

EDITORIAL

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On the occasion of this year's World Water Day on 22 March, the United Nations has pointed out that the opportunities from exploiting wastewater as a resource are enormously underutilised. This position was supported by Professor Stefan Uhlenbrook, coordinator of the UN World Water Assessment Programme, presenting the motto „Wastewater, the untapped resource“ during the BLUE PLANET Dialogue held on this year's trade fair and exhibition WASSER

BERLIN INTERNATIONAL.

The KWB has been dealing with wastewater reuse issues for several years already. Two new projects underline our strategy for the development of follow-up projects with the aim to put ideas generated by a first study into best practice:

The recently launched “E-VENT” project validates new process options contributing to enhanced biogas production during sewage sludge treatment in terms of their feasibility under the specific operating conditions in Berlin WWTPs. This project aiming to increase energy recovery is based on several previous KWB projects like Decamax, Carismo and also Powerstep.

Phosphorus recovery has been a research topic for a long time, also at KWB. Recovered materials however, become recyclables only if they are actually used. In cooperation with Bioland Beratung GmbH and the Institute of Agricultural and Urban Ecological Projects (Berlin Humboldt University) our project “nureg4org” (Nutrient recycles for organic farming) investigates whether and to what extent phosphorus-containing products recovered from the wastewater path will be acceptable and approved for organic farming.

We feel that the current UN statement confirms our focus of research. The projects mentioned and further activities are presented in this newsletter.

Edith Roßbach,
Kompetenzzentrum Wasser Berlin, Managing Director

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LATEST NEWS

Combined natural and engineered processes for water treatment systems – Technical meeting in the Aegaen

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The EU Horizon2020 research consortium AquaNES investigates the benefits of combined natural and engineered systems for water and wastewater treatment at 13 test

sites, predominantly situated in Europe. In cooperation with the Berlin partners AKUT Umweltschutz and Berlin's water utility Berliner Wasserbetriebe the KWB coordinates a workpackage focusing on the combination of constructed wetlands or soil filters with different engineered systems. One of five demonstration sites regarding this topic is the sewage treatment plant on the Antiparos island in the Aegean Sea. The wastewater of 2,000 inhabitants is treated in a constructed wetland combined with post-disinfection and subsequently used for irrigation purposes. During the AquaNES project meeting, the options for a further plant optimisation were discussed with the Greek project partners and the local plant operator.

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Energy-related optimisation of Berlin WWTPs: Project E-VENT launched

The power consumption of wastewater treatment plants is rather high. 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 143 GWh. The WWTPs' internal power supply covers only 40% of the total demand.

The E-VENT project examines new process options contributing to a further energy-related optimisation of Berlin's WWTPs. One of the project's major objectives is to analyse the eligible process

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WASTEWATER – A SOURCE OF RENEWABLE ENERGY?

WE HAVE ACCOMPANIED RABEA SCHUBERT, ENVIRONMENTAL ENGINEER AT KWB, FOR ONE DAY DURING HER RESEARCH ACTIVITIES ON THE WWTP WESTEWITZ WHICH IS OPERATED BY THE WASTEWATER DISPOSAL ASSOCIATION (AZV) DÖBELN-JAHNATAL, SAXONY.

Rabea is an environmental engineer at Kompetenzzentrum Wasser Berlin. Since summer 2016 she has been in charge of a pilot study in the scope of the European joint project POWERSTEP that aims to investigate various novel energy-positive process options for sewage treatment throughout Europe.

Rabea, what are the essential issues to be dealt with here in Westewitz?

On the wastewater treatment plant Döbeln-Jahnatal which is operated by OEWA, a subsidiary of our POWERSTEP partner Veolia Germany, KWB is carrying out one of the six case studies performed in the scope of the European joint project POWERSTEP. We are dealing here with a sequencing batch plant with a cleaning capacity for 2,000 inhabitants. During real operation, it will be demonstrated how a new process management can generate energy from sewage without compromising the treatment performance. The concept is based on a microsieve system enabling enhanced carbon extraction from raw water. In addition, we have designed and constructed a pilot facility together with the company Aquaplant Solution GmbH which allows for nitrogen removal from wastewater by means of a duckweed reactor.

How about your everyday research work?

I start my day with an intensive check of the process control system and the planning of the daily sampling in accordance with the process steps of the treatment plant. Throughout the day, samples are taken and instantly analysed with regard to the chemical and physical parameters. Additional subsamples are sent to the lab of the central WWTP in Döbeln. On the basis of the results the team decides on the necessary steps for the following week. Of course, it is my personal ambition to get the most out of the system by varying the operating parameters. Therefore, I constantly keep an eye on the control scheme.

So you actually “play” with the plant?

Yes, the plant operators have complete confidence in our work. Nevertheless, any malfunction must be eliminated immediately.

The smooth and faultless plant operation is a priority and must be maintained day and night. So troubleshooting may indeed become a physical challenge in case of constant rains, frost and snowfall, since most of the work has to be done outdoors. But when the plant works faultlessly again, I feel very happy which is the perfect compensation for all the stress and strains. And of course I can always rely on the excellent support of my colleagues on the spot.

