

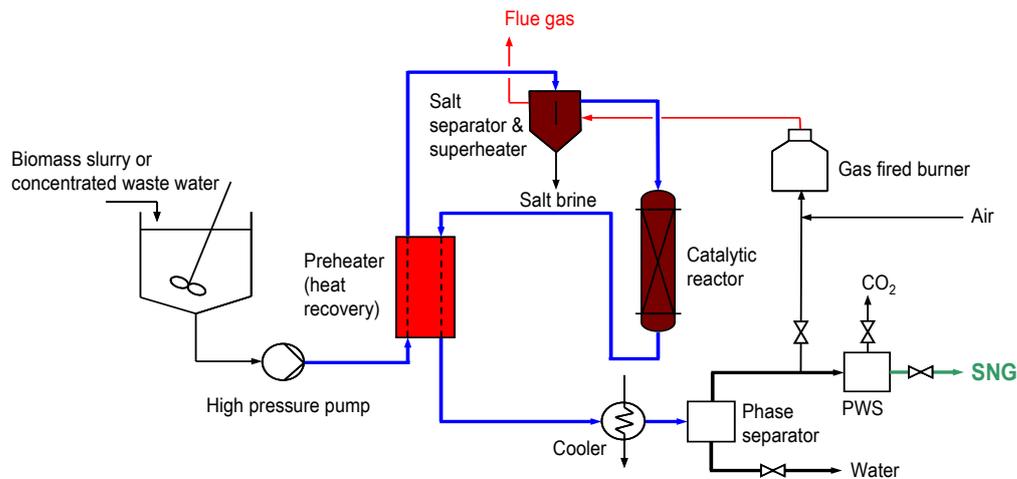
Production of synthetic natural gas from organic residues – the next generation biogas technology

Adds value to every biofuel plant



Technology

- Catalytic high pressure gasification and methanation in an aqueous (hydrothermal) phase at approx. 300 bar and 400°C.
- On-line separation of nutrient salts by a proprietary process design.
- High thermal process efficiency (biomass to methane) of 60-70%.
- Methane can be obtained directly at a high pressure (up to ca. 280 bar).
- Prerequisites: the feed must be pumpable and it must contain a minimum of 10 wt% of organics.



Simplified process schematic (PWS: pressurized water scrubbing, SNG: synthetic natural gas)

Applications

- Valorization of the crude glycerol from the production of biodiesel without the need for a distillation.
- Heavily polluted (tar-containing) waste water from thermochemical conversion and synthesis processes (pyrolysis, Fischer-Tropsch, methanol, DME, etc.). Indicatory values: TOC > 50 g/L, COD > 130 g/L.
- Valorization of press water from anaerobic digestion with full recovery of nutrient salts.
- Valorization of distillers' grains and solubles (DDGS) from the production of bioethanol. No need for drying the DDGS.
- The plant size can be designed to meet specific requirements in the range of ca. 2-20 MW (feed capacity).
- Outlets for the methane: feed-in to the local pipeline, local conversion to electricity, filling into gas cylinders, or local sale at a CNG filling station.

In a second development phase the process will be adapted to handle more difficult biomasses such as manure, sewage sludge, residues from wood processing, food and meat production, etc.

Added values

Credo: Instead of treating and disposing of a waste stream from the production of biofuels \Rightarrow production of additional valuable products

- Energy: methane as an additional, high quality and clean energy carrier, produced in a CO₂-neutral way.
- The thermal process efficiency from biomass to methane is in the range of 60 to 70%. In other words: per kg of organic dry matter fed ca. 0.25 kg of methane can be produced.

Example: for every ton of biodiesel (xME) an additional 36 m_n³ (363 kWh) of methane can be produced from the crude glycerol.

- Nutrients: Additionally, a concentrated nutrient solution can be obtained. Nitrogen compounds are converted to ammonium salts (no loss of nitrogen).
- This technology converts also non-fermentable organic fractions completely.

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Intellectual Property & Licensing

PSI has filed a patent for their catalytic hydrothermal gasification technology for wet biomass. The patent application number is EP 05 021 601.9 (October 4, 2005) for the priority application, and PCT/EP 2006/005837 (June 19, 2006) for the international application. As of April 2008, the following regional and national patents have been applied for: Europe (EP), USA, Brazil, Canada, China, and Japan.

PSI has licenced the Intellectual Property Rights to Hydromethan AG. They will implement the technology and realise such facilities. In order to contribute to and safeguard the technology and the know-how transfer, PSI is as shareholder obliged to support the testing and commissioning as described above with accompanying R&D activities within the scope of corresponding projects.

