the Leibniz University Hanover ISAH (management); Kompetenzzentrum Wasser Berlin; Dahlem Beratende Ingenieure GmbH & Co. Wasserwirtschaft KG; Steinhardt GmbH Wassertechnik; LAR Process Analysers AG; NIVUS GmbH; Martin Membrane Systems AG; AKUT Umweltschutz Ingenieure Burkard und Partner; BPI Hannover Verworn Beratende Ingenieure Academic partners in China: Tsinghua University, Harbin Institute of Technology

Federal Ministry of Education and Research

Project team in Shenzen: Exchange and planning of components for rainwater management and wastewater treatment



Technical treatment of groundwater featuring elevated sulphate levels

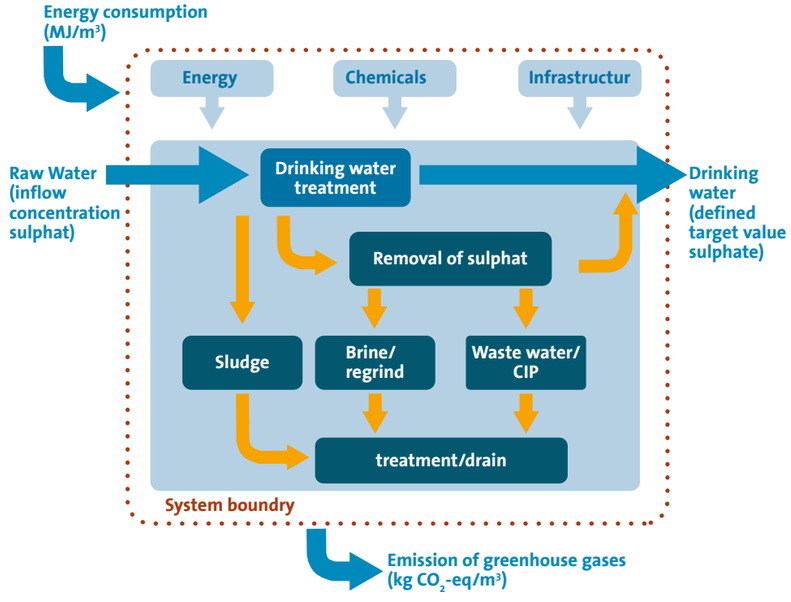
Rising sulphate concentrations in groundwaters and bank filtrates are challenging many water utilities in terms of drinking water supply. In certain regions, it has become increasingly difficult to meet the threshold concentration for sulphate (250 mg/L according to the Drinking Water Ordinance) without additional technical measures. The project investigates commercially available processes of sulfate removal for efficiency in resource and energy consumption at locations of the water utilities HAMBURG WASSER and Berliner Wasserbetriebe under real operating conditions.

OBJECTIVES

- Investigation of resource and energy efficiency of low pressure reverse osmosis compared to ion exchange
- Further development and optimisation of new modified ultrafiltration membranes (LbL-UF)
- Life cycle assessment of the studied process concepts for the removal of sulphate from groundwater

RESULTS

- Preparations for the installation of the pilot plant were started. Likewise, goals and assessment frameworks for the life cycle assessment have already been defined and work started on the inventory balance sheet. There are no results yet.



Technical Treatment of Groundwater featuring elevated sulphate levels: Advanced Options and Limits of a Resource and Energy Efficient Drinking Water Management (SULEMAN)

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Duration 06/2018 – 05/2021
Project Volume KWB: 291,490 euro
Financing 6th Energy Research Programme "Research for an environmentally-friendly, reliable and affordable energy supply" of the German Federal Ministry for Economic Affairs and Energy (BMWi); Berliner Wasserbetriebe

Partners
DVGW Research Centre of the Hamburg University of Technology (Coordination); Hamburger Wasserwerke GmbH; Berliner Wasserbetriebe AöR; Kompetenzzentrum Wasser Berlin; INGE GmbH; Surflay Nanotec GmbH

