

Editorial

Dear Reader,

Not only in response to the dramatic events in Japan, energy issues are one of the most talked about topics at present. In the field of water management, the implementation of energy-efficient measures has been a matter of major concern for quite some time. In the scope of its Energy Programme launched in summer 2006, the Land Berlin has reached a cooperation agreement with an alliance of Berlin companies and thus also with Berliner Wasserbetriebe, to significantly reduce energy consumption, and consequently, greenhouse gas emissions through definite efficiency improvements, all in comparison with the reference status of 2005. These initiatives have led to intensified research activities scrutinizing water-related processes with regard to their energy consumption and searching for saving potentials.

In particular, wastewater treatment schemes offer, upon closer investigation, an enormous energy saving potential. Up to now, the process technology of large wastewater treatment plants is based on the activated sludge process that mineralises most of the organic fraction, so that the energy content gets almost completely lost. Only the biomass contained in the surplus sludge is sometimes converted into biogas and subsequently used as an energy carrier, which is already an important step towards increased energy efficiency. Against this background, KWB's currently running project CoDiGreen is a good example of how further progress will be achieved.

Furthermore, our activities are designed to tap the full potential of chemical energy contained in domestic wastewater through the application of sophisticated methods. Our vision: WWTPs will produce additional energy exceeding their own energy demand. WWTPs as power plants? In the scope of our recently launched project CARISMO, first steps towards this target have been taken.

Ahead of us, there is still a wide field of study requiring fruitful research activities which we are looking forward to carry out in cooperation with our research partners from universities, research institutions and companies.

Andreas Hartmann, Managing Director
Berlin Centre of Competence for Water (KWB)

Latest News

Membranes, Ozonation and Microsieves Information Day Project OXERAM



Together with Berliner Wasserbetriebe, KWB presented first results of a comprehensive project on the improvement of water quality. The OXERAM project supported and financed by Berlin's Environmental Relief Programme (ERP II), Berliner Wasserbetriebe and Veolia is currently evaluating several promising hybrid methods of advanced wastewater treatment with regard to phosphorus removal and wastewater disinfection, also taking into account the energy efficiency and cost effectiveness of the processes investigated. The pilot plants are operated by micro sieving, membrane filtration and ozonation methods. The results of the technical investigations are complemented by systematic life cycle analyses.

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Large-scale Wastewater Treatment Plants as Power Plants? New research project launched at KWB

Due to its potential of chemical energy (organic content), municipal wastewater is yet a largely untapped source of renewable energy. Instead, conventional municipal wastewater treatment plants need additional primary energy as aeration requirements to biologically degrade the contents in question.

The large WWTPs of Berlin have currently a specific energy demand of about 0.2-0.4 kWh/m³, but the complete methanisation of the organic content present in the wastewater could theoretically generate up to 0.8 kWh/m³ with state-of-the-art technologies. KWB has recently launched the research project CARISMO which aims to transform municipal WWTPs from net consumers of fossil energy into net producers of renewable energy by the year 2030, without losing sight however, of the core function of a wastewater treatment plant. In the next three years, the project is thought to set bases towards this ambitious goal by identifying and assessing potential treatment schemes and defining technical bottlenecks and limitations. The project is financed by Veolia Eau and



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News from the KWB Network Office

KWB to intensify its contribution to the European Water Platform WssTP

After more than three years of active membership in the European Water Platform WssTP, Boris Lesjean, one of the two deputy directors of KWB, has been elected as board member of this network organisation to represent the research institutions members of the association. In 2004, the EU supported the creation of WssTP as a non-profit and industry driven organisation with the aim to receive professional advice by both users and scientists with regard to the development of specific research programmes on water issues at European level. Since the appearance of the last issue of our Newsletter, KWB has launched the

projects CARISMO (page 1) and OPTIWELLS (page 3). Both projects address the energy efficiency of water treatment facilities. KWB is currently working on 11 large research projects together with national and international partners. The project volume in 2011 amounts to 3.1 mil. €. Almost half of it is financed by Veolia, 36 % originate from public funding programmes (Land Berlin, EU, BMBF), 18 % are provided by Berliner Wasserbetriebe.

Further information:

www.wsstp.eu/site/online/home
www.kompetenz-wasser.de



KWB team participating in the annual Berlin staff relay

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Water Technology and Environmental Protection: All Ecologically Sound?

Interview with Christian Remy, Research Fellow at KWB since March 2010

Christian Remy is an Environmental Engineer who received his PhD from the Technical University of Berlin, Department Water Quality Control, in 2010. Whilst working on his dissertation, he was involved in the preparation of life cycle assessments for new sanitary systems in KWB's SCST project.



