

## D.T4.3.1. TRAININGS CURRICULA FOR NEARING PUBLIC ADMINISTRATIONS TO REEF 2W IMPLEMENTATIONS

# GERMANY

06/01/2020

## 1. Purpose and scope

The main goal of this deliverable is to describe the approach and methodology taken at the training in Berlin, which was conducted in the context of the project REEF 2W.

Generally, the trainings in REEF 2W intend to communicate information on wastewater-to-energy technologies explored in REEF 2W, as well as project results, to regional authorities (for example those from the feasibility studies or the REEF 2W Tool).

In Berlin, the state government, with which KWB and adelphi signed the Memorandum of Understanding (DT2.5.2), was particularly interested in co-developing the Regional Strategy (DT.2.5.1). The purpose of the Regional Strategy was to investigate how the regional authority could support the local water and wastewater utility in the implementation of the wastewater-to-energy technologies looked at in REEF 2W.

We, the local project team, decided, therefore, to make the Regional Strategy a key element of the collaboration with the regional authority in Berlin. The collaboration with the state government of Berlin was hosted by the Senate Department for Urban Development and the Environment (SenUVK). However, also representatives from departments that deal with waste and wastewater took part in the training.

## 2. Dates

The training took place on the 10<sup>th</sup> of December. For more information on the agenda and content of the training, please see DT4.3.2.

## 3. Methodology

The training comprised one of the last steps in developing the Regional Strategy. The steps prior to and after the training can be summarised as below. All of these steps were important for the training itself.

- a) **Conduct research and develop a rough draft of the Regional Strategy:** As a first step, we reviewed literature and existing government documents to understand what actions the SenUVK already undertakes to promote wastewater-to-energy solutions in wastewater treatment plants in Berlin. This helped us to identify possible gaps in actions that the SenUVK should address in the future. We also adapted the template provided to complete the deliverable.

- b) **Present rough draft to the Berlin Senate and collect feedback:** As a second step, we summarized initial findings in a draft and presented it in the second meeting with the SenUVK in July 2019. The first meeting was only about agreeing on the terms of the MOU. The feedback we received helped us to gain a better overview and narrow the scope for the Regional Strategy. We also decided to conduct more interviews, as we noticed that information on the topics the Regional Strategy addresses is limited.
- c) **Meet with Berliner Wasserbetriebe (BWB):** We had a meeting with two representatives from BWB, the local water and wastewater company, with whom we had a discussion on the initial results of the Regional Strategy. The main purpose of the meeting was to inquire about the main factors that impeded BWB from implementing wastewater-to-energy solutions at a large scale. The information we gained was used to further refine the Regional Strategy.
- d) **Present final results of Regional Strategy at the training:**  
A variety of relevant actors participated in the training, including representatives from one of the local energy providers, BWB, SenUVK and other departments of the Senate, and the Germany Environment Agency. For the final meeting, adelphi and KWB prepared a discussion paper, which summarized the findings of the Regional Strategy up to this point. The discussion paper was circulated prior to the training. During the training itself, adelphi presented the key points of the discussion paper and initiated a discussion, seeking to validate the findings in order to answer still open questions (specially to define future actions the Berlin Senate should take).
- e) **Produce a position paper that captures main results of the discussion at the training**  
On the basis of minutes that were taken during the training, adelphi developed a position paper. The position paper summarises several of the key issues and actions to tackle them. These include those the participants considered as most important and urgent to address. A draft text was shared with all participants to finalise the position paper.

## 4. Teacher's CV

Anika Conrad (adelphi) and Mehdi Habibi (KWB) took part in the Training for Trainers (DT4.2.1) in Prague in November. The CVs are displayed below. However, it needs to be mentioned that, since the focus of the Training was on the Regional Strategy, the training of trainers the two took part in was not particularly relevant for the training in Berlin. Instead, André Müller and Annika Kramer moderated the discussion during the training, who developed together with Anika Conrad the Regional Strategy. **Anika Conrad:**

Background:

- Master degree in Environmental Science and Technology at the Technical University of Berlin

Current role:

- involved in several projects dealing with the transfer of innovative water technologies and tools while fostering participative and integrated approaches in water management
- conducted workshops and events with key stakeholders and decision makers in Europe and South America (e.g. SUBSOL project)
- contributes to the SMART-Control project (activities by conducting trainings and developing transfer concepts for the SMART-Control framework)

