BIOFIT

Bioenergy Retrofits for Europe's Industry

HORIZON 2020
BIOFIT PROJECT

SUIKER UNIE BIOETHANOL PLANT (GERMANY)

BEST PRACTICE FACTSHEET

KEY INFORMATION

Plant owner:	Suiker Unie GmbH & Co. KG
Plant name:	Zuckerfabrik Anklam
Location:	Anklam, Germany
Industry sector:	1st generation biofuels
Main product of plant:	Bioethanol and sugar
Retrofit measure:	Bolt-on of a biomethane production from residues of ethanol and sugar production
Beginning of retrofit:	2012
Start-up after retrofit:	2013
Capital Expenditure:	16 Million EUR

TECHNICAL DATA

	INITIAL STATE	AFTER RETROFIT
Capacity of main product (bioethanol – 1st generation biofuel) [tonnes/y]	52,000	52,000
Main feedstocks for 2nd generation biofuels	-	Vinasse and beet pulp
Capacity of 2nd generation biofuel plant (biomethane to grid) [million m^3/y]	0	13.8
Estimated annual GHG emissions [tCO_2eq]	Not available	Not available
Estimated annual specific GHG emissions [$tCO_2eq/(t_{main\ product})$]	Not available	Not available

INITIAL STATE

At Zuckerfabrik Anklam, sugar beet are processed into sugar and ethanol. For approximately 120 days after the beginning of the beet harvest, raw sugar juice can be extracted from the beet. The extracted sugar beet pulp can be used as feed, e.g as part of the diet of ruminants. In Anklam the raw juice is processed to sugar and, since the inauguration of the bioethanol plant in 2008, also partly to ethanol. Furthermore some of the sugar juice is evaporated to thick juice which can be stored and used for ethanol production after the beet processing campaign.

The ethanol is produced by fermentation of the sugar with yeast. From the resulting fermentation broth, pure ethanol (>99.5%) is separated by distillation and dehydration. Unconverted parts of the juice, yeast, by-products from fermentation, nutrients and water remain in the so called vinasse. This vinasse was originally evaporated and sold as an ingredient to feed formulations. It was blended into compound feed as an adhesive and to increase the protein content. In order to decrease the water content, the vinasse had to be evaporated significantly (to approximately 67% dry matter).

"Unfortunately, there are still too few natural gas filling stations in our region. We hope to gain additional momentum here through a current EU initiative with the aim of creating a Europe-wide network of filling stations and providing financial support for such projects."

Mathias Sauer, Suiker Unie, 2013

RETROFIT

MOTIVATION AND DECISION

Since the evaporation of vinasse is an energy intensive process and the beet pulp is available in large amounts at the sugar factory, alternatives for their efficient utilization were sought. A decision was taken to construct an industrial biogas in mesophilic operation plant with biogas upgrading and injection into the grid. Vinasse and beet pulp are mixed (approximately 22% dry matter) and fed to the digesters. The digestate can be used as a fertilizer.

PLANNING AND EXECUTION

At the beginning of the retrofit project, the German company Krieg & Fischer Ingenieure GmbH was contracted for the basic evaluation, pre-, draft-, approval and execution planning, tendering, and participating in the contract awarding process. Moreover the engineering company was responsible of the site management, project controlling, start-up and training of operators. The operation of the biogas plant started in 2013.

2008
START-UP OF ORIGINAL FACILITY

2012
START OF RETROFIT WORK

2013
RETROFITTED PLANT STARTS OPERATION

CURRENT STATE

The new plant integrates the following components into the existing structures of the bioethanol and sugar factory: four main digesters (enameled steel tanks 4 x 4,600 m^3), one secondary digester, a gas storage above the secondary digester, 2 high pressure water scrubbing units with heat recovery and gas injection, digestate treatment with a decanter for separating fermentation residues, emergency flare for combined combustion of biogas and biomethane.

The plant is operational and is currently listed with a feed in capacity of 2400 m^3/h (standard conditions) at www.biogaspartner.de. It is thus amongst the largest German biogas plants with gas upgrading and grid injection.

IMPACT

With biomethane, a new energy product is produced and generates income to the plant. Through the grid injection, biomethane can be stored and transported efficiently. Biomethane is also a very effective biofuel with high GHG-emission reduction. It can be used in all vehicles (trucks, cars, etc.) suitable for fueling on natural gas. As the energy demand for processing of the vinasse has been reduced significantly, the GHG-emissions attributed to the bioethanol production were reduced.

"We could not only supply the gas, but also convert from diesel-powered to gas-powered trucks for the transport of our sugar and sugar beet."

Mathias Sauer, Suiker Unie, 2013

SOURCES

https://www.agrarzeitung.de/nachrichten/wirtschaft/Anklam-feiert-doppelt-47992

https://www.kriegfischer.de/en/biogas-plants/references/europa/germany/anklam/

https://www.suikerunie.de/Standorte

http://www.biogaspartner.de/einspeiseatlas/

MORE INFORMATION ABOUT THE SUIKER UNIE PLANT

Website www.suikerunie.de Contact www.suikerunie.de/Kontakt.aspx

THE BIOFIT PROJECT

BIOFIT
Bioenergy Retrofits for Europe's Industry

This best practice factsheet was prepared within the BioFIT project.
The project aims to facilitate the introduction of bioenergy retrofitting in Europe's industry.
Target industries are

- First-generation biofuels
- Pulp and paper
- Fossil refineries
- Fossil firing power
- Combined Heat and Power (CHP)

Success factors of the best practice case studies are used as basis to develop **10 concrete bioenergy retrofitting proposals** (2 per industry sector) and to facilitate the two-way dialogue with industry in dedicated working groups. The overall target is to integrate bioenergy and biofuels in existing industrial installations and encourage others to follow the existing examples.

Project website https://www.biofit-h2020.eu Contact reumerman@btgworld.com

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