Interreg CENTRAL EUROPE European Union European Regional Development Fund

TAKING COOPERATION FORWARD

OUTPUT FACT SHEET

Pilot action (including investment, if applicable)

“ENERGY RECOVERY FROM THE LOW CALORIFIC FRACTION (LCF) OF A MECHANICAL WASTE TREATMENT PLANT”

Version 2

Project index number and acronym	CE1125CIRCE
Lead partner	ARPA VENETO
Output number and title	O.T3.3 Pilot actions to test the business model and quality standards verifications
Investment number and title (if applicable)	Not applicable
Responsible partner (PP name and number)	ATM, PP6
Project website	https://www.interreg-central.eu/Content.Node/CIRCE2020.html
Delivery date	02.2020

Summary description of the pilot action (including investment, if applicable) explaining its experimental nature and demonstration character

Pilot Case “ENERGY RECOVERY FROM THE LOW CALORIFIC FRACTION (LCF) OF A MECHANICAL WASTE TREATMENT PLANT”
This case study focuses on the low calorific fraction (LCF) as the output flow after shredding and sieving of residual waste at a mechanical waste treatment plant (MWTP). Currently, the LCF is transported for 300km to the nearest waste incineration plant (WIP). Incinerating the LCF is very energy intensive, as the waste flow is humid (<60% DM) and rich in organic matter (>45% of FM). Therefore, this case study aims at improving the environmental impact of transportation and the energy efficiency of processing this waste stream. For this reason, the LCF is intended to be further separated into fractions which can be either used as secondary raw materials or processed more sustainably.
To do so, a hydrocyclone was specifically designed and installed in a nearby waste water treatment plant. After adding water to the LCF (< 12 mm) the hydrocyclone processes an overflow and underflow consisting of two new outputs:

1. liquid fraction, rich in organic matter (overflow)
2. solid inert fraction containing glass, stones and sand (underflow).

The liquid fraction, rich in organic matter, was co-digested to produce heat and energy. The dewatered sewage sludge was separated into its components. The glass component can be recycled, and the remains (sand and stone) need to be transported to a landfill.

The pilot cases has experimental nature and demonstration character. A pilot plant test run with an existing pilot plant was performed and accompanied by lab analysis of the outputs and by-products.

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

The Austrian pilot region is the administrative province of Tyrol (NUTS 2 AT33, Figure 1), which has a population density of 59 inhabitants/km² (746,153 inhabitants; 12,640 km²). The strongest economic sector in respect to the economic output (gross value added) is the tertiary sector (services), with 70.5%, followed by the secondary sector (manufacturing), with 28.7%, and the primary sector (forestry and agriculture) with 0.8%.

Investment costs (EUR), if applicable

No investments were performed within the pilot actions But the LCC-study of the pilot action showed the following potential investments and costs to be expected when installing the technology at full scale.

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Investment costs at MT and WWTP

Item	Value	Unit
Investment at MT (AAG)	400,000	€
Investment at WWTP	500,000	€
Total investment	900,000	€
Depreciation period	10	a
annual costs (depreciation expense)	90,000	€/a
Investment costs	17	€/t

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

The expected impact of the Pilot Case "ENERGY RECOVERY FROM THE LOW CALORIFIC FRACTION (LCF) OF A MECHANICAL WASTE TREATMENT PLANT" are:

- ⇒ Creation of a regional loop for the organic fraction of the low calorific fraction (LCF) of a mechanical waste treatment plant within the pilot area, instead of exporting it to another federal state in Austria, where it is thermally treated
- ⇒ Substitution of source separated organic waste, which until now is used as co-substrate in WWTPs. These organic wastes would then be available for digestion and composting in a mono bio-waste treatment facility. Subsequently land application of the produced fertilizer, closing local nutrients and carbon loops is possible.
- ⇒ Increase of the regional overall biogas production potential, when the organic fraction of the LCF is used as an additional co-substrate in WWTPs
- ⇒ Enable glass recycling of the heavy fraction of the LCF, which currently ends in thermal treatment

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

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Concept and conclusions how the technology can affect the CE effect