Work in REEF 2W:

- Identification of Key barriers impeding further implementation and dissemination of REEF 2W solutions
- Design of an Regional Strategy in collaboration with the Berlin Senate and BWB, which outline concrete steps for implementing the REEF 2W approaches beyond the project's end

**Mehdi Habibi:**

Background:

- Master of Engineering in Mechanical Engineering - Renewable Energies

Current role:

- Development of scenarios for optimal use of sewage gas
- Simulation of different energy scenarios for a wastewater treatment plant

Work in REEF 2W:

- Responsible for the implementation of environmental assessment in the REEF 2W tool
- Work on the feasibility study in the case study Berlin

## 5. Annex

Below you find the discussion paper that built the foundation for discussions at the training.

### **Discussion paper for the REEF 2W Regional Strategy**

The **purpose of this discussion paper** is to capture the main preliminary results of the work to develop a Regional Strategy in the project REEF 2W.

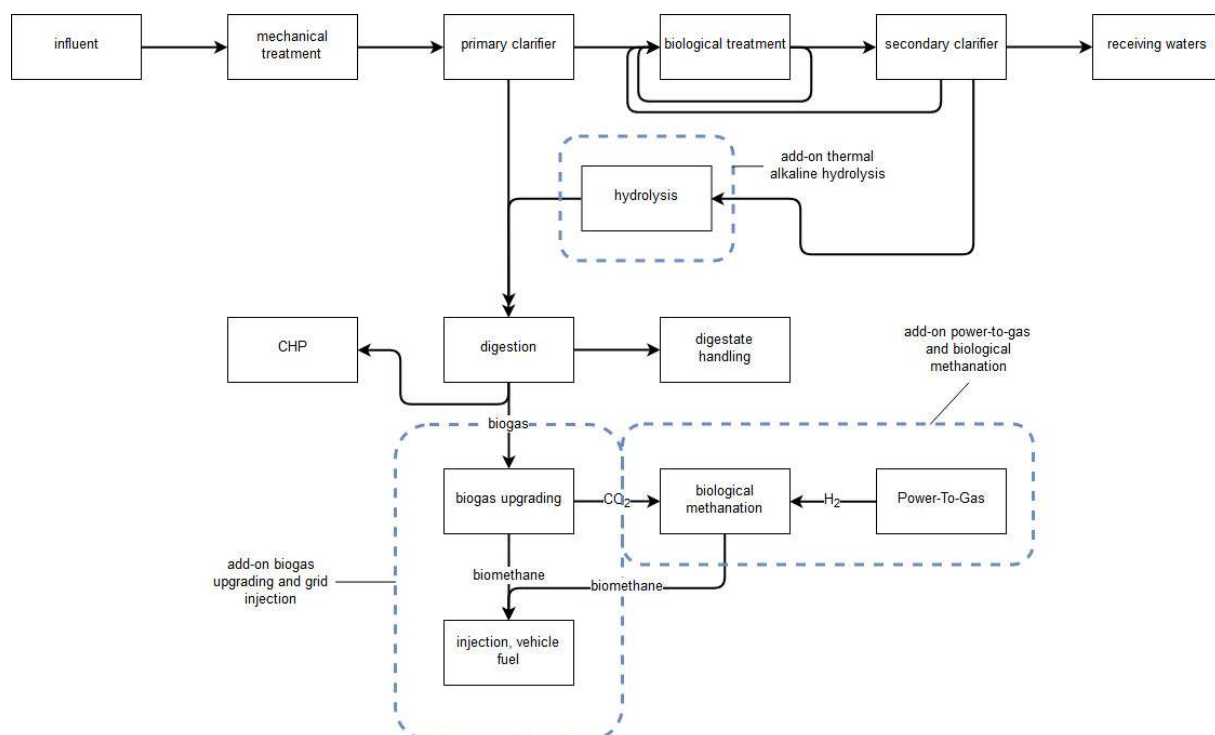
The vision of the Regional Strategy is that wastewater treatments plants (WWTPs) in Berlin become energy self-sufficient and use surplus energy to supply the market, thereby contributing to key energy-related targets in the Energy and Climate Protection Programme of Berlin 2030 (BEK 2030).