Gefördert durch:
Bundesministerium für Wirtschaft und Energie
aufgrund eines Beschlusses des Deutschen Bundestages

Berliner Wasserbetriebe

Planning of climate-resilient water infrastructure for the city of the future

The design of climate-resilient cities requires an integration of urban development and infrastructure planning. The Kompetenzzentrum Wasser Berlin is responsible for the work package “Natural-scientific and Technical Assessment”. On the one hand existing evaluations of water infrastructure are simplified and extended by resilience. On the other hand, a goal-oriented planning method, developed in the project KURAS, is applied in actual planning projects and adapted in this process.

OBJECTIVES

- Coupling of grey, green and blue elements of stormwater and wastewater infrastructure aiming at the sustainable transformation of urban areas, exemplified for the two partner cities of Berlin and Norderstedt (grey = technical infrastructure, green = urban green, blue = water bodies).
- Development of common guidelines and goals at different urban levels.
- Assessment of factors that determine the resilience of urban infrastructure.

RESULTS

- Finalised assessment of green-blue-grey water infrastructures for ecosystem services and quality of life allows case-specific selection of measures
- Approach for quantitative evaluation of resilience was proposed and made available for testing and critique on the KWB Github
- Conduct of practical tests to evaluate resilience factors in selected focus areas (e.g. school site, day care centre, neighbourhood densification) in Berlin-Pankow; Extension of the KURAS method by development of new material (info cards) and by separation of non-monetary goals and monetary evaluation.
- Results from participatory planning workshops show that acceptance-based water concepts have high potential for urban drainage.

Estimation of resilience factors during a stakeholder workshop in Berlin-Pakow

netWORKS

netWORKS4 - Resilient networks: Contributions to Urban Supply Systems for Climate Justice

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Duration 10/2016 – 09/2019
Project Volume 1,0 million euro; KWB: 121,000 euro
Financing German Federal Ministry of Education and Research (BMBF), KWB with cofinancing by Berliner Wasserbetriebe

Partners
Kompetenzzentrum Wasser Berlin, ISOE – Institute for Social-Ecological Research (project management), German Institute for Urban Affairs (Difu), Ramboll Studio Dreiseitl, Berliner Wasserbetriebe, Berlin Senate Administration for Urban Development and Housing, Berlin Senate Administration for the Environment, Transport and Climate Protection, City of Norderstedt

Federal Ministry of Education and Research

FONA Forschung für Nachhaltige Entwicklung BMBF

Berliner Wasserbetriebe

Construction and renovation as source of pollution in the urban environment

Despite good water monitoring there is only little knowledge, which pollutants can leach during storm events from urban construction and redevelopment areas, possibly leading to the exceedance of environmental quality standards in receiving urban surface waters. Within a three-year research contract with the Federal Environment Agency (UBA), a combination of product tests and on-site investigations will be carried out to determine which building products can be responsible for the suspected leaching of relevant compounds.

OBJECTIVES

- Enhanced understanding of the interaction of construction materials with stormwater
- Identification of relevant pollutants released from construction materials during rain events and determination of event-based loads
- Application of a model for transfer of results to different meteorological conditions
- Development of a guideline with recommendations for measures contributing to the reduction and avoidance of the entry of pollutants from construction materials into the urban environment.

RESULTS

- Identification of high concentrations of biocides in facade runoff of investigated new-built areas
- Load estimations based on first monitoring results show that during rain events relevant amounts of compounds that were washed-off from facades could end up in stormwater runoff
- For selected contaminants transformation products were found in concentrations that were higher compared to the applied active compound

Sampling system for facade runnoff

Sampling system in rainwater runoff to the river

UFOPLAN BaSaR

UFOPLAN BaSaR – Construction and Renovation Materials as Source for Pollution in the Urban Environment

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Duration 07/2017 – 07/2020
Project Volume 447,000 euro
Financing German Federal Environment Agency (UBA)

