Agricultural cooperative biogas plant

A partnership between the Theuma municipal government and the Theuma agricultural cooperative creates a supply chain of processing locally sourced agricultural residues into biogas. The biogas is utilized in combined-heat-and-power (CHP) units that are capable of producing an approximate annual output of 10,000 MWh of electricity and 10,000 MWh of heat. The created power derived from the biogas is sold to the municipality for use in the public electrical grid and Theuma's heating grid system (approx. 115 households, public buildings, and several small businesses).

The Theuma agricultural cooperative operates on approximately 1970 ha. and produces both livestock manure and crop silage that is collected in fermentation tanks, where bacterial decomposition allows for the collection of biogas (containing approx. 55% methane). The biogas is then burned according to demand either within the biogas plant or two satellite CHP units. The remaining organic and mineral waste material after biogas production is reutilized as an agricultural fertilizer.

Identified disadvantages of the operationalized biogas plant technology include large investment and maintenance costs, the requirement of trained personnel for operations and maintenance, and the lack of sustainability reward systems for biogas plants in electricity and heat markets.

Identified advantages of the operationalized biogas plant technology are focused on the creation of storable energy that is base-load capable (i.e., no fluctuations in energy generation), demand driven, CO_2 neutral, unsusceptible to outside influences, and decentralized and expandable through satellite CHP units.

Theuma Agricultural Cooperative Biogas Plant
(Photo: https://www.ag-theuma.de/)

KEY WORDS

Organic residue, biogas, electricity and heat production

COUNTRY

Germany

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ADDITIONAL INFORMATION

The implementation of regionally supplied biogas plants allows for small municipalities and enterprises to contribute to the decarbonization of heat and electricity production through a circular supply chain of biogas creation sourced from regional organic residues. The creation and operationalization of the biogas plant in the Theuma agricultural collective provides a model example for implementing the systematic steps necessary for small municipalities to transform their electricity and heating system towards biogas plants powered by regional agricultural waste.

Timeline of Biogas Plant Operation in Theuma Agricultural Cooperative

- 2006 - Agricultural Cooperative Theuma-Neuensalz biogas plant construction
- 2007 - Biogas district heating grid construction
- 2008 - Connection of first satellite CHP unit to district heating grid (Dorfgemeinschaftshaus / Village Community Center)
- 2009 - Connection of second satellite CHP unit to district heating grid (Schule/School)
- 2014 - Operationalization of wood chip drying plant, using waste heat from biogas plant

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ABOUT BRANCHES

BRANCHES is a H2020 "Coordination Support Action" project, that brings together 12 partners from 5 different countries. The overall objective of **BRANCHES** is to foster knowledge transfer and innovation in rural areas (agriculture and forestry), enhancing the viability and competitiveness of biomass supply chains and promoting innovative technologies, rural bioeconomy solutions and sustainable agricultural and forest management.

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THE PARTNERSHIP

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