To achieve the vision, the Regional Strategy has the goal to identify how The Berlin government can support the Berliner Wasserbetriebe (BWB) to accelerate the implementation of wastewater-to-energy solutions and maximize the energy potential of WWTPs.

The investigation of the Regional Strategy is confined to several technologies investigated for potential future implementation at the WWTP Schönerlinde during the REEF 2W project. The Regional Strategy additionally looks at capturing waste heat in WWTPs and the sewer system.

The energy-related objectives pursued through these technologies can be grouped into three categories:

- I: Increased biogas and waste heat<sup>1</sup> yields and improved utilisation
- II: Improved energy storage for secured generation capacity
- III: Improved conditions for energy injection into the regional grid



<sup>1</sup> Please beware that waste heat is not investigated as part of the project REEF 2W. During an earlier meeting with different departments of the Senate, adelphi, and KWB, it was decided to consider waste heat in the regional strategy.

## Background: current state of energy efficiency efforts at BWB

- BWB is one of the largest communal energy users in Berlin, with its energy consumption equivalent to that of the city of Augsburg
- Through measures such as increasing energy efficiency, reducing drinking water consumption, and producing renewable energy on-site, BWB has been able to reduce CO<sub>2</sub> emissions by 50 % compared with 1990 levels (SenUVK and BWB 2016).
- Today, BWB already generates 63 % of the energy required by its WWTPs and 23 % of its total energy requirement itself, making it also one of Berlin's largest energy producers (SenUVK and BWB 2016).
- Through exploiting the energy potential in sewage sludge, mostly burning biogas in Combined-Heat-Power systems, the Berlin WWTPs cover 55 % of electricity and 96 % of the heat needed for their WWTP operations (Simon, 2017).
- Across all WWTPs in Berlin, biogas production has been raised by 19 % since 2005 and Simon (2017). BWB has also facilitated multiple projects to capture waste heat in the city's sewer system.
- The other wastewater-to-energy technologies under investigation - biogas upgrading, power-to-gas, thermal hydrolysis, methanisation - have not been implemented at scale and remain at the stage of research and development.
- With regard to energy optimisation there is still room for improvement. This potential has been analysed in a feasibility study within REEF 2W for the WWTP Schönerlinde.

## Existing gaps in current action and potential measures

### I: Towards an enabling legal and regulatory framework

Studies conducted in REEF 2W revealed that a variety of legal and regulatory barriers impede the implementation of wastewater-to-energy solutions in the five pilot countries. In sum, framework conditions that support all of the three energy-related objectives of the Regional Strategy are only in the making. Implementation of projects is driven rather by “good will” of operators than systematic political support. Despite a lack of sound evidence, there are strong indications as to why the situation in Berlin seems to be no exception.

BWB faces little regulatory pressure or economic incentive to replace conventional technologies by the ones discussed in here. Considerably lower subsidies for biogas from wastewater than for biogas derived from energy crops or substantial fees and quality standards that impede utilities to feed energy into the grid are just two key barriers. The progress BWB has made today in reducing CO<sub>2</sub> emissions may have largely been driven by easily attainable cost savings or internal motivation by leadership and management staff to improve sustainability targets. The framework conditions, as they currently are, may prompt BWB to further optimise energy consumption or increase biogas yields for self-supply to some degree. Yet, they are not conducive in that they would lead BWB to introduce the technologies (including biogas upgrading, methanisation, and power-to-gas) that enable flexible storage and provision of energy for sale.

The opportunities for the Berlin government to improve the overall framework conditions are limited. Many of the major barriers root in national legislation and regulation or EU directives. The Berlin government can attempt to achieve changes in legislation and regulations at the national level. The final report of the 2014 Enquete Kommission “Neue Energie für Berlin - Zukunft der Energiewirtschaftlichen Strukturen” has outlined a range of recommendations the Berlin government should endorse, including specific aspects relevant for the wastewater sector.

It will be equally important for the Berlin government to tackle existing regulatory and legal barriers at the federal level and gradually create framework conditions at the federal level that help to meet the Senate’s energy-related policy objectives. Unless already available, a study should be conducted that develops an approach for how to reform framework conditions over the next decades. Although some technologies are not market-ready yet (such as Power-to-Gas), early efforts to design the required framework conditions are recommendable, among other due given long planning cycles in the wastewater sector (Obermaier et al. 2018). The Berlin government should ensure that the position and interests of BWB and other relevant actors are adequately reflected in upcoming processes to review and amend legislation and regulation.

