

Waste to energy – modern and small scale solutions

The Clinic Workshop on waste-to-energy solutions for municipalities
Online, 7-8 April 2022

Rafal Stanek
Environmental investment expert, WECCOOP



Funded by the
European Union

WECCOOP

EU – Central Asia Cooperation on
Water – Environment – Climate Change



This project is implemented by the consortium led by Stantec, with ELLE (Estonian, Latvian & Lithuanian Environment), ACTED, and KommunalKredit Public Consulting as the consortium partners.

Waste

Sorting, transport and storage

Waste to Energy conversion technologies

Thermal

Mechanical
& thermal

Thermo-chemical

Biochemical

Incineration

Pulverization
& drying

Gasification

Pyrolysis

Liquefaction

Fermentation

Anaerobic
digestion

Refuse
Derived Fuel
(RDF)

Syngas

Pyrolysis oil

Syngas

Ethanol

Biogas

Solid fuel

Liquid fuel

Gas fuel



Funded by the
European Union

WECCOOP

EU – Central Asia Cooperation on
Water – Environment – Climate Change



Stantec



ACTED



KOMMUNAL
KREDIT

This project is implemented by the consortium led by Stantec, with ELLE (Estonian, Latvian & Lithuanian Environment), ACTED, and KommunalKredit Public Consulting as the consortium partners.

Refuse Derived Fuel (RDF)

RDF is a solid fuel produced from the municipal solid waste, has higher calorific value than direct incineration of the waste.

RDF can replace other fuels in production of energy. RDF can be used locally (where produced) or transported to other places.

Examples:

- Sofia CHP (in construction) use nearby produced RDF from the municipal waste to replace natural gas to produce heat and electricity
- Planned RDF production in Lviv to be transported to cement factories to replace coal

Solid fuels from biodegradable waste

Materials for the production of the solid fuels from biodegradable waste

- vine-pruning
- hazelnut shells,
- fruit orchard pruning,
- sunflowers,
- wheat straw,
- bay-leaf,
- corn straw,
- waste from gardening or grass and leaves

Briquets or pellet production facilities

Production facility includes:

- initial grinding,
- **drying** (drum dryers),
- fine grinding,
- conditioning and granulating,
- cooling,
- granule cleaning,
- storage and packaging.



Location should be where there is a lot of residues

Pellet is sold on the market while special types of boilers shall be used for incineration

Incineration of biodegradable waste

Supply chain is needed:

- Collection and bailing,
- Transport from the field to storage facility,
- Further processing if needed: grinding, drying,
- Storage,

- Incineration.

Local (farm scale) incineration of biodegradable waste

In case of residues like wheat or corn straw, sunflowers and similar, farmers may use it to heat the local their houses.

The technology requires baling, storage and a boiler suitable to use this kind of residues.

Special boilers, generally with higher temperature of the incineration and reduction of the air pollution (Ecodesign). Efficiency improved from 40% in 70' to +80%



Funded by the
European Union

WE COOP

EU – Central Asia Cooperation on
Water – Environment – Climate Change



This project is implemented by the consortium led by Stantec, with ELLE (Estonian, Latvian & Lithuanian Environment), ACTED, and KommunalKredit Public Consulting as the consortium partners.

Local (farm scale) incineration of biodegradable waste

Larger farms use large boilers: 400-1000 kW, large bales and automatic feed of boiler and ash removal

Supply chain and incineration of biodegradable waste in public buildings (schools)

Example of Telavi in Georgia for use of vine pruning waste to heat schools.

District heating with straw

About 60 plants on straw in operation in Denmark, 0.5-12MW each

Power plants and CHP

Straw boiler

Straw boiler + wood chip boiler superheat

Fluid bed

Co-firing with coal (Denmark/straw, Italy/vine pruning)

Biogas from sewage sludge

Each wastewater treatment plant produces sewage sludge that is problematic. One solution is a fermentation process to produce biogas.



WECOOP

EU – Central Asia Cooperation on
Water – Environment – Climate Change



This project is implemented by the consortium led by Stantec, with ELLE (Estonian, Latvian & Lithuanian Environment), ACTED, and KommunalKredit Public Consulting as the consortium partners.

Landfill biogas

Capture of the landfill biogas. Existing landfills produce landfill biogas that contains 40-65% of methane. Captured can be used for production of heat and electricity.

Example: Radom in Poland in 90' started to capture biogas, currently the entire gas network consists of 50 wells with an average depth of 25 m each. The gas from the wells is collected through pipelines and led to the compression station through collecting stations. The capacity of the entire deposit is approx. 500 m³ of biogas per hour. The fuel travels through pipelines to the station, equipped with biogas suction devices and two power generators with a total electric power of 677 kW. As a result of electricity production, waste heat is generated, used for central heating and domestic water heating for the needs of the entire plant. The surpluses go to the nationwide power grid (annual production is 1.2 million kWh of energy on average).

