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REGIONAL STRATEGY - AUSTRIA

Project Title: REEF 2W—Increased renewable energy and energy efficiency by integrating, combining and empowering urban wastewater and organic waste management systems

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1. PURPOSE AND SCOPE OF THE DELIVERABLE

The aim of this deliverable is to give suggestions on how the regional government of the Austrian feasible study site (federal province of Upper Austria) could support broader application of energetic use of wastewater (implementation of the REEF 2W approach).

2. BACKGROUND

Climate change is one of the great challenges of our times. To counteract global warming the reduction of greenhouse gas emissions is of crucial importance. Consequently, the EU Energy Road Map 2050 aims at reducing greenhouse gas emissions by 80 to 95 % until the year 2050 (compared to 1990). In this context, a more efficient use of energy as well as the substitution of fossil energy source by renewable ones is considered to be a key aspect. On the search for renewable energy sources, wastewater has attracted increasing attention in recent years. This is for reasons: (1) Wastewater contains chemical energy in the form of organic wastewater contents. Due to anaerobic digestion of the sewage sludge this energy can be made accessible. The here generated digester gas can be applied in combined heat and power units for the generation of electricity and heat. For decades, this has been common practice at many wastewater treatment plants (WWTPs) around the world to supply their own electricity and heat demands. (2) Wastewater also contains significant amounts of heat, which can be made usable by heat exchanges situated in the wastewater flow and subsequent heat pumps. On a global level, this technological approach is not common yet. However, since the end of 2018 the European Union, for the first time, fully recognizes wastewater as a renewable source of energy due to its heat content (Council of the European Union, 2018).

The REEF 2W approach suggests different options for WWTP energy generation (sewage digestion for generating digester gas, wastewater heat recovery, solar and hydropower installations) and supply (external heat supply, biomethane feed-in). However, according to international literature (Hao et al., 2019, Kretschmer et al., 2015) the available amounts of excess heat from wastewater heat recovery as well as from digester gas combustion (although in lesser shares) are most promising. This is also because the heating (and cooling) sector is already and expectedly remains the biggest energy sector in the EU (European Commission, 2016). Today, this sector is still heavily dominated by fossil heat sources. Consequently, we consider

the integration of WWTPs into local energy/heat supply systems a promising contribution to counteract climate change. Concurrently, it supports the diversification of local energy supply and thus the resilience of the energy system.

3. REGIONAL STRATEGY

The Austrian REEF 2W case study is located in the province of Upper Austria. Consequently, the focus of this deliverable is on this “region”. The regional government has already launched an energy strategy (Land OÖ, s. a.). The vision is to establish the province of Upper Austria as an internationally leading energy region in terms of the improvement of energy efficiency and application of novel technologies as well as an international technology leader for selected energetic and environmental technologies. Hereby, the energy strategy comprises five equally ranked targets:

1. Energy efficiency and renewable energy
2. Supply reliability
3. Competitiveness and economic efficiency
4. Innovation, securing the economic future of the region research and development
5. Acceptance and representation of interests

REEF 2W can contribute to achieving these targets in manifold manner:

1. In many cases wastewater treatment plants (WWTPs) are the biggest energy consumer on municipal level. Consequently, increasing the energy efficiency of wastewater treatment processes is of crucial importance in the broader context of local/regional energy systems. Furthermore, WWTPs can provide different types of renewable energy (electricity, heat, digester gas) which cannot only be used on a WWTP internal scale but also to supply surrounding settlement structures with substitutes for fossil energy (resulting in a reduction of greenhouse gas emissions).
2. Wastewater (and solar) based energies promoted in REEF 2W solutions are not only manifold, they can also be considered as “naturally available” local resources. Their activation can contribute to a diversification of energy sources used. As a consequence, the resilience of the entire energy supply system and thus supply reliability can be increased.

3. The use of locally/regionally available energy source can support competitiveness of the domestic economy as it decreases the dependencies on energy imports and related uncertainties. This aspect might also apply for private households in the context of long-term stable energy costs.
4. The activation of “new” energy sources (as wastewater based ones) can foster the implementation of innovative solutions and technologies and catalyse related research, education and development. Furthermore, “naturally” and locally available energy supply can provide a local advantage in the sense of maintaining or even increasing existing economic and commercial value.
5. Energetic use of wastewater considers a broad variety of disciplines and interests. Consequently, the REEF 2W approach recognises stakeholder involvement at early planning stages to be a very crucial aspect for successful implementation. The bundling of (regional) inter- and transdisciplinary expertise provides a sound basis for the elaboration of sustainably and broadly accepted solutions.

4. STRATEGIC AREAS AND IMPLEMENTATION

In the context of counteracting climate change Mair (2019) mentions “the three I’s” as possible access point for action:

1. Information
2. Institutions
3. Investments

We consider these points as a very suitable basis to promote energetic use of wastewater and the REEF 2W approach. In the following the different aspects and related possible actions are presented in more detail.