Next to the sewage treatment plant there is an illuminated glass house. Is this a work of art?

No (smiling), this is the duckweed reactor just mentioned. It is equipped with an elaborate lighting system. This facility is fed with the ammonium-rich filtrate from the microsieve discharge which is a good substrate for duckweed. We are analysing whether this treatment method leads to energy savings compared to the conventional nitrogen removal processes in the



aeration tanks. The duckweed itself can be “harvested” and yields additional biomass, which can also be used as a substrate for the production of sludge gas.

You are a Berliner through and through, how do you get along in the countryside?

Well, first of all I have to admit that I am not a native Berliner (like most so-called Berliners). I come from North Rhine Westphalia situated in the West of Germany. So I like the country atmosphere. Seriously, the landscape is very beautiful, it is a scenic spot, but to be honest sometimes it feels a bit lonely though. But there is permanently a lot of work to do, so I never get bored. The water of the public swimming pool is always toasty in contrast to the outside temperature. This is also true in a figurative sense for the people here who are really friendly and open-minded.

Thank you very much for the interview.

Bodo Weigert asked the questions.



POWERSTEP (Full-scale demonstration of energy-positive sewage treatment plant concepts) is a European joint project which is being funded for three years in the scope of the EU Framework Programme for Research and Innovation Horizon2020. The funding volume amounts to 5.2 million €. Kompetenzzentrum Wasser Berlin coordinates the work of the 15 project partners from Germany, the Netherlands, Austria, Switzerland, Belgium, Denmark and Sweden. The project aims to investigate novel concepts in full scale demonstration providing for the generation of additional energy from wastewater: Enhanced carbon extraction from wastewater, groundbreaking nitrogen removal methods, power-to-gas technology, power generation from waste heat and cutting-edge process water treatment. The project will be running until June 2018.

WATER RESEARCH IN BERLIN AND BRANDENBURG

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FLUSSHYGIENE – Research for Clean Bathing Waters

The pollution of Germany's rivers has been reduced substantially in the past decades. Nevertheless, out of the approximately 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 discharges and combined sewer overflows which can turn recreational bathing into a health risk.

The objective of the FLUSSHYGIENE project which started in June 2015 is to gain a clearer understanding of the entry paths and dynamics of sanitary loads in rivers. The investigations are performed by ten project partners at different types of rivers situated in Berlin, Bavaria, Rhineland-Palatinate and North Rhine-Westphalia. In 2016, comprehensive measurements of the sanitary loads and related processes were carried out in the four reference areas. KWB was responsible for the investigations in Berlin. First promising results reveal that the water quality at bathing sites situated along the River Unterhavel can be reliably predicted by means of a few climatic parameters already. The examinations of the degradation processes in Berlin surface waters allowed for a first estimation of in-situ decay rates of both viruses and fecal indicators by grazing, sedimentation and UV light. By means of a four-week representative telephone survey started in late April, scientists and official project partners expect to obtain a feed-back of Berlin's citizens concerning the preservation or even development of new bathing areas at the rivers Spree and Havel.

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Nutrient Recycles for Organic Farming

The aim of organic farming is to minimise the consumption of finite resources and to concentrate on "Circular Economy". Closing regional nutrient cycles is therefore one of the corner stones to ensure sustainable agriculture.

Nutrients recovered from bio-based materials and waste offer the opportunity to promote the transformation towards sustainable agriculture and circular economy. So far, nutrient cycles are not sufficiently closed, be it in conventional or organic agriculture. This accounts in particular for the case of phosphorus. The only allowed mineral source to compensate phosphorus losses from organic farming systems is fossil based phosphate rock with its arguable fertilising efficiency and potential contamination with the toxic elements cadmium and uranium.

The project „nurec4org“ (Nutrient recycles for organic farming) examines to what extent phosphorus-containing products, which can be obtained through currently available recovery and recycling methods, will be acceptable and approved for organic farming. The aim is to introduce the scientific findings to the corresponding German and European approval bodies and to finally transfer them to the regulations for organic farming (EC/889/2008). Important stakeholders like farmers, trading companies and scientific institutions are involved in the investigations.

The project which has been funded by The Deutsche Bundesstiftung Umwelt (German Federal Environmental Foundation) since January 2017 is being carried out by Kompetenzzentrum Wasser Berlin in cooperation with Bioland Beratung GmbH and The Institute of Agricultural and Urban Ecological Projects affiliated to Berlin Humboldt University (IASP).

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Assessment and Prediction of Berlin's Sewers Condition

Recent studies about wastewater infrastructure in Germany show that current investments for sewer rehabilitation are not sufficient to tackle the ageing and deterioration of the networks. In order to determine the sewers' condition, regular CCTV inspections are conducted.

For the long-term definition of asset management strategies CCTV data are insufficient since they deliver only a snapshot of the sewer condition at the time of its inspection. For this reason, deterioration models have been designed to predict the development of sewer systems which can simulate the estimated development also of non-inspected sewers on the basis of current and previous inspection data. The results can be used to define specific sewer inspection methods and cost-effective rehabilitation strategies. This is indeed a promising approach as demonstrated by KWB's previous project SEMA using sewer inspection data from the Brunswick sewer system.