Partners
Kompetenzzentrum Wasser Berlin (coordination), HSR Hochschule für Technik Rapperswil, Schweiz; Berliner Wasserbetriebe

Umwelt Bundesamt

Advanced urban water management to efficiently ensure bathing water quality

Stormwater and combined sewer overflows are one of the main pollution sources with strong impact on the quality of urban water bodies, which are more and more used as bathing waters. New real-time control strategies of urban drainage systems as well as new and rapid analytical devices to determine faecal contamination are promising solutions to reduce water pollution. Via information systems and prediction models the population can quickly obtain real-time information on the quality of bathing waters. Such solution options are to be developed and tested in Berlin and Barcelona.

iBathWater - Advanced Urban Water Management to Efficiently Ensure Bathing Water Quality

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Duration 9/2018 – 12/2021
Project Volume KWB: 222,240 euro
Financing EU Life
(Grant Agreement No. LIFE17/ENV/ES/000396)

Partners
Fundació Eurecat (Koordination); ADASA Sistemas (S.A.U.), Barcelona Cicle de l'Aigua, Stadtverwaltung Barcelona und Kompetenzzentrum Wasser Berlin

OBJECTIVES

- Implementation of a web platform for real-time control of sewer systems in Barcelona aiming to reduce the number of short-term contamination caused by heavy rainfalls and to minimise the related health risks of bathing waters.
- Implementation of a newly developed integrated web platform providing real-time information on bathing water quality in Berlin and Barcelona and demonstration of its added value.

RESULTS

- Planning of the installation of four monitoring devices for the online measurement of pathogens in the surface waters in the Berlin city centre. First results will be expected in summer 2019.

River Spree in Berlin

Research for clean bathing waters

The pollution of Germany's rivers has been visibly reduced in the past decades. Nevertheless, out of the 2,000 sites which comply with the EU Bathing Water Directive there are only 30 bathing areas situated along rivers. This is due to the fact that rivers in particular are subject to short-term pollution loads resulting from unpredictable stormwater entries and combined sewer overflows which can turn recreational bathing into a health risk.

The project has been prolonged for 12 months to digitise the developed products and make them available online via the web site of the Federal Environment Agency (UBA).

OBJECTIVES

- Development of models for the short- and long-term prediction of the sanitary water quality of rivers
- Implementation of early warning systems on river bathing sites for the short term prediction of pollution events
- Gaining a better understanding of the self-purification processes of rivers in terms of pathogenic viruses and indicator bacteria
- Analyses of the socio-economic conditions to be taken into account in the development of new river bathing sites

RESULTS

- Development of a highly innovative new strategy for improved bathing water management, validated and implemented in Berlin
- The concept is presented at European Commission Informal Expert meeting for the revision of the European Bathing Water Directive
- Development of checklists to support the necessary administrative procedures prior to the opening of new river bathing sites

The River Havel in Berlin with view to Grunewald Tower

Hygienically relevant microorganisms and pathogens in multifunctional water bodies and hydrologic circles – Sustainable management of different types of water bodies in Germany

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Duration 06/2015 – 11/2018
prolongation 10/2019
Project Volume 2,7 million euro;
KWB: 713,000 euro
Prolongation: 280,000 euro
KWB: 180,000 euro
Financing German Federal Ministry of Education and Research (BMBF) with additional co-financing by Berliner Wasserbetriebe

Partners
Kompetenzzentrum Wasser Berlin (Coordination), Berliner Wasserbetriebe, The German Federal Institute of Hydrology (BfG), German Federal Environment Agency (UBA), IWW Water Centre, Ruhrverband, Dr. Schumacher – Ingenieurbüro für Wasser und Umwelt, Bavarian Environment Agency (BLU), inter 3 Institute for Resource Management, University of Cologne, Berlin Senate Department for the Environment, Transport and Climate Protection, Bavarian Health and Food Safety Authority (LGL), Stiftung Zukunft Berlin (SZB), Münchner Stadtentwässerung (MSE)
Partners after prolongation: Kompetenzzentraum Wasser Berlin, inter3, Umweltbundesamt, Berliner Wasserbetriebe, Technologiestiftung Berlin (subcontract)

