Interreg CENTRAL EUROPE
European Union European Regional Development Fund
REEF 2W

TAKING COOPERATION FORWARD

O.T3.2 FIVE FEASIBILITY STUDIES FOR AS MANY REEF 2W DEMONSTRATION PILOTS

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OUTPUT FACT SHEET

Feasibility Study Austria

Project index number and acronym	REEF 2W
Lead partner	ENEA
Output number and title	OT3.2 Five feasibility studies for as many REEF 2W demonstration pilots
Investment number and title (if applicable)	n/a
Responsible partner (PP name and number)	BOKU, PP6
Project website	https://www.interreg-central.eu/Content.Node/REEF-2W.html
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Summary description of the pilot action (including investment, if applicable) explaining its experimental nature and demonstration character

Since 2008 a combined heat and power (CHP) plant has been in operation at the Reinhaltungsverband (RHV) Trattnachtal in Upper Austria, providing a total of 3.7 GWh electricity and 2.8 GWh heat in 2016. Currently, a significant amount of surplus electricity (approx. 1.8 GWh/a) is fed into the power grid. The aim of the operator of the wastewater treatment plant (WWTP) is to utilize surplus electricity to recover thermal energy from the effluent of the wastewater. For this purpose, heat pumps have to be installed and the spatial context needs to be analyzed, in order to evaluate the amount of heat demand in the vicinity of the treatment plant. Additionally, a district heating network has to be conceptualized, which is essential to transport the thermal energy from the WWTP to heat consumers such as settlements or industrial areas. The main benefits of this approach are the replacement of conventional fossil energy sources like oil and natural gas with renewable heat from wastewater as well as additional economic revenues for the operator due to selling surplus heat. It is also important to highlight, that the application of heat pumps in the effluent of the WWTP will not negatively affect the treatment processes or include any other downsides for the WWTP.
The average wastewater flow in 2016 and 2017 was measured at 6 million m^3/a. Considering a wastewater decrease of 2K, a total of 18.8 GWh/a of thermal energy could be recovered. Depending on the assumed delta T, recovered energy could even be increased. Besides heat recovery, measures to increase energy efficiency like improving the insulation of the digester towers, changing to low temperature based heating of the digester towers or aeration improvements are also followed at the pilot plant.
After the evaluation of the energetic context at the WWTP, a spatial analysis was carried out. In a first step, relevant energy zones (potential supply areas) were delimited in both case study municipalities. The second step was to conceptualize a district heating network, which is mainly based on the existing road network. Results show significant heat demand of more than 20 GWh/a in the defined energy zones. The district heating network, consisting of main segments and building links, accounts for a total length of approximately 17,000 m. Hence, a connection density of almost 1.2 MWh/(m.a) was calculated. These results indicate that there is considerable amount of energy demand in the vicinity of the WWTP. At the same time, the economic feasibility of a district heating network can be taken for granted, due to the comparably high connection densities.

NUTS region(s) concerned by the pilot action (relevant NUTS level)

Pilot action:
NUTS 1: AT3 - Westösterreich
NUTS 2: AT31 - Oberösterreich
NUTS 3: AT311 - Innviertel

Investment costs (EUR), if applicable

At this investigation stage no investment costs can be made applicable.

Expected impact and benefits of the pilot action for the concerned territory and target groups and leverage of additional funds (if applicable)

Due to the pilot actions, and as revealed in the Integrated Sustainability Assessment (ISA), the local environmental welfare will increase. One reason for the improvement is the central heat supply via district heating. Hence, no additional emissions are generated at the consumer site. Another aspect are CO_2 emission reductions due to heat recovery. Generally, the provided heat from the WWTP is renewable and fossil heating systems such as oil and natural gas heating can be replaced, resulting in significant ecological benefits. Due to the additional local energy source from the WWTP, the resilience of the energy system in the case study municipalities will further increase. Also, economic advantages for the territory due to local heat supply are becoming apparent. Finally, it can be concluded, that the transformation of the WWTP from an energy consumer to an energy provider is a vital force to reduce the carbon footprint and to foster the energy turn on the local level.

The leverage of additional funds cannot be assessed precisely. Additional funding mainly depends on the relevant funding scheme, which (in the Austrian case) can be distinguished between European level, Austrian national level and provincial/regional level.

Sustainability of the pilot action results and transferability to other territories and stakeholders.

The sustainability of the pilot actions was assessed using the developed ISA in four contexts: Environmental, social, economic and technical. As already indicated, the WWTP and its current technical features can be rated as highly sustainable. One main reason is the energetic surplus (electricity and heat) that is already available and its corresponding high shares of energetic self-sufficiency. Although the electric self-sufficiency will decrease if heat recovery is realized, the overall environmental benefits due to utilizing surplus heat will further increase after the REEF 2W solutions are implemented. Thermal energy will be sold at market prices and the environmental welfare will further increase. Nonetheless, necessary investments for heat pumps will be compensated by additional income of selling heat.
Subsidies and local authorities might influence the transferability. However, single measures like insulating the digester towers are easily realizable and transferable. Also, the transferability of the technical realization of heat recovery is fully given. For instance, in other federal states of Austria, such as in Lower Austria (city of Amstetten) or in Styria (city of Weiz), heat recovery was also realised. Furthermore, it is not always necessary to plan a district heating network from scratch. Existing networks might already be available. Another option to facilitating the realization of heat recovery from wastewater is to find partners with waste heat potentials like industries or thermal spas.

Lessons learned and added value of transnational cooperation of the pilot action implementation (including investment, if applicable)

The potential of realizing heat recovery from wastewater in other CEU countries was tested by the project partners and their pilot studies. Generally, the realization of REEF 2W solutions are recommended throughout CEU countries. Moreover, it was beneficial to compare for instance legislative frameworks and boundaries within the REEF 2W project. For additional assessments on this subject please refer to the outputs of thematic work package no 4.

Contribution to/ compliance with:

- **relevant regulatory requirements**
- **sustainable development – environmental effects. In case of risk of negative effects, mitigation measures introduced**
- **horizontal principles such as equal opportunities and non-descrimination**

Besides positive effects of the REEF 2W solutions on the energetic situation of the WWTP, the main environmental benefit is seen in substituting fossil energy sources beyond the boundaries of the treatment plant. In other words, surplus heat from the WWTP can consequently contribute to replacing fossil sources for heating private households or public buildings as well as industry and service utilities. Generally, by using recovered thermal energy in the WWTPs surroundings, the carbon footprint of whole municipalities can be reduced. Further, the provided renewable energy will contribute to a more local and more resilient energy system, positively effecting the sustainability of the whole energy system.
Finally, a successful implementation of the (Upper) Austrian pilot action can serve as a best-practice example to support initiatives towards establishing energetic use of wastewater (and thus the REEF 2W approach) on both, regional as well as national levels (e. g. Upper Austrian Energy Strategy, working committee “energy from wastewater” at the Austrian Water and Waste Association).
Further, no risks or negative effects were noticed, not requiring any mitigation measures.

References to relevant deliverables (e.g. pilot action report, studies), investment factsheet and web-links
If applicable, additional documentation, pictures or images to be provided as annex

The O.T3.2 is closely related to five Feasibility studies described in D.T3.3.1 - D.T3.3.5. conducted in each project partners country. Additional reference is given to deliverable D.T3.2.1.