4.1. Information

As already mentioned before, energetic use of wastewater does not only comprise one single but different disciplines and sectors. In this context Kretschmer et al. (2018) identify wastewater utilities, energy suppliers, municipalities and energy consumers as core stakeholder groups. These groups have different knowledge and awareness in regard to the possibilities and benefits related to energetic use of wastewater. Among stakeholders, a broad perception of wastewater as a renewable source of energy and the possible contributions WWTPs could make for

local/regional energy supply is a prerequisite to foster the REEF 2W approach. Consequently, the provision of information tailored to the specific background of each stakeholder group is of crucial importance. Furthermore, one has to consider that the different stakeholder groups might use quite different information paths (Lindemann, 2016). Information will only reach the target group if communicated through appropriate paths. To conclude, possible actions to increase knowledge and awareness of different stakeholder groups are as follows:

- Information campaigns in specialised media (periodic journals/newsletters of the different disciplines, municipal newspapers, websites etc.)
- Information events in cooperation with specific umbrella organisations of the different disciplines (seminars, training courses etc.)
- Enabling direct contact and exchange of different stakeholder groups beyond the “specific borders” of the different disciplines (joint workshops on municipal level, joint visits application sites etc.)

4.2. Institutions

By end of 2018 the European Commission published a recast of the Directive 2018/2001 on the promotion of the use of energy from renewable sources. Concerning the REEF 2W approach, one can consider this recast as groundbreaking as it considers, for the first time, wastewater (sewage water) as renewable energy source (due to its thermal energy content which is understood as “ambient energy”). As European law has to be transfer into national law, in Austria wastewater has to be recognised as renewable source of energy now as well. Another important legal aspect concerns the Austrian federal republic of Styria. The recast of the Styrian spatial planning law specifically addresses energy planning on municipal level (Abart-Heriszt and Stoeglehner, 2019). A recent guideline supports municipalities by integrating energy and climate relevant issues in their local development concepts. This approach shall foster the exploitation of locally available and renewable energy sources. It would be desirable if other Austrian provinces soon follow this future-orientated approach. In this context, a findings document on integrated energy and spatial planning of the Austrian Spatial Planning Conference shall also be mentioned. This document explicitly addresses wastewater heat recovery in the context of optimising and activating of so far untapped energy sources.

Apart from above mentioned legal aspects the organisational framework is of central importance. This refers to the establishment of (regional) central contact point in charge of all aspects related to the energetic use of wastewater (information, networking, technical assistance etc.). In 2018, a working committee dealing with energetic use of wastewater was established on Austrian national level in the premises of the Austrian Water and Waste Association. However, due to the rather local character of the issue the installation of an adequate body on regional level appears also beneficial. Summarising the above, the following institutional actions can be suggested (for the Austrian case study region):

- Integration of wastewater as a renewable source of energy in provincial legal framework.
- Consideration of wastewater based energy potentials in integrated energy and spatial planning on regional and local/municipal level.
- Establishment of a central contact point for information and assistance concerning wastewater energy related issues on regional level.

4.3. Investment

A (temporally limited) funding of wastewater energy related actions (feasibility studies, practical implementations etc.) can foster the establishment of wastewater as a source of renewable energy. Successful practical applications could serve as demonstration sites and thus raise awareness and create knowledge. However, from an economic perspective it is evident that energy recovery from wastewater has to be economically efficient in the long-term (without permanent funding).

According to our current knowledge energetic use of wastewater is neither funded on national nor on provincial/regional level. However, due to the aforementioned recast of the EU directive 2018/2001, it can be expected that energetic use of wastewater will find its way (back) into Austrian national funding schemes in the near future.

It is evident that apart from public funds also private investments (energy suppliers etc.) would advance energetic use of wastewater. In this context, the economic performance of related installations is a key aspect. Examples/demonstrations of successful implementations (promoted and realised with public support) would certainly support private initiatives.

Possible financial actions in the energetic use of wastewater can be summaries as follows:

- Public funds (temporally limited) can trigger the practical application of energetic use of wastewater in the sense of REEF 2W.
- Successful realisations can serve as demonstrations site to also encourage private investors.

5. CONCLUSIONS & CHALLENGES

The presented strategic areas “information” and “investment” are harmonizing very well with the existing energy strategy of the province of Upper Austria.

Target number 3 “competitiveness and economic efficiency” addresses the prevention of additional financial burden on economic as well as on household level. Furthermore, it mentions incentive programs and the use of all available potentials and technologies. The different options/technologies for wastewater based energy generation summarised in the REEF 2W approach can support reaching this target.

Target number 5 “acceptance and representation of interests” concerns measures of knowledge building and awareness raising, increasing acceptance and the bundling of regional competences. Consequently, aspects regarding the energetic use of wastewater and the REEF 2W could be easily integrated into the existing approaches.

The strategic area “institutions” goes beyond the regional energy strategy as it concerns the adaption of national and provincial legislation. However, legislation is subject to constant adaption, especially in the context of the energy transition (compare the above mentioned recast of the EU directive on renewables). Energetic use of wastewater can be considered in the ongoing adaption process. The establishment of a central contact point concerning the energetic use of wastewater could be integrated into the existing (energy related) counselling infrastructure of the province of Upper Austria (e. g. OÖ Energiesparverband - Upper Austrian energy saving association).

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