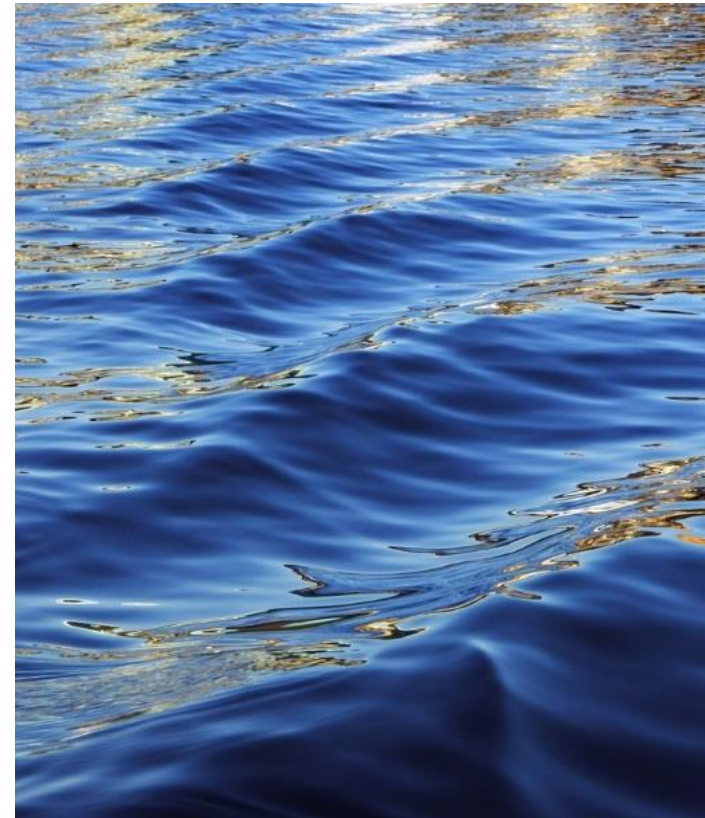


Äänekoski Biogas Production

Sludge from forest industry to biomethane

NBC 2016 7.9.2016



Bioproduct mill <http://bioproductmill.com>

- **Metsä Fibre**, which is part of Metsä Group, is building a new bioproduct mill in Äänekoski in Central Finland. With a value of EUR 1.2 billion, the bioproduct mill is the largest investment in the history of Finnish forest industry.
- The Äänekoski mill is the first next-generation bioproduct mill in the world. In addition to high-quality pulp, it will produce a broad range of bioproducts, such as tall oil, turpentine, lignin products, bioelectricity and wood fuel.
- Potential new products created from production side streams include product gas, sulphuric acid, textile fibres, biocomposites, fertilisers and biogas. The mill is designed to create a platform for a broad, diverse range of products manufactured by a unique bioeconomy ecosystem of companies.
- Its annual pulp production capacity is 1.3 million tonnes. The bioproduct mill will begin operations in the third quarter of 2017.

Biomethane production to fuel

EcoEnergy's investment is based on new thinking in bioeconomy

- Globally first of a kind biogas production plant in pulp and paper industry
 - Global industry – new possibility and solution for sludge processing
- Production is also suitable for municipal wastewater sludge and separately collected biowaste from the area nearby in middle Finland → gives logistics advantages as codigesting process.
- Biogas upgrading for fuel use to local cars & buses but also for transport in Biomill logistics – co-operation with Gasum
 - New filling station by the highway 4 – which is main route for south to north traffic in Finland
 - Biomill will bring 2500 jobs – large potential users also for biomethane, when commuting
- Biomethane use also in heavy transport as future option
 - LNG will enter in Finnish road transport by 2017 in Jyväskylä area
- Main target is to minimize the use of fossil fuels in Biomills logistic chain
- LBG/LNG market creates ground for BIO-SNG production in future

- EcoEnergy SF has same owners than Envor Protech Oy
 - Leading Finnish biogas technology know-how and operation experience
 - Several referencess in Finland and abroad
- Managing director and project manager Tero Mäki
- Chairman Mika Laine
- Jobs during the consruction and mechanical work 60-80 man-year
- Operational jobs 12-16 man-year
- Preparatory work of biogas project was started at the beginning of 2014
 - During the preparatory work many things were done: long term laboratory-scale test-runs with the sludges from forest industry, finding the right process solutions and running parameters
 - Significant product development within Tekes project
 - The design of the plant was carried out during the year 2015
 - Construction work has started and the biogas plant will be completed during the spring of 2017