Reliable Sewer

Reliable Sewer- Optimisation of Sewer Inspection and Rehabilitation Strategies

Contact
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Duration 4/2016 – 9/2019
Project Volume k.a.
Financing Veolia / VERI, (Veolia Recherche et Innovation)

Partners
Veolia / VERI
(Veolia Recherche et Innovation)

Optimisation of sewer asset management strategies

The maintenance of wastewater infrastructure systems is expensive. The costs for replacement and maintenance amount to several millions of euros which have to be procured by cities and communities. In the last 30 years, most municipalities have invested in sewer system expansion to meet growth and treatment plant upgrades, but a relatively small proportion of the budget has been allocated to sewer rehabilitation. As a result, most cities face the problem of an ageing infrastructure in need of extensive and ongoing repair, rehabilitation or renewal.

OBJECTIVES

- Development and testing of a panel of tools to support municipalities and water utilities in the definition of cost-efficient sewer inspection and rehabilitation strategies.

RESULTS

- A sewer deterioration modelling tool for simulation of sewer asset management strategies has been developed and successfully tested in Brunswick, Germany and Sofia, Bulgaria.
- The inspection data of the city of Sofia have been used to calibrate the sewer deterioration model. The calibrated model can now be used to simulate the influence of asset management strategies over the future evolution of the network condition in Sofia.
- An optimisation module is currently under development to identify the appropriate annual sewer rehabilitation budget and share of rehabilitation techniques.

View to a combined sewer system in Berlin

Support of sewer inspection and investment strategies by means of deterioration models

Recent studies show that current investments on sewer rehabilitation are not sufficient to tackle the ageing of the networks. So-called sewer deterioration models allow to predict the condition of sewer pipes and to support municipalities and water utilities with decisions on rehabilitation and investments. In the first project phase different statistical and machine learning modelling approaches have been tested for the city of Berlin. Two of the tested approaches have shown to be particularly useful and are now prepared for practical use.

OBJECTIVES

- Enhancement and improvement of the tested deterioration models
- Development of approaches for the consideration of rehabilitation effects
- Analysis of effects of different rehabilitation strategies on network condition, age, remaining value and rehabilitation costs
- Prioritization of single sewer pipes and areas for short-term inspection and rehabilitation planning

RESULTS

- The shares of sewer pipes in good, fair and bad condition on network level can be predicted with an accuracy of 99 %.
- Two out of three sewer pipes that need urgent rehabilitation can be identified correctly.
- The developed methods for handling biased and incomplete datasets further improve the accuracy of the prediction model.
- The model results contribute to more efficient rehabilitation and inspection planning procedures.

SEMA-Berlin - Test and Selection of a Model Approach to Support Sewer Inspection and Investment Strategies

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Duration 05/2018 – 04/2020
Project Volume 176,171 euro
Financing Berliner Wasserbetriebe

Partners
Berliner Wasserbetriebe

VKU Innovation Award Ceremony for Sema-Berlin in March 2019: Katherina Reiche (VKU Chief CEO), Regina Gnirss, Nic Lengemann (BWB), Mathias Riechel (Kompetenzzentrum Wasser Berlin), Elke Eckert, Frank Bruckmann, Andreas Schmitz (BWB) und Michael Ebling (VKU President) (from left to right)

Construction area of a mixed sewer storage tank below the Mauerpark, Berlin

HYDRA

Hydraulics for MAR Schemes in Berlin against the Background of Changing Climatic Conditions (HYDRA)

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Duration 01/2018 – 12/2019
Project Volume 100,173 euro
Financing Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMU) and Berliner Wasserbetriebe

Partners Berliner Wasserbetriebe

Supported by:
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
based on a decision of the German Bundestag

Berliner Wasserbetriebe

Investigation of climate change effects on groundwater augmentation

HYDRA investigates possible impacts of climate change on groundwater augmentation, which is a major component of Berlin's drinking water production. The project is about to figure out to what extent varying surface water discharge may lead to restricted use of groundwater augmentation in the future. Another focus of the project is to determine the impact of increasing temperatures on the hydraulic performance of groundwater augmentation during infiltration and subsurface passage until abstraction.