1. Existing technology in the MWTP is applied to produce the input material: LCF < 12 mm
2. A newly developed hydrocyclone, based on existing technology but adapted to the specific technical requirements of the input material, will be used to produce an organic, liquid fraction, with a very low content of impurities and a sufficiently high biogas potential to make it suitable for co-digestion in WWTP reactors.
3. The (partial) substitution of source separated organic waste, until now used as co-substrate in WWTPs, is one of the expected outcomes. These organic wastes would then be available for anaerobic digestion and composting in a mono bio-waste treatment facility, and subsequent land application of the produced fertilizer, closing local nutrients and carbon loops.
4. Another expected outcome is the increased regional overall biogas production potential, when the organics content of the LCF is used as an additional co-substrate in WWTPs
5. The implementation of the CE-solution is realistic. Stakeholders are organized in a mutual effort to make waste and wastewater management and the respective treatment facilities more sustainable, thus contributing to the further development of a regional circular economy. This is supported by EU and country-specific legislation, including financial support for the development of respective R&D.

PP's opinion of the technology

Although the technology of the proposed CE-solution is promising, its success depends on the acceptance by the WWTPs' operators, and their cooperation. The results achieved with the technology until now are restricted to the physical composition of the potential co-substrate from MSW-LCF, which indeed has a very low impurity content. However, no reliable data on its biogas potential exist to date, particularly with regard to continuous digestion processes.

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

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Possible limiting factors

- Costs: Reliable data on costs and revenues not yet available.
- Degree of implementation at local scale: Project is scheduled to be implemented at local scale (date unknown)
- Other stakeholders involved: MWTP, WWTP, waste transport firms, local landfill.

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

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Local and national regulation

Waste water treatment plants that decide to (co-)ferment other substrates than sewage sludge need to fulfil certain legal requirements in Austria.

In the following, these requirements are described using the example of a Tyrolean waste water treatment plant that fulfils the legal requirements for co-fermentation and which is potentially interested in the substrate produced from the LCF of a mechanical waste treatment plant.

Example: Wastewater Association AIZ (Strass, Tyrol)

For the legal approval of co-fermentation, the AIZ Wastewater Association created a waste water and waste legislation project (for the Austrian legal regime). The corresponding permits according to water law, waste management law and according to the Animal Materials Act for 16 non-hazardous and suitable wastes (co-substrates) were issued. The respective wastes consist mainly of food and food leftovers, surplus food, biowastes from households, dairy wastes and mycelium wastes.

The hygienization of the co-substrates is performed according to the principles of the animal materials regulation (BGBl. 484/2008). The digestate is either composted in compliance with the relevant requirements of the Compost Ordinance (BGBl. 292/2001) and Chapter 4.3.2 of the "Guideline of the BMNT (former BMLFUW) on the state of the art of composting" or incinerated in a waste incineration plant. Both treatments are recognized as an equivalent processes for hygienization in Austria.

Source: http://www.kan.at/Kontext/WebService/SecureFileAccess.aspx?fileguid=%7Bbc36124d-d33c-4dfe-8b22-695fd5546871%7D (accessed on 5th of June 2019)

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
D.T2.2.3 Report of PEF-compliance environmental scenarios by using LCA tools D.T2.3.3 Report of mid-term economic scenarios to check profitability of new by-products markets D.T2.4.1 Matrix of concrete circular economy machtmakings within each industrial area D.T2.4.2 Analysis & interpretation and interpolation of remanufacturing donors & recipient companies D.T2.4.3 Design of the circular economy business model as driver for the pilot tests (AT3.2) for each area D.T3.2.1 Closing the loop & activation of secondary raw materal markets in the pilot areas D.T3.2.2 Pilot actions infographics (one per each waste/flow) D.T3.2.3 Report on implementation of the pilot actions D.T3.2.4 Checkup service for verification of quality standards of by-products D.T3.2.5 Performance Monitoring of pilot actions environmental & economic performance Wiki-page: https://www.circe2020-wiki.eu/

Annex

Infographic pilot action 1°