In the scope of the SEMA-Berlin project, these results are to be further verified with inspection data from Berlin. A detailed analysis of the sewer condition and the relevant influencing factors are used to test several statistical and data-driven models and to evaluate their prediction quality. The project is financed for a period of 13 months by sponsoring funds from Berliner Wasserbetriebe.

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options in view of their feasibility taking into account the specific operation conditions of the treatment plants in Berlin. The according tests are performed in close cooperation between Kompetenzzentrum Wasser and Berlin's water utility Berliner Wasserbetriebe.

Alternative methods for nitrogen and carbon removal, as well as methods for increasing the biogas yield in sewage sludge treatment, are being tested. For the majority of the process options to be examined data from previous KWB projects are available which are to be transferred to the process conditions of large scale WWTPs.

In addition, experimental studies on laboratory and pilot scale are carried out. With regard to the granular sludge technology, it will be analysed whether and to what extent the generation of granulated bio-

mass from Berlin wastewater is possible at all. Furthermore, test series relating to the treatment of sewage sludge by thermochemical hydrolysis processes as well as thermal pressure hydrolysis are to be carried out in order to get a more reliable estimate of the process efficiency and risks associated to different compositions of sewage sludge.

The project E-VENT (duration from 3/2017 to 3/2020) is financed by the Berlin Programme for Sustainable Development (BENE) with funds from the European Regional Development Fund and the State of Berlin (funding code 1158-B5-0). In addition, Berliner Wasserbetriebe contribute to the project expenses.

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EVENTS

Meet us at the following events:

06 June 2017

MEP Water Group Event: Public session on the United Nations World Water Development Report 2017 "Wastewater: The Untapped Resource" – Presentation POWERSTEP

Venue: Brussels, Belgium
Organiser: Water Supply and Sanitation Technology Platform
→ <http://mepwatergroup.eu>

13 July 2017

43th Berlin Water Workshop Digitisation in sewers – Detection of sewer deterioration by innovative image processing and models

Venue: Fraunhofer Institute for Telecommunications, Heinrich Hertz Institute, CINIQ Center/ Smart Data Forum, Salzufer 6, 10587 Berlin
→ www.kompetenz-wasser.de

20–22 June 2017

World Green Infrastructure Congress WGIC 2017

Venue: Berlin, Germany
Organisers: Fachvereinigung Bauwerksbegrünung e.V. (FBB), World Green Infrastructure Network e.V. (WGIN), Europäische Föderation der Bauwerksbegrünungsverbände e.V. (EFB)
→ www.gebaeudegruen.info

28–29 June 2017

5th Anniversary of the „Centres of Competence for Micropollutants“

Organisers: KomS BW, Kom-M.NRW and VSA Platform
Venue: Friedrichshafen, Germany
→ <http://www.spurenstoffe-bw.de/>

23–6 July 2017

IWA Water Reuse 2017

Venue: Long Beach, California, USA
Organiser: International Water Association
→ <http://iwareuse2017.org>

12 September 2017

DPP Forum 2017: National Conference of the German Phosphorus Platform with a focus on how to get P-recycling to the market

Venue: Berlin, Germany
Organiser: German Phosphorus Platform DPP
→ www.deutsche-phosphor-plattform.de

20–21 September 2017

TASIMA22 22nd Conference on Urban Waste Management – Circular Economy: We can do it!

Venue: Magdeburg, Germany
→ www.tasima.ovgu.de

FOCUS



Ecologic City Map – Presentation of 19 urban ecology projects in Berlin

Editor: Berlin Senate Department for Urban Development and Housing in cooperation with Kompetenzzentrum Wasser Berlin
March 2017

→ [WEB-Version](#)

The ecological city map, published as a folding map, comprises 19 illustrated descriptions of pioneering construction projects relating to stormwater management measures which have been realised in Berlin in recent years. In addition, the map summarises all results of the KURAS research project ("Concepts for Urban Stormwater Management and Sewage Systems") in a nutshell. The online version is available on the website of the Senate Department for Urban Development and Housing pinpointing all projects on an interactive map. So it has become easy to plan individual project visits. Both the brochure and the online version of the Berlin „Ecological City Map“ have been developed within the framework of the KURAS project and were funded by the German Federal Ministry of Education and Research (BMBF) within the funding initiative „Intelligent and multifunctional infrastructure systems for a sustainable water supply and wastewater disposal (INIS)“.

about us

The Berlin Centre of Competence for Water (Kompetenzzentrum Wasser Berlin, KWB) is a public-private partnership company. Its associates are the Technologiestiftung Berlin, the Berliner Wasserbetriebe and the Berlinwasser Holding. Through its network activities, the KWB strengthens Berlin's position as an international centre in the field of water economy and technology. Partners and actors are scientific facilities, public institutions, companies as well as multipliers from public and private sectors.

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