**Potential actions:**

- Comprehensive study to assess legal and regulatory framework conditions, including barriers and ways to overcome them at the federal level
- Synthesize findings from existing studies to build a well-informed position on the ways the Berlin government should influence national framework conditions

## **II: Prioritisation in policy and planning instruments**

Limited information is publicly available on how the Berlin government envisions the wastewater sector to contribute to energy targets and on how it seeks to promote exploiting the sector’s energy potential in practice. Key policy and planning



**documents currently signal a rather low ambition to further elevate the energy potential of the wastewater sector.**

The BEK 2030 and its action plan list a range of actions for various sectors. Many actions could possibly be relevant for the wastewater sector, too (e.g. to promote Power-to-Gas infrastructures). However, whether these actions actually include the wastewater sector as a target group remains largely unclear due to a low-level of detail in the documents with respect to sector-specific information. Only one action (E-24) specifically addresses the wastewater sector. It seeks to foster the flexibilisation of WWTPs in Berlin, for example by improving framework conditions, expanding research and development activities, and fostering the implementation of pilot projects. The Climate Protection Agreement between BWB and SenUVK is more detailed in this sense. However, the majority of wastewater-to-energy solutions investigated in REEF 2W are not reflected in the agreement. For instance, Action M3.16 aims at improving flexibility options, yet without listing power-to-gas technologies or other relevant technologies among them.

The Berlin government needs to ensure that policy and planning documents provide more detail on energy-related targets and envisioned actions for the wastewater sector in the future. This would give various actors, from the wastewater sector itself to energy providers and private-sector investors, a necessary basis for planning. The development of these measures (unless they exist already) should be guided by recommendations that have been co-developed with BWB and other sectors. The BEK and its action plan are valid for the period between 2018 and 2021. The Senate could initiate a consultation and discussion with various actors to define actions that should guide amendments to future editions.

**Potential actions:**

- A (ongoing) consultation with various actors that investigates which wastewater-to-energy technologies should be implemented, and how, building on the aforementioned analysis of the energy potential for all WWTPs in Berlin
- A detailed implementation plan for the wastewater sector that serves as a supplement to the BEK 2030 and climate protection agreement between the BWB and Berlin Senate

### **III: Information and capacity**

Knowledge and capacity at BWB do not seem to be a major barrier to the implementation of wastewater-to-energy solutions. Yet, the Senate could offer support for research to accelerate implementation at early planning and development stages through, among others, feasibility studies and potential analyses.



The large size of BWB entails advantages regarding its institutional capacity and access to information. Resources are available that allow some management personnel to deal particularly with energy aspects at the WWTPs. BWB seems to be aware of the potential in optimising energy outcomes and possesses expertise and technical know-how to implement new technologies. Reportedly, it has piloted several of the technologies discussed here (e.g. Biogas Upgrading). Consequently, there may be limited demand for the Senate to provide informational and educational services (such as information on the benefits of wastewater-to-energy solutions or capacity training on new analytical tools or business models).

However, research needs are greater when it comes to technology implementation at the early planning and development stages. For example, it seems particularly useful to conduct a study that demonstrates the role the wastewater sector could play in Berlin's energy transition (including the suitability of different wastewater-to-energy solutions for the different plant locations). As such, this study would provide an evidence-based foundation for a more detailed action plan to complement the BEK 2030 action plan, help to align different sectoral policy objectives with respect to the energy transition in Berlin, and mobilise more political support and investments for wastewater-to-energy solutions.

Furthermore, BWB and other actors would profit from certain studies that provide information necessary for the implementation of wastewater-to-energy technologies and associated infrastructures. For example, the 2015 Enquete Kommission recommended mapping the potential for using waste heat through heat pumps, e.g. in new building areas or industrial sites that are close to the sewer network or the WWTPs. Project developers, for example, depend on this information, which can be made available in the form of energy maps. The surplus of heat from WWTPs in Berlin, which mostly exists during the summer months, is currently wasted because of lacking nearby demand for it. Furthermore, to lay the foundation for Power-to-X applications in the future, studies are needed that investigate how the WWTPs can access renewable energy, which is not available in sufficient quantities and at low cost at the moment.