Christian Remy

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Christian, we recruited you as a member of our team at KWB about a year ago. Could you give us some brief insight into your career path?

During my studies at the Technical University of Berlin, I stumbled into the world of "water" at the department of Water Quality Control and have been fascinated by this subject ever since. After completing my undergraduate thesis on the combination of ozonation with bank filtration, Professor Jekel offered me a position as a doctoral student in the Sanitation Concepts for Separate Treatment (SCST) project, which dealt with life cycle assessments for novel sanitation systems. With great assistance from my predecessors in the field, especially Dr. Alexander Ruhland, I familiarized myself with the subject of life cycle assessment (LCA) and completed the project successfully. At the end of my doctoral studies, Professor Finkbeiner, a renowned expert in LCA, came to the university and also became my second thesis supervisor. After receiving my PhD in January 2010, I started work directly at the Berlin Centre of Competence for Water, which I already knew well from my work on the SCST project.

After your entry in the KWB, Life Cycle Assessment became one of our main research areas. Why do we need such tools? Are water supply and wastewater treatment not ecological services per se?

In principle, of course, waste water treatment in particular fulfils an "ecological" function because it protects the surface waters and their ecosystems from suffering overly negative effects from the wastewater we produce. Obviously, it is in our own interest not to pollute our drinking water and recreational water resources. At the same time, water supply and wastewater treatment result in negative environmental impacts in other areas. These impacts may be related to factors such as

the additional consumption of fossil fuel resources and the related emission of greenhouse gases and other pollutants. Particularly in view of the challenges of the future, we must determine the extent to which it is necessary to enhance our existing technologies or to introduce new water protection requirements for higher environmental impacts. If, for example, an additional purification step is introduced to a wastewater treatment regimen, then it will invariably lead to the additional expenditure of energy and resources and add to the burden of related greenhouse gas emissions. Therefore, Life Cycle Assessment is a suitable tool because of its ability to identify the shifting of environmental impacts into other problem areas or into other parts of the water management system.

The evaluation of technical processes by means of LCA will gain increasing importance in the future. Are there any methodological limitations to Life Cycle Assessment?

Methodologically, LCA is a tool for systematic analysis of technical processes, in particular, for comparison of either individual technologies or whole concepts. In LCA, environmental effects are characterized and compared using global or, ideally, national factors. Therefore, these effects may not necessarily reflect the actual local impacts of a process as, for instance, is the case with environmental impact studies. For example, an LCA cannot predict exactly how the emissions from a wastewater treatment plant will impact on surface waters, but it can compare different technological options in a consistent manner and thus provide information on their potential environmental effects. In many cases, life cycle assessments already provide enough information for decision-making, and they are generally much faster to perform than elaborate local impact studies, which must take several different site-specific conditions into account. However, the same rule applies to LCA as to any other model calculation: "Crap in, crap out". That

is to say, any LCA is only as good as the quality of the data used to feed the model. Hence, the collection and evaluation of process data are also significant factors in LCA.

Which assessment projects are you currently working on?

In the "CoDiGreen" project, we are conducting ongoing life cycle assessments for the enhancement of energy and nutrient recovery in wastewater treatment systems. In this context, I have performed an assessment of the sludge treatment at a major WWTP in Berlin and have assessed enhancement measures to reduce its carbon footprint. An analysis of the sewage system of the city of Braunschweig, which emits purified clear water and sewage sludge into agricultural sites for the purpose of water and nutrient reuse, is also in progress. The "OXERAM" project compares different advanced tertiary wastewater treatment technologies for extensive removal of phosphorus and bacteria from wastewater. The available sand, membrane and disc filter technologies differ greatly in terms of their energy and infrastructure requirements, and these differences are to be quantified by means of LCA. I am also working on the recently launched NITROLIMIT project, in which various measures to limit nitrogen inputs into the Spree and Havel river basin will be compared. One of the foremost goals of this project is to determine which environmental effects can be expected to arise from the implementation of additional measures at sewage treatment plants and combined sewage overflows as well as from agricultural sources.

What do you, personally, find most appealing about working at KWB?

First of all, I think that the working environment at KWB is very conducive to research. We are a young and dedicated team in which it is fun to work, and the professional exchange is very good. In contrast to the university, my work here is more directly related to practice. Of course, as an LCA specialist, I

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Water Research in Berlin and Brandenburg

Optimisation of energy and nutrient recovery in wastewater treatment schemes – The CoDiGreen Project

Regarding the targets of EU environmental policy of reducing primary energy demand and the emission of greenhouse gases, wastewater treatment offers a significant reduction potential in the urban water cycle.