OBJECTIVES

- Identification of operational control and adaptation options to cope with a limited use of groundwater augmentation in times of limited availability of surface waters
- Identification of the impacts of rising water temperatures and higher nutrient loads on the technical surface water treatment
- Quantification of the effects of rising water temperatures on the hydraulic properties of groundwater recharge

RESULTS

- During low discharge conditions possible restrictions of surface water abstraction for groundwater augmentation are likely
- During low discharge and high temperature conditions increased nutrient concentration in surface water leads to an additional burden on the treatment stage and a significant increase in operating expenses
- Utilisation of the aquifer as a reservoir to overcome seasonal shortage can bridge up to 80 days

Measurement of temperature profiles in a groundwater infiltration plant

Optimisation of design and operation of dewatering wells

The mining of lignite in the Rhenish lignite mining area requires the area's groundwater table to be lowered. Dewatering wells reaching down to a depth of about 750m are used. In the entire Rhenish lignite mining area, approx. 1,500 dewatering wells are operated by RWE Power AG to drain the opencast mines. Declining groundwater levels and well ageing processes lead to substantial reductions in productivity of individual wells which have to be compensated by considerable investments for the construction of new wells. In addition, the progressive open-pit mining requires a continuous adaptation of the dewatering planning and control.

OBJECTIVES

- Development of suitable measures and strategies for the operational and constructive optimisation of the dewatering efficiency
- Development of concepts for adjusting the well design and operating regime to reduce well ageing
- Development of concepts for alternative dewatering techniques and predictive maintenance of drainage technology

RESULTS

- 10 % well capacity increase through implementing an intermittent well operation
- Significant reduction of well ageing processes by optimising the well design of > 500 new wells
- Development of tools to monitor groundwater level-controlled dewatering
- Maximised well grid by numeric simulation of dewatering-scenarios
- Development and implementation of an innovative technology for explosion protection

Rhenish lignite mining area

RWE-BO

RWE-BO - Planning, Implementation and Evaluation of Investigations on the Optimisation of Dewatering Wells

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Duration 10/2014 – 04/2019
Project Volume k. a.
Financing RWE Power AG

Partners RWE Power AG

RWE

FAKIN

FAKIN - Development of Standardised Processes for Research Data Management

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Duration 05/2017 – 04/2019
Project Volume 157,665 euro
Financing German Federal Ministry of Education and Research (BMBF)

Partners

Federal Ministry of Education and Research

Development of standardised processes for research data management

Research data management (RDM) comprises all activities related to the processing, storage, archiving and publication of research data. The importance of research data management has grown immensely in recent years due to the large amount of data generated in the course of digitisation and automation. Their administration and processing can hardly be managed with the existing tools.

OBJECTIVES

- Implementation of a sustainable research data management scheme as a case example for small research institutions

RESULTS

- Best Practices for research data management especially designed for small research institutes were tested in projects and subsequently adapted
- Web-based development platform for hosting and versioning of code implemented
- Data managements plans applied