Agricultural biogas

Biogas is produced from organic material in bioreactors that are used for anaerobic digestion.

It works well with many types of the biodegradable waste and fruit and vegetable wastes perfectly fits the requirements. Feedstock can be also organic residues from food production (peelings), food waste (overstored, expired, leftovers ...), liquid manure / slurry. After the digestion process, the digestate is reused as fertiliser for the crops. The bioreactor can work almost on continuously supply of the waste. Production of the biogas that can be utilized locally or mixed with the natural gas to ensure continuous supply.

Agricultural biogas

Materials for the production of biogas

Agricultural

animal excrements

energy crops

plant breeding waste

grass clippings and garden waste

food scraps

Industrial

food industry waste,

dairy,

sugar,

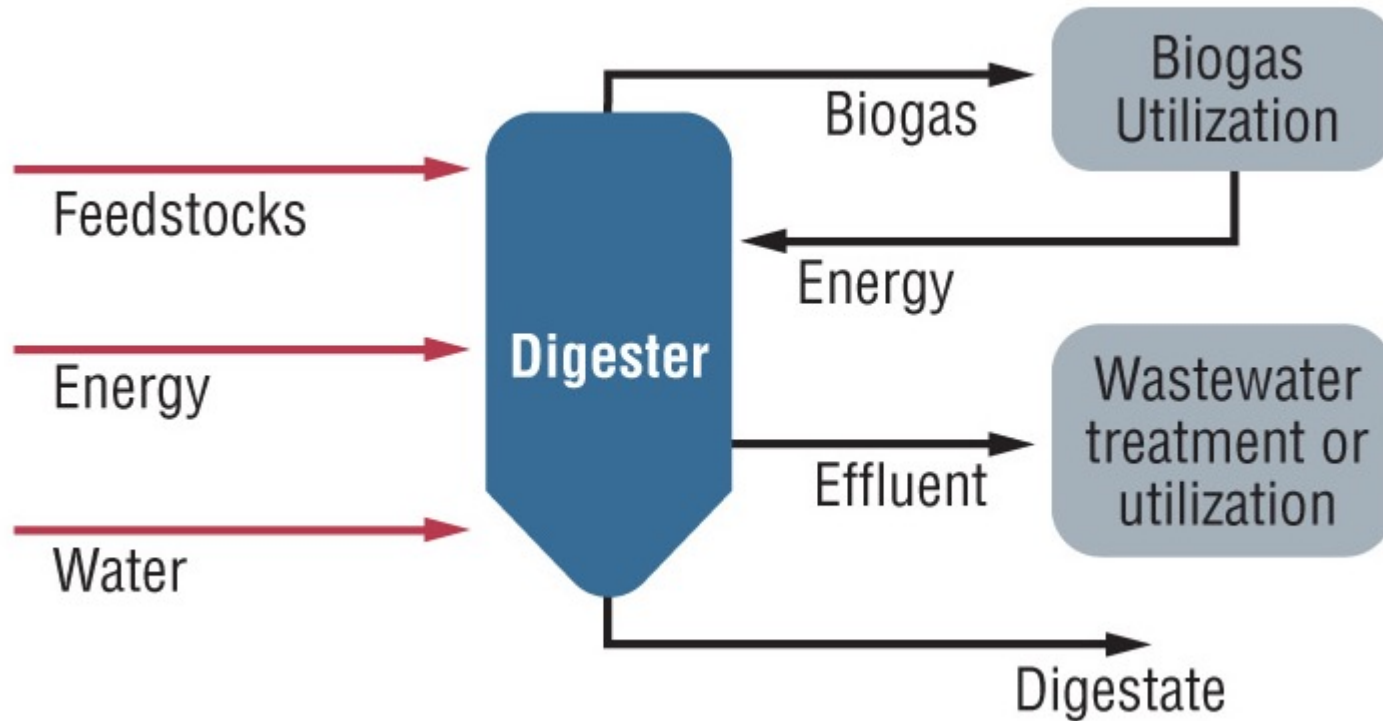
Cosmetic

biochemical,

meat,

etc.

Agricultural biogas



Straw and simmilar biodegradable waste in biogas production

About 10 biogas plants in Denmark is co-digesting straw and animal manure/slurry

Deep litter and poor quality straw can be used

Thank you!



Office 15
5 Dostyk street
Z05H9M1 Nur-Sultan, Kazakhstan
www.wecoop.eu
info@wecoop.eu

   @wecoopproject



Funded by the
European Union

WELOOP

EU – Central Asia Cooperation on
Water – Environment – Climate Change



This project is implemented by the consortium led by Stantec, with ELLE (Estonian, Latvian & Lithuanian Environment), ACTED, and KommunalKredit Public Consulting as the consortium partners.