

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

Conducted by Veolia CR 31/03/2020



## Pilot actions (including investment, if applicable) Version 3

Project index number and acronym	REEF 2W
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Responsible partner (PP name and number)	-
Project website	Veolia, PP9
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Summary description of the pilot action (including investment, if applicable) explaining its experimental nature, demonstration character and transnational added value

The main challenge addressed by the Prague WWTP pilot action was to prove the improvement of energy efficiency by implementing of biogas upgrading to biomethane.

For Prague WWTP there is biomethane unit for biogas upgrading and vehicle refuelling station designed. The biomethane plant can positively affect the energy efficiency of WWTP and reduce the air pollution generated by transport.

Due to the priorities of the project, the membrane biogas upgrading method was selected for Prague project because of lower investment costs of this technology. The technology consists of membrane biogas upgrading unit and bioCNG vehicle filling station.

The upgrading plant is connected to the existing raw biogas pipeline from digesters to current CHP. It contains a unit for additional special biogas pre-treatment (removal of H<sub>2</sub>S), gas drying and cooling unit, a compressor unit with filtration, a membrane separation unit itself, and a pressure control device for further distribution. The membrane separation unit is situated in a standard ISO20 container - width = 2.438 m, length = 6.058 m, height = 2.2348 m (or other according to the technology supplier), the container is mounted at the level of the terrain on the concrete blocks. The filling station for vehicles contains compressor, gas drying device, balancing pressure container - these again in the container version and also covered its own dispenser stand with the payment terminal (here again the assumption of automatic unmanned operation).

For compressed gas filling stations for motor vehicles, TDG G 304 02 of the Czech Gas Association is available, which specifies the conditions for the location, execution, testing and operation of CNG fast-moving stations for motor vehicles if the inlet pressure does not exceed 0.03 MPa, the compressor does not exceed 20.3/h and the compressor internal volume does not exceed 0.5 m<sup>3</sup>.

The installation of biogas upgrading unit causes only minor changes to WWTP site. Installed technology is small and compact situated in standard containers. Only small part of produced biogas (now not used) is upgraded.

Biogas upgrading unit maximum is 250 Nm<sup>3</sup>/hour of raw biogas. Corresponding biomethane production is 160 Nm<sup>3</sup>/hour. It means that 2,500 kg of CNG per day can be produced. By energy It means 1,370 kWh of green energy produced from - currently unused biogas.

The demonstration character of pilot proved the feasibility of biogas upgrading in conditions of Prague WWTP.

Investment costs (EUR), if applicable

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

CZ-NUTS, NUTS 0 - Czech Republic

There were no investment costs financed by the project

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

The main result of the pilot action was the verification of the positive effect of the biomethane plant on the energy efficiency of WWTP and the reduction of the air pollution generated by transport. Thanks to biogas upgrading 2,500 kg of CNG per day can be produced. By energy it means 1,370 kWh of green energy produced from - currently unused biogas.

Considering the comprehensive environmental, social, economic and technical analysis, the REEF 2W technology - introduction of biomethane production - is beneficial for the selected WWTP. As shown by results of ISA (Integrated Sustainability Assessment) methodology, REEF 2W scenario - biomethane production has the better composite index in three categories (environmental, social and economic) and it is equal in one of them (technical), which means, that implementation of evaluated methane upgrading to biomethane brings additional benefits in these fields.

Based on the pilot results the Prague WWTP included the biogas upgrading in the plan of investment actions.

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

As it was mentioned before the Prague WWTP included the biogas upgrading in the plan of investment actions. Successful application of the biogas upgrading technology in the biggest WWTP in Czech Republic would stimulate its use in other territories as well. Sustainability of the biomethane production was tested by using if the ISA tool (Integrated Sustainability Assessment) developed in the framework of REEF 2W project.

To have detailed information about specific parts of ISA (social, environmental, economic and technical) are calculated separately to be used by decision makers for their own analysis and decision. The sustainability of the biomethane production was confirmed by better composite index in environmental, social and economic category and equal composite index in technical one.

The transferability of the pilot action results to other territories and stakeholders is feasible in high extent, except of economic part. In this area, the big role-play subsidies supporting the energy production from renewable sources, which are very country specific. In specific case of biomethane production, it is very important the extent and relation of electricity, heat and biomethane related subsidies.

There was only limited transnational cooperation in this case. However very interesting was comparison of legislative framework and boundaries in different CEU countries, which was the main lesson learned.

If applicable, 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-discrimination

All relevant regulatory requirements have been met, although the quality requirements for biomethane are very strict.

The contribution of the described pilot action is very strong in the field of sustainable development - environmental effects. These effects are totally positive being implemented in wastewater treatment plant (WWTP) and positively affecting the energy efficiency of WWTP and reducing the air pollution generated by transport. Both the mentioned benefits contribute significantly to reduction of carbon footprint of WWTP and municipality as a whole. No risk of any discrimination was observed.

**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.T3.1 is closely related to five Feasibility studies conducted in each project partner's country  
D.T3.3.1 - describing the Increased energy efficiency for a waste treatment plant through biogas production

D.T3.3.2 - describing the generation and optimization of a mix of energy outputs in WWTP

D.T3.3.3 - describing the wastewater-based heat supply potential

D.T3.3.4 - describing the implementation of biomethane production

D.T3.3.5. - describing the combined energy recovery from sludge and biowaste