Small funded projects and contracts

Project	Client	Unit	Contact
Monitoring of addictive drugs in the wastewater path	Bundeswehr University Munic	Urban Systems	Dr. Pascale Rouault
Sampling and analysis of bathing sites in Offenbach Harbour	Mainviertel Offenbach GmbH & Co. KG	Urban Systems	Dr. Pascale Rouault
Consultancy for the advancement of the integrated sewer system model	Berliner Wasserbetriebe	Urban Systems	Dr. Pascale Rouault
Determination of the CO_2 footprint of water infrastructure options in two selected urban districts	Institute for Social-Ecological Research (ISOE) GmbH	Process Innovation	Dr. Ulf Miehe
Development and implementation of a simulation tool to support the strategic planning of sewer inspection and investment strategies	Berliner Wasserbetriebe	Urban Systems	Dr. Pascale Rouault
System analysis of flood-related behaviour of central and decentralised stormwater management systems	Berliner Wasserbetriebe	Urban Systems	Dr. Pascale Rouault
Joint treatment of municipal and industrial wastewaters	Kalundborg Forsyning, Sweden	Process Innovation	Dr. Ulf Miehe
Study on technologies for phosphorus recovery from wastewater - Preparation of a global study	GWRC - Global Water Research Coalition, Great Britain	Process Innovation	Dr. Ulf Miehe
Life Cycle Assessments of phosphorus recovery	Easy Mining, Sweden	Process Innovation	Fabian Kraus
Data analysis of geogenic salination in the Berlin groundwater	Berliner Wasserbetriebe	Groundwater	Dr. Christian Menz
Construction and operation of drainage wells at opencast mining sites	RWE Power AG	Groundwater	Dr. Christian Menz

Network | Communication

In addition to our research activities, our tasks include informing the (professional) public about the results of our work, current research trends and developments in the water sector. For this purpose, we organise both professional events and events for the interested public and communicate with journalists.

Based on our network of actors from science, industry and public administration, we promote communication both at national and international level.

Long Night of the Sciences

Kompetenzzentrum Wasser Berlin again contributed to Berlin's "Long Night of Sciences", this time in close cooperation with the Department of Physics of the Humboldt Universität zu Berlin in Berlin-Adlershof.

The institute's innovative architecture was the inspiration behind our theme "Everything about rain": Using rainwater for cooling buildings? What are the consequences of discarded cigarette butts for surface waters? Can mobile phone photos help prevent flooding? Or can the quality of life in cities be improved thanks to rainwater? We discussed these and many other questions in short lectures and experiments with the visitors until late at night.

Berlin Water Workshop

The Berlin Water Workshop sessions initiated in 2004 were continued. The events no 44 and 45 focused on "New tools for predicting hygienic quality of bathing waters" and "Plastic particles in the aquatic environment – Macro, micro, nano". The presentations held can be downloaded from our homepage.

Discussion series „Wasser bewegt Berlin"

The series of these Berlin-specific discussions started in 2010 was continued with another session. The event format, which is deliberately designed for the interaction with the attendants, is to encourage the public discussion about issues of regional water management The results are having some influence on Berlin's national policy. The aim of the event held in 2018 was to include Berlin's plans for decentralised stormwater management in the city's school construction programme: "Stormwater management for schools – Schools as an ecological learning environment".

Research for clean bathing waters – final event of the FLUSSHYGIENE Project

The 3-year joint project FLUSSHYGIENE was terminated by a closing event held in November 2018. With more than 110 participants, the event was fully booked. A combination of lectures, short pitches for poster presentation and a panel discussion ensured that the complex and extensive project outcomes were presented in their entirety.

BLUE PLANET Berlin Water Dialogues – innovative solutions for sustainable smart cities

The BLUE PLANET Berlin Water Dialogues is a series of events initiated as a platform for dialogue in 2011 by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and the Berlin Senate Department for Economics, Energy and Public Enterprises. In 2018 the series was continued as a cooperation project between Kompetenzzentrum Wasser Berlin and the business network German Water Partnership. The conference focused on innovative solutions for sustainable smart cities, and with more than 120 participants from business, research, politics and non-governmental organisations the conference was well attended. Innovative event features and the 16 invited international experts have encouraged the participants to contribute to a concentrated professional exchange. The next event will be held in 2019.

