

D.T2.1.1 REASONS/CONDITIONS LEADING TO THE CHOICE OF THE 5

Croatia

16/07/2018



1. Objective of the task:

In DT2.3.1, the pilot locations were selected. The main objective of this deliverable (D.T.2.1.1) is to identify the leading reasons for selecting the pilot locations, in this case the WWTP in Prague.

The deliverable draws on four deliverables finalised in Work Package 1.

- D.T1.2.1: Base line analysis of the current situation in the targeted utility companies/ territories
- D.T1.2.2: Relevant models highlighting integration and combination of technologies
- D.T1.2.3: Guiding document to demonstrate the benefits of implementation of REEF 2W plants
- D.T1.4.1: Detailed description of the methodology and criteria for location suitability

The deliverable is divided into three parts. First, an overview is provided about the initial situation at Central Prague WWTP (PCWTP), including the technological setup and its suitability. This is followed by an overview of the planned technological upgrade in the context of Reef2 W and the benefits accruing from it. The last part analyses the leading conditions including socio-economic and institutional aspects that qualified the WWTP for selection in Reef2W.

2. Initial Situation at the pilot site

The Central wastewater treatment plant Zagreb (CWWTZ) was completed in 2007 and counts as the first modern wastewater treatment plant (WWTP) in Zagreb. The WWTP complies with the environmental standards of the European Union in the field of environmental and water protection.

To date one of the main issues that CWWTZ is facing lies in the sustainable management of waste sludge. Sludge is currently landfilled at the location, total volumes of which measure up to approximately 50,000t per year on average. Of this approximately 30% is dry matter. In addition the municipality is in need to find a feasible solution for the treatment of collected bio-waste. At present bio-waste is partially collected from large producers. However the majority of produced bio-waste is not recycled since household bio-waste is not subject to separate collection; it is disposed off as a mixed stream at an adjacent landfill. Significant improvement is expected in the future due to the legal obligation to start the collection of bio-waste from households.

The CWWTZ provides its services to 790.017 inhabitants of Zagreb and is operated by Zagrebacke Otpadne Vode d.o.o (ZOV), a private company that implemented the plant on the basis of funding from the European reconstruction and development bank. The operation of the plant is undertaken by the ZOV for a duration of at least 28 years.

The CWWTZ uses mechanical and biological treatment (AD). So far the sewage sludge is not undergoing any further treatment, but is discharged at an on-site landfill.



(Source: www.zov-zagreb.hr/en/home/)

Energy consumption

Sludge stabilization is being performed throughout the anaerobic process of biogas production. During this process half of the organic component in the sludge is turned into biogas and water. The plant has four digesters for AD, with each having a volume of 8.840 m³. The daily energy output of produced biogas is 137.797 kWh/d. Its own biogas production covers more than 70% of the WWTP's electricity demand..

3. Technological Upgrade

Regarding the consideration of the REEF 2W technology, the main focus is on:

- utilization of bio-waste collected in the City of Zagreb;
- biogas upgrade to the quality of CNG;
- and sustainable solution for the produced sludge (Figure 1).

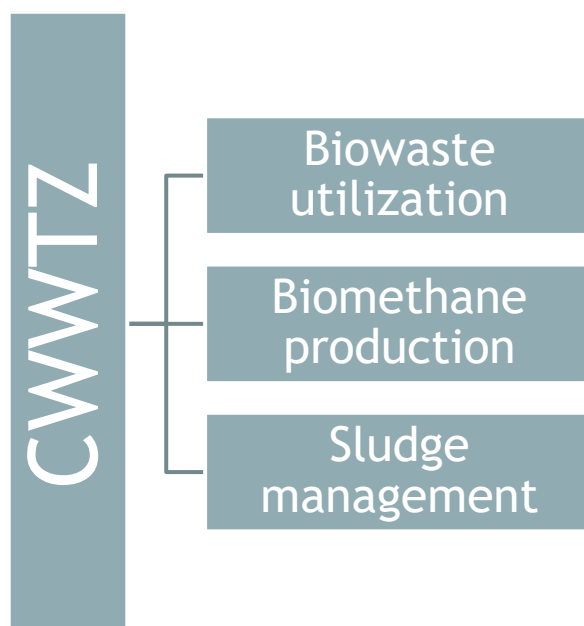


Figure 1: Proposed implementation of the REEF2W technologies in Zagreb

At the CWWTZ pilot site the implementation of a co-digestion plant is favoured.

To increase the biogas yield during anaerobic digestion bio-waste from the municipal solid waste collection is planned to be added to the sewage sludge. The biogas produced during AD shall then be upgraded into bio methane. The biomethane is subsequently planned to be injected into the natural gas grid, to which the plant lies in close proximity.

4. Expected Benefits

Efficient bio-waste use

City of Zagreb in January 2018 adopted the Decision on the manner of performing the public service of collecting mixed municipal waste and biodegradable municipal waste and services related to public service. This decision contained the obligation to start separate collection of biowaste within the city area.

Currently existing composting plants are not suitable for the treatment of bio-waste. The implementation of proposed REEF2W technology will hence be a significant benefit in order to treat separately collected bio-waste.

Reduced volumes of sludge

Total sludge disposal costs of large scale WWTPs such as the CWWTZ in Zagreb are approximately equal to personnel costs. The issue of final disposal of sludge at this site remains unsolved, which poses a big problem in the operation and maintenance of this plant. Therefore the treatment of the excess sludge by injection into a digester

stabilises the sludge, minimizes the digestate and facilitates the further deposition of the sludge. Next to that it decreases the financial burden for sludge disposal.