**Potential actions:**

- Analysis of the potential role the wastewater sector can play in contributing to multiple targets set for achieving the energy transition in Berlin
- Studies that help to facilitate specific aspects of implementing wastewater-to-energy solutions (e.g. improve access to surplus renewable energy)

#### **IV: Exchange, dialogue, and collaboration across sectors and states**

**More exchange and cooperation between BWB and a growing number of actors will become necessary if the WWTPs in Berlin are to interact increasingly with energy markets.**

Cooperation and exchange become particularly critical once WWTs flexibilise their energy consumption and production and interact with energy markets. At large, the state of Berlin needs to cooperate with the states of Brandenburg and Mecklenburg-Vorpommern, as it will not be able to cover its own needs for renewable energy in the future.

There are various examples of networks or working groups which have been put in place to facilitate cooperation and exchange. These bring together relevant actors including energy providers, grid operators, and enterprises, entrepreneurs, politicians, associations and government representatives. One-off events or regularly convening groups can help wastewater utilities to identify new energy efficiency measures and funding opportunities or gain contact to investors, develop projects together, or work out cross-sectoral strategies (e.g. on the long-term use of biogas to attain the highest efficiency rates).

The Climate Agreement between BWB and SenUVK is a good example to show that the Berlin government already cooperates with BWB with respect to energy objectives. The departments of the Senate can play a key role in establishing more additional formats for exchange and cooperation. BWB articulated that such a need particularly exists for harmonizing conflicting policy objectives in relation to higher water quality standards to protect freshwater ecosystems versus the need to reduce energy consumption in WWTs.

#### **Potential actions:**

- Establish some form of regular platform for exchange and cooperation between BWB, the Senate, energy providers and other relevant actors (and possibly utilities from other federal states)

## **V: Providing funding and advice on how to access funding**

**Finances are a key barrier and appear to impede the implementation of all the analysed wastewater-to-energy technologies. While BWB made attempts to introduce several of them, low profitability impairs a systematic application across the different WWTs.**

This is because wastewater-to-energy solutions require high upfront investments and cause additional costs for operation and maintenance. Utility operators are usually not able to recover the costs through wastewater fees and other revenues.

While introducing them usually depends on some form of continuously provided support schemes (like subsidies), targeted funding can be useful to accelerate specific aspects of implementation. The Berlin government can foster the readiness of technologies, which are not mature enough to compete at the market yet, through research. This is done in several projects already (e.g. E-VENT as part of the programme BENE). To accelerate the implementation of mature technologies, such as for biogas upgrading or waste heat capture, on the other hand, start-up financing for preliminary

investigations or feasibility studies is useful to kick-off development projects (e.g. to create demand).

Gaining a thorough understanding on how new and existing finance programmes should be designed to match the distinct technological needs could be a first step the Senate can undertake. The Senate should use such information to develop funding lines in support of implementing the BEK 2030. Presently, none of them seems particularly relevant for wastewater-to-energy solutions. Furthermore, there may be demand to advice BWB (or others actors) on how to access funding at national and EU level, an action which was established as a goal in the Climate Protection Agreement.

- Tailor BEK 2030-related funding to wastewater-to-energy solutions
- Support BWB and other actors with information and capacity on how to access federal and EU funding programmes

## Sources:

Obermaier et al. (2018) Klimaschutz und Abwasserbehandlung. Sinnvolle Beiträge zur Energiewende. Position. Umweltbundesamt.

SenUVK and BWB (2016): Klimaschutzvereinbarung zwischen dem Land Berlin Senatsverwaltung für Stadtentwicklung und Umwelt und den Berliner Wasserbetrieben. Unter Mitarbeit von A. Geisel und J. Simon. Online verfügbar unter [https://www.berlin.de/senuvk/klimaschutz/aktiv/vereinbarung/download/20160614\\_ksv-bwb\\_senstadtum.pdf](https://www.berlin.de/senuvk/klimaschutz/aktiv/vereinbarung/download/20160614_ksv-bwb_senstadtum.pdf) , zuletzt geprüft am 15.07.2019.

Simon (2017) Praxis der ganzheitlichen Betrachtung der Wasser- und Energiewirtschaft in Berlin. Online verfügbar unter [https://bmbf.nawam-erwas.de/sites/default/files/simon\\_webseite.pdf](https://bmbf.nawam-erwas.de/sites/default/files/simon_webseite.pdf), zuletzt geprüft am 15.07.2019.