The wastewater treatment plant of the future – final conference of EU-funded POWERSTEP project at IFAT2018

The EU funded project POWERSTEP which was managed by the Kompetenzzentrum Wasser Berlin, organised a 2-day conference at the IFAT 2018 in Munich. The world's leading trade fair for environmental technologies was the perfect platform to present the comprehensive results achieved after three years of project work carried out together with 15 European partners from research and industry. Technical lectures and panels informed the trade visitors on how sewage treatment plants equipped with technologies already available on the market can be transformed from energy consumers to energy suppliers.

Membership in the research platform Watershare®

Watershare® is a water knowledge platform initiated by the Dutch KWR Watercycle Research Institute. Its aim is to keep research results available to potential users after completion of funded projects. The members of Watershare®, currently 21 public research organisations from all over the world, have agreed to share their expertise and knowledge in the field of applied water research, e.g. software tools, and to disseminate them through the Watershare® website. Five Communities of Practice (CoPs) relating to the key water themes Natural Water Treatment, Future-proof Water Infrastructure, Resource Recovery, Emerging Substances and Resilient Urban Water Management, intensified their collaboration in several workshops.

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Duration since 2013
www.watershare.eu/watershare-tools

Member of German Water Partnership

The German Water Partnership is a joint initiative of the German private and public sectors, combining commercial enterprises, government and non-government organisations, scientific institutions and water-related associations. This unique network is supported by the five Federal Ministries of the Environment, Research, Development, Economic Affairs and the Federal Foreign Office. Kompetenzzentrum Wasser Berlin has been a member since 2016 and is actively involved in the working groups “Water 4.0” and “Water and Energy”.

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The European Water Platform

The European Water Platform (WssTP) was initiated in 2004 by the European Commission to stimulate integrated research and technology development in the European water sector. Kompetenzzentrum Wasser Berlin is one of the founding members. In the meantime, more than 160 institutions from academia, industry and policy have joined the platform, which provides recommendations on future research programmes to the European Commission. The recent trends and challenges in the European water management are gathered and recorded by several expert groups. Kompetenzzentrum Wasser Berlin is participating in the working groups “Ecosystem Services”, “Green Infrastructure”, “Emerging Pollutants” and “Bathing Waters”, the latter being headed by Kompetenzzentrum Wasser Berlin.

WssTP – European Technology Platform for Water
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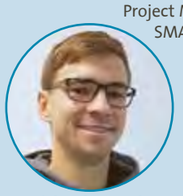

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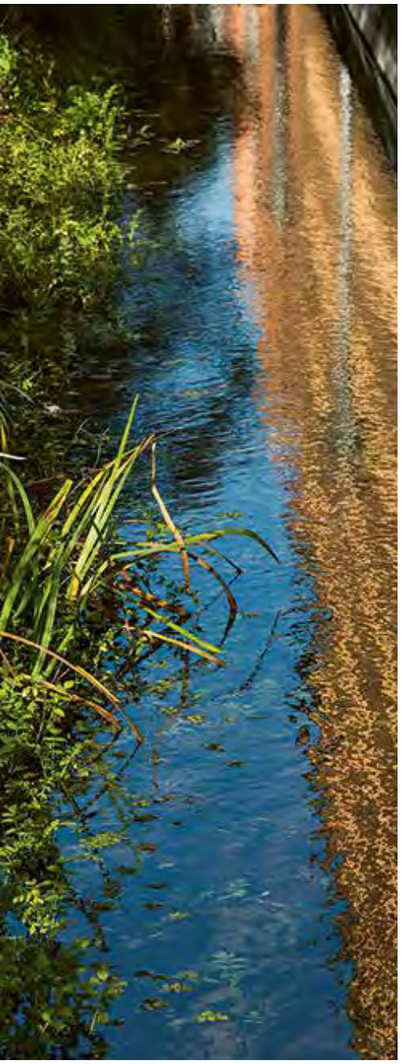