Increased energy yield

Co-digestion of bio-waste and wastewater sludge increases the biogas yield. Energy utilization of bio-waste will increase biogas production at the CWWTZ and therefore increase the total energy production at site. The utilization of biomethane as a biofuel will have additional benefits as well. It is especially interesting due to the fact that City of Zagreb, through its public transport company (ZET), already has a fleet of busses that are fuelled by CNG.

Lowering landfill pressure

Separate collection of bio-waste will divert biodegradable waste from the landfill, which helps the City of Zagreb to fulfil targets set by current legislation.

Employment market development

New jobs are created by building a new employment segment in the waste collection and waste water treatment sector.

Alternative to incineration

The REEF2Water technology offers an innovative alternative to waste incineration and fosters the separation of municipal solid waste. Separate collection will divert biodegradable waste from landfill and have positive impact on overall employment. This is a step towards more sustainable waste management as it allows waste recovery and recycling, as well as the preservation of the natural resources.

5. Key Selection Criteria

Technological setup:

At the pilot site, a multitude of technological conditions favour the implementation of REEF2W solutions. The WWTP uses state-of-the-art technologies, being the first one in Croatia to comply with EU standards in the field of environmental and water protection, as was more thoroughly described in D2.4.1.

The proposed location already serves as the city's wastewater treatment plant and has the initial infrastructure necessary for accepting a biogas and biomethane plant, both from logistical point of view.

Location

Several factors make the location of the Zagreb WWTP suitable. It is situated close to the city centre with good connections for transport of biowaste in the future. At the same time, it was built with sufficient distance to residential areas. Public opposition, for example arising from complaints about odour, is hence unlikely to occur. Another central advantage is that the city's main high-pressure natural gas pipeline passes right next to the plant, making future grid injection of biomethane possibly uncomplicated.

Suitable scale and substrate

As the biggest WWTP in Croatia, the CWWTZ collects wastewater from 790.017 citizens and is designed for treatment of approximately. one million people. The sludge being produced at the WWTP in combination with the prospective addition of bio-waste from the municipal solid waste collection ensures sufficient quantities of digestible substrate. The use of biomethane is especially interesting due to the fact that the City of Zagreb, through its public transport company (ZET), already has certain Compressed Natural Gas (CNG) fleet of buses.

Biowaste availability

During recent years, collected bio-waste volumes have been increasing constantly in Zagreb. Despite needed improvements, nowhere else in Croatia than in the capital is there a greater availability of bio-waste . Over the past five years various projects were prepared and actions conducted in Zagreb to improve biowaste collection in response to fulfilling the EU's targets on landfilled organic materials. The increased availability bio-waste also exerts pressure on regional and local governments to find disposal options for bio-waste, opening possible for co-fermentation in WWTPs.

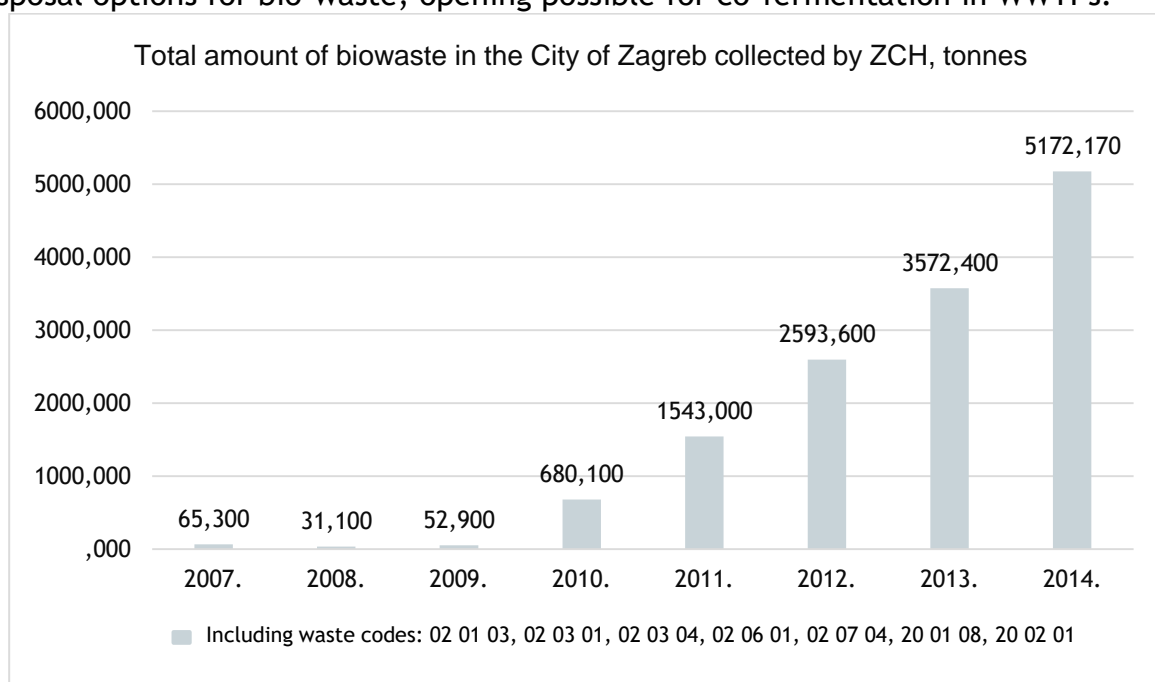


Figure 2: Increase of collected biowaste in the City of Zagreb (2007-2014)

Good basis for collaboration

The plant operator ZOV is largely owned by a consortium consisting of the German RWE Aqua GmbH and the Austrian WTE Wassertechnik. The collaboration with these internationally operating companies ensures necessary access to resources as well as a high level of skill and knowledge essential for the implementation of the technology and accurate maintenance. In addition the long-term agreement to operate the plant for 28 years enables the company and external investors to invest into long-term projects.