Ex-situ Biological Syngas Methanation

Karin Berg, RISE

Sweden

4th Consortium Meeting
Thessaloniki, 2024-06-19

Co-funded by
the European Union

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**.

- 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

Co-funded by the European Union

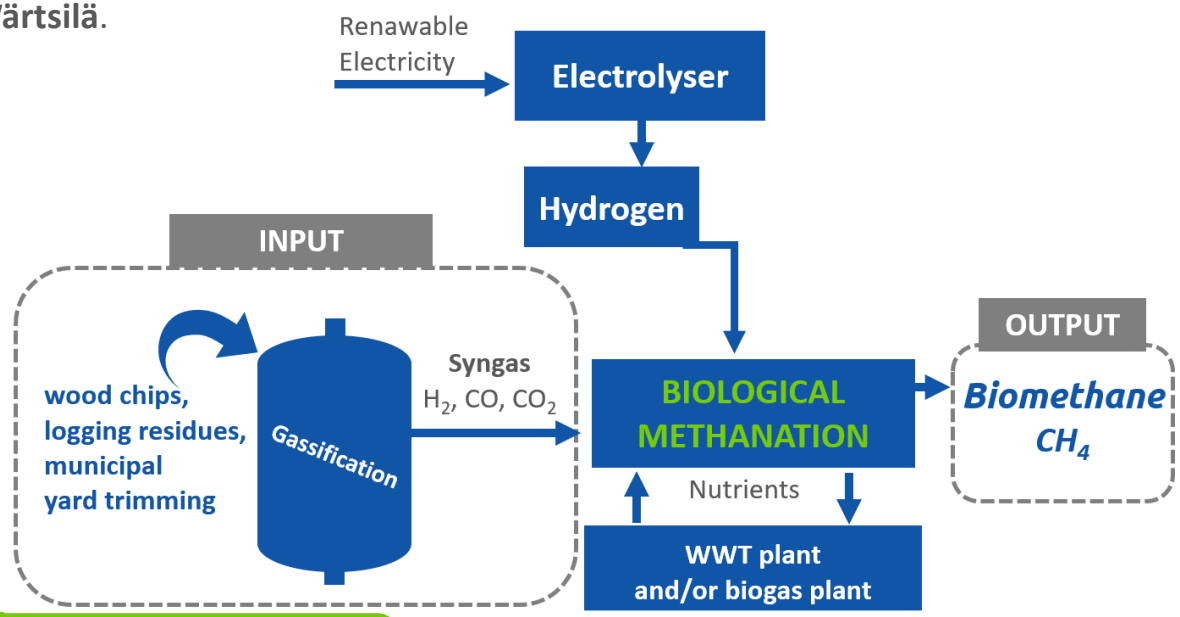
Description of innovative technology

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**.



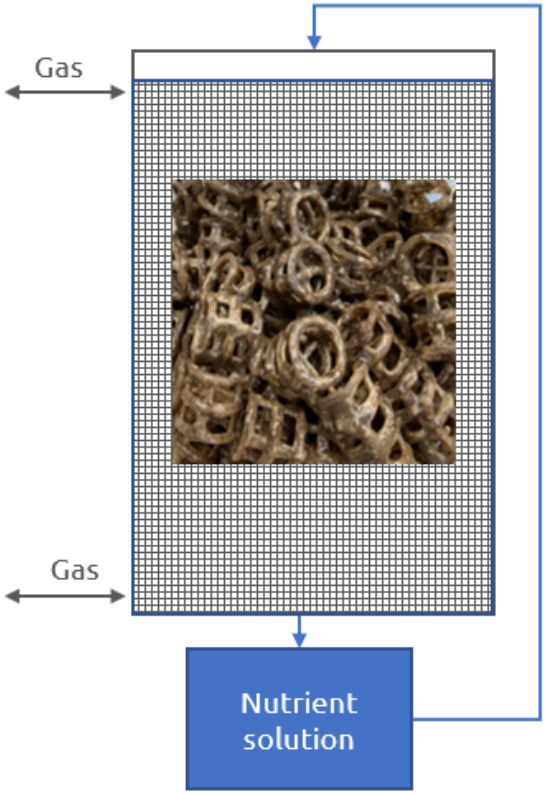


Figure: Tricle Bed Reactor (TBR)