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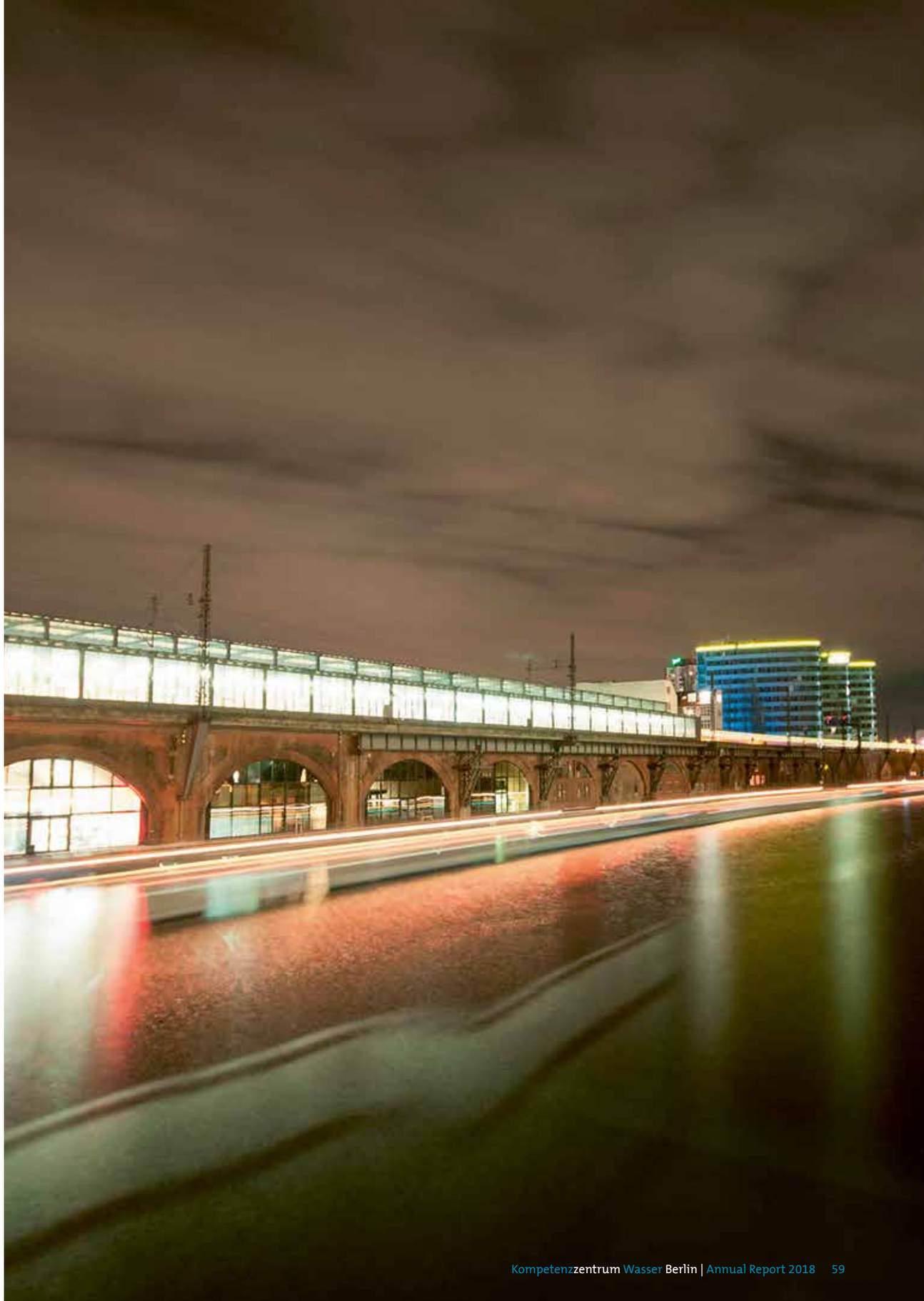

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