In the CoDiGreen project coordinated by the Berlin Centre of Competence for Water (KWB) and financed by Veolia Water and Berliner Wasserbetriebe, two wastewater treatment schemes in Berlin and Braunschweig are studied and optimised in terms of energy efficiency and nutrients recovery. TU Braunschweig has completed pilot studies to assess the potential of codigestion with grass and/or thermal hydrolysis. Together with SE-BS (Stadtentwässerung Braunschweig), full-scale codigestion trials with grass are currently in progress at the wastewater treatment plant Steinhof using ensiled grass mowed locally. KWB performed Life-Cycle Assessment (LCA) studies of the treatment plants Steinhof and of the sludge handling schemes of Wassmannsdorf treatment plant (Berlin), on the basis of operational data. The LCA approach will be also used to assess several optimisation options of the two studied systems in terms of global environmental performance. The key results of the project will be presented at the Re-Water conference in Braunschweig on 21-22 November 2011.

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3 parallel digestion reactors of WWTP Steinhof, Braunschweig

KWB supported Study on Bankfiltration in Honduras

A team composed of four engineers from the US and Canada went to Honduras in early April to assess the feasibility of bank filtration as alternative source for public water supply. This project was organised by 'Water for People', a world-scaled NGO implemented in 11 countries that promotes total coverage of sustainable access to drinking water through local development.

This development mission is part of a large program led by the Honduran government to modernize its national water sector and involved four

municipalities near San Pedro Sula, which supply approximately 50,000 people with drinking water. One objective of the project was to assess the feasibility of bank filtration as a water supply alternative compared to present groundwater abstraction from deep wells. KWB supported this study by providing technical expertise how to use the Bank Filtration Simulator, a simple modelling tool developed within the NASRI project. With this support the project team was able to identify potential sites and make evidence of their suitability for bank filtration. Finally, these results will be released in a report including the optimal design and pumping rates for the bank filtration wells.

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Water sampling in a Honduran river

OptiWells – Energy Efficient Well Operation

With rising energy prices and global climate change, the question of the energy efficiency of drinking water production becomes more and more present. Against this background, the Franco-German project OptiWells was started in April 2011.

Well field operation is seldom optimised with regard to energy efficiency. Approximately one third of the energy input required for drinking water supply – covering water production and treatment as well as its distribution through the pipe network – is used for well operating procedures. Recent studies have revealed that energy savings of up to 20% could be achieved by optimising pump design and operation of drinking water wells. The specific energy consumption for well field operation depends on numerous factors which have to be taken into consideration for any optimisation approach. The project



OptiWells will address the relative importance of the different parameters impacting energy demand and investigate the savings potential through improvement of the technical equipment. On the basis of the achieved results, a tool will be developed allowing for the combined simulation of groundwater, well and operation characteristics of a well field. A case study will examine the practicability of the modelling tool and provide information on whether any binding recommendations for improved energy management measures can indeed be derived. The first project phase will be

performed in close cooperation with the Technical University of Berlin (Department of Fluid Dynamics) and financed by Veolia Eau.

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Investigated well field in France

ELaN – Land Management Towards Sustainable Water and Nutrients Use

ELaN is a sub-project within the BMBF Research Programme "Sustainable Land Management" which currently consists of eleven joint research projects, comprising different topic areas, tasks and challenges dealing with sustainable land management, located in specific research region.

The research project ELaN aims at coupling technological innovations for water and nutrient management together with organisational innovations for an adapted land management. This goes along with innovations of socio-economic forms of governance for the implementation and economical valuation of those combined model solutions. They include the use of purified waste water in order to support the landscape water balance and the cultivation of energy plants. These local model solutions are developed further to regional systems solutions of sustainable land use in close co-ordination with stakeholders. The result will be a combined water resources and nutrient management. Central parts are the use of purified waste water and recycling nutrients for sustainable agricultural production lines. The project is coordinated by the Leibniz Centre for Agricultural Landscape Research (ZALF) and involves 11 partners including Berliner Wasserbetriebe.

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Sewage irrigation field Hobrechtsfelde – Study area for water reuse

continuation of page 1 (CARISMO)

supported by Anox Kaldnes, Berliner Wasserbetriebe and Hydrotech. During the initial phase, three new treatment schemes, all of them based on the low energy microsieve separation process and aiming to increase the COD yield from primary sludge, will be tested and evaluated at pilot scale with real wastewater.

