Ex-situ Biological Syngas Methanation

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innovations in the BIOMETHANE uniVERSE

Brief description of the site

Demonstration site

The demonstration site is an existing 6 MW gasification plant, owned by the company **Cortus Energy**.

- Raw material: wood chips
- Unique gasification technology
- Ultra-pure syngas without costly gas purification

The demonstration plant location is in direct connection to the Cortus facility.

Location of demonstration site: Höganäs, Sweden

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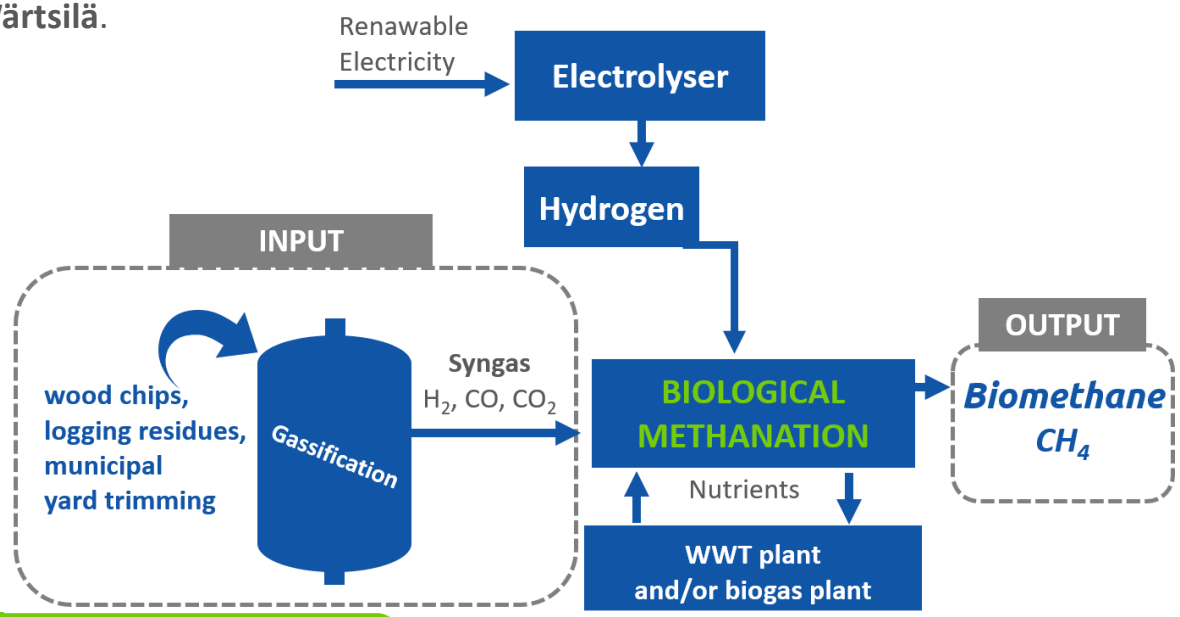
Description of innovative technology

Ex-Situ Syngas Biological methanation (ESB)

The ESB demo will:

- produce biomethane without using conventional upgrading technology, through biological methanation of syngas with addition of external hydrogen.
- combine thermo-electro and biochemistry to reach the right final product.
- increase methane yield (e-methane from CO2-H2 methanation)

The demonstration plant for this technology is containerized and fully mobile, built and operated by **RISE** and **Wärtsilä**.



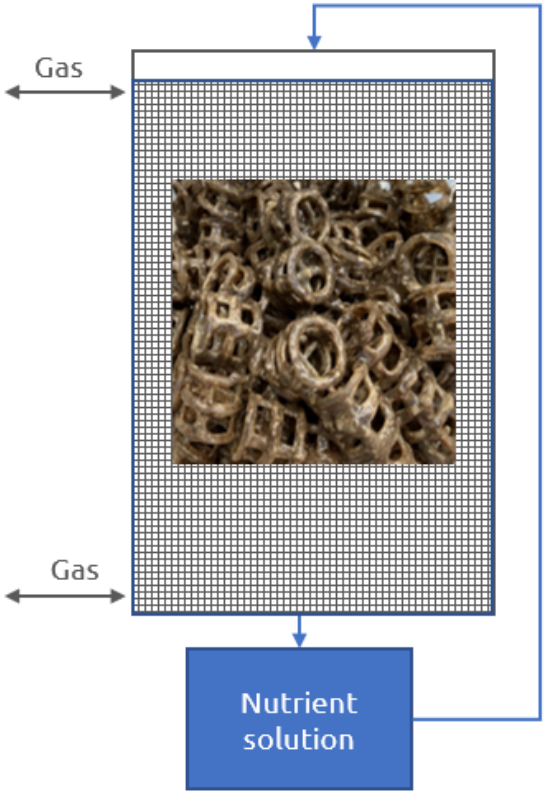


Figure: Tricle Bed Reactor (TBR)