Biogas production possible steps in Äänekoski

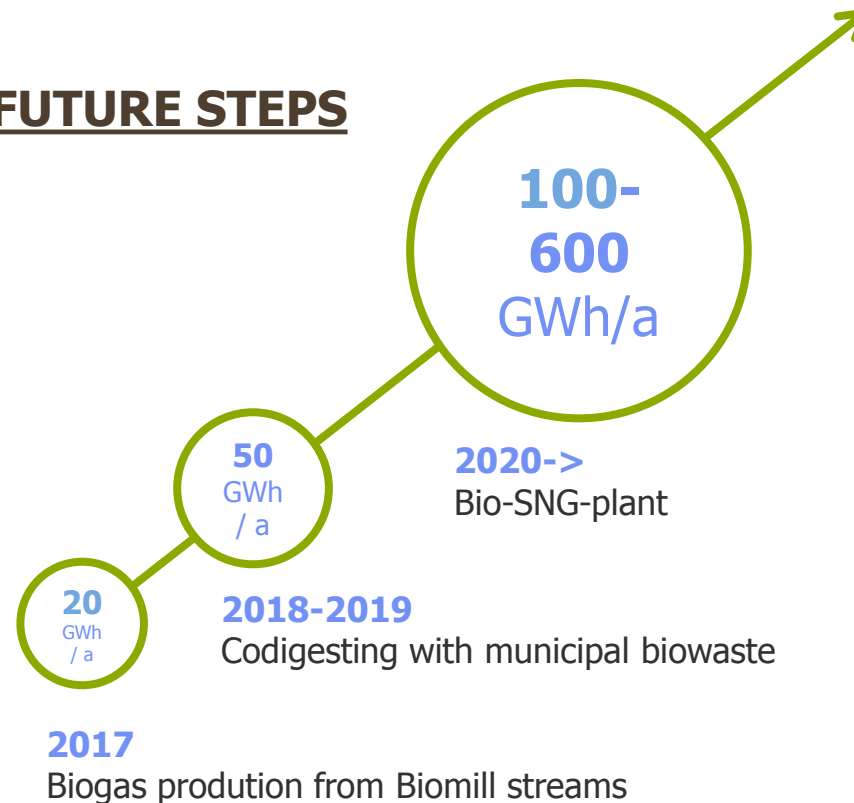
PLANNING CRITERION, Feeds

Operating hours 24/7 – 365 d/y

Wet slurries from Biomills production

- fiberslurry; 5 tTS/d (4 %TS, 64 %VS)
- bioslurry; 25 tTS/d (2 %TS, 81 %VS)
- chem.slurry; 15 tTS/d (2 %TS, 60 %VS)
- fibre clay; 8 tTS/d (25 %TS, 52%VS)
- weighted design value; 2,47 %TS
- design quantities and values;
 - a) Total solids: 53 tTS/d
 - b) Total sludge feed: 2158 m³/d
 - c) Temperature of the sludge; 30 °C

FUTURE STEPS



PLANNING, ENERGYbalance

- Produced biogas
 - ❑ 3 703 735 Nm³/a
 - ❑ 431 m³/h
 - ❑ 4 482 t/a (CH₄-pit, 65 %)
- The energy content of the biogas
 - ❑ calorific value; 6,5 kWh/Nm³
 - ❑ energy value; 24 074 MWh/a
 - ❑ Average power value; 2,75 MW
- Process heat
 - ❑ heating the feed; 1 597 MWh/a
 - ❑ hyginisation; 1 640 MWh/a
 - ❑ share of the biogas energy value; aprx. 13 %
- Electricity used in the process and plant
 - ❑ connected load; n. 1,3 MW
 - ❑ electricity consumption; n. 4 600 MWh/a
 - ❑ share of the biogas energy value; aprx. 19 %



Solid biofuel production and use

Solid biofuel for the power plants which can use solid fuels

- Brand new renewable fuel which can replace coal and oil
- Sludges from forest industry contains lignin – doesn't decompose totally in the biogas process – can be exploited in industry
- Digestate from the biogas process is dried so that the energy value of the solid fuel increases significantly. Solid biofuel is a ready product which meets all the quality and technical demands of the solid fuel. The biofuel can be used in the power plants which can use solid fuels.
- Digestate from the biogas plant can also be used as a organic fertilizer



Thank you!