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continuation of page 2 (Interview)

personally find it very attractive to have direct access to operating and process data on such a large scale, as well as personal interaction with colleagues on site. This has given me the opportunity to learn a lot more about WWTPs and to improve and expand my LCA models.

Interview: Bodo Weigert

Events

7. July 2011

Urban in drinking water – Theory and practice. Elimination, further processing, application.

Venue: Zwickau, Konzert- und Ballhaus "Neue Welt"

Organiser: VWS Deutschland GmbH - Krüger WABAG

Contact: hildegard.schmidt@veoliawater.com

23.-29. Juli 2011

International Congress on Membranes and Membrane Processes

Ort: Amsterdam

Veranstalter: Membrane Technology Group of the University of Twente,

The Netherlands

www.icom2011.org/



21. September 2011, 17 – 21 h

5th Talk of the Town Water: Aquatic sports, tourism, nature conservation – conflicts or opportunities?

Venue: Landesruderverband

Berlin (LVR), Berlin-Grünau

Organiser: AG Wasser des

Stadtgesprächs Berlin

www.stadtgesprach-berlin.de



6.-17. September 2011

Asia-Pacific Weeks Berlin: Partner for a Common Future

Topics: Water resources management, nutrition research, food safety, medical technology
www.berlin.de/apforum/apw/apw2011/



26.-29. September 2011

8th IWA International Conference on Water Reclamation & Reuse

Venue: Barcelona

www.waterbcn2011.org/

29.-30. September 2011

Forum Green Cities

Advanced power and heat supply; from waste management to resource management; sustainable water supply and disposal.

Venue: Regensburg, Germany

Organiser: University of Applied Sciences

Regensburg

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4.-7. October 2011

6th IWA Specialist Conference on Membrane Technology for Water & Wastewater Treatment

Venue: Eurogress Aachen

www.iwa-mtc2011.org/



International Water Association

10.-11. Oktober 2011

Innovationsforum Wasserwirtschaft

Veranstalter: DWA und DBU

Ort: Zentrum für Umweltkommunikation der

DBU, Osnabrück

www.dwa.de

www.dbu.de

12.-13. October 2011

IWRM – International Conference on Integrated Water Resources Management

Management of Water in a Changing World:

Lessons Learnt and Innovative Perspectives

Venue: Maritim Hotel &

International Congress Center,

Dresden, Germany

Organiser: German Federal

Ministry of Education and Research (BMBF)

www.bmbf.iwrm2011.de/



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Federal Ministry of Education and Research

17.-21. October 2011

4th IWA Conference on Odours and VOCs.

Venue: Vitória, Brasilien

www.iwa2011odour.com



International Water Association

21.-22. November 2011

en3 2.0 – energy, environment, engineering

Organiser: e.qua Network for

energy recovery and resource

management

Venue: Andels Hotel Berlin

www.e-qua.de



21.-22. November 2011

Re-Water International Symposium

Venue: Braunschweig;

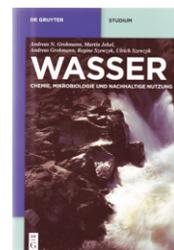
Organiser: SE/BS, Wastewater Association

Braunschweig, TU Braunschweig, KWB, EWA

www.se-bs.de

Focus

WASSER – Chemie, Mikrobiologie und nachhaltige Nutzung



Andreas N. Grohmann, Martin Jekel, Andreas Grohmann, Regine Szewzyk, Ulrich Szewzyk

De Gruyter 2011,
ISBN 978-3-11-021308-9

In May 2011, a team of scientists of the Technical University of Berlin and the German Federal Environmental Agency has published a comprehensive interdisciplinary specialist book on water. As the authors emphasise, this reference book is supposed to provide both students and interested laypersons with a broad understanding of water-related topics. On 360 pages, all basic scientific principles of water including its chemical and physical properties are elucidated. Particular attention is given to issues of water use and water quality as well as to the technical basics of water treatment. In addition, methods for water analysis as well as factual information on microbiological and health-relevant aspects are presented. The authors have excellently succeeded, from a purely scientific perspective, in sensitising the reader not only to the considerate exploitation of water resources, but also to their sustainable use.

About Us

The Berlin Centre of Competence for Water (Kompetenzzentrum Wasser Berlin, KWB) is a public-private partnership company. Its associates are the TSB Technologiestiftung Berlin, the Berliner Wasserbetriebe, the Berlinwasser Holding and Veolia Wasser. The KWB stands as a network node to strengthen the position of Berlin 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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