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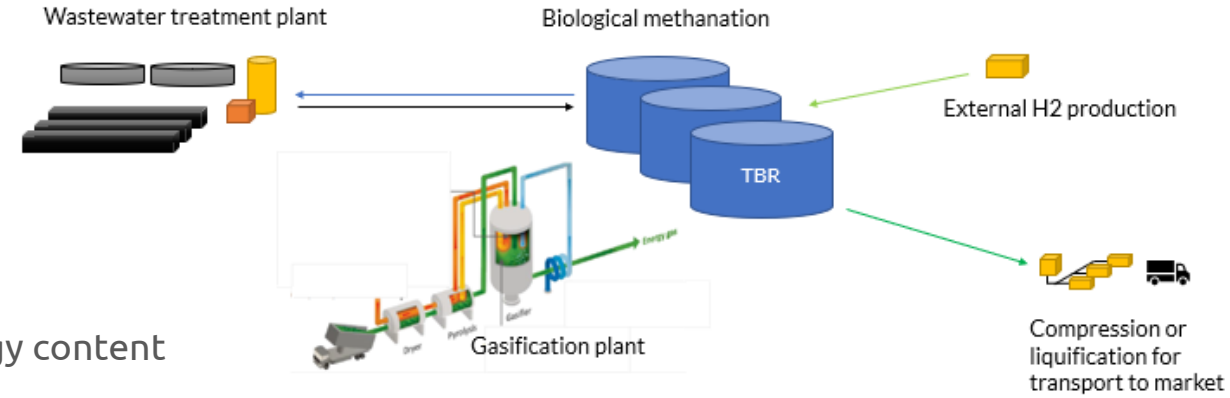
Challenges and criticalities of technology

Syngas

- Multiple applications for syngas (on-site user, catalytic methanation, methanol, H2, aviation fuel)
- The EU approach to biomass use

Methanation

- Maintaining performance of the bed
  - During sale-up
  - Over time



System perspective

- Difficult to generalize, no generic syngas plant
  => no generic system design
  - Different syngas content and different energy content
  - Different amount of impurities
- Geographic location matters

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What done so far

- Lab scale experimental campaign
- Design and building of demo plant
- Testing and adjustments
- Preparation of site and installations to accommodate demo plant
- Shipping demo plant to demonstration site
- Commissioning

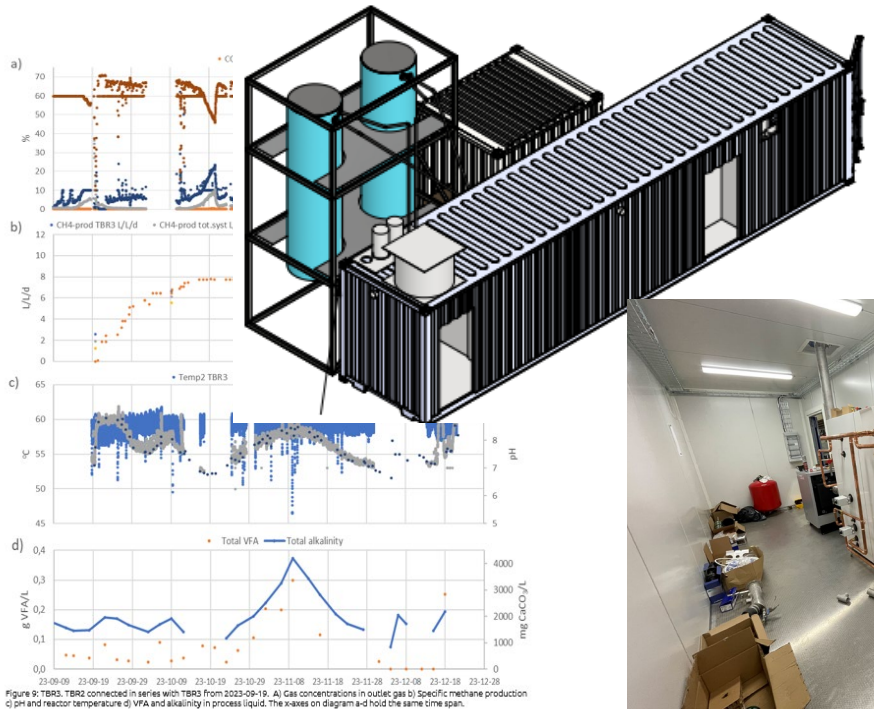
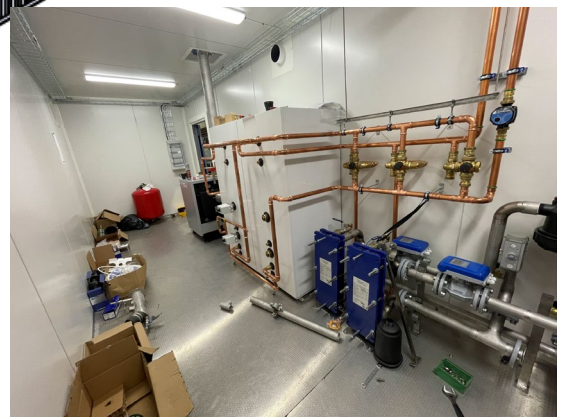


Figure 9: TBR3, TBR2 connected in series with TBR3 from 2023-09-19. A) Gas concentrations in outlet gas b) Specific methane production c) pH and reactor temperature d) VFA and alkalinity in process liquid. The x-axes on diagram a-d hold the same time span.



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Future activities

- Building electrolyzer system
  - Initial testing, transportation to site and commissioning
- Continue operating the plant
  - Syngas conversion in first phase
  - H2-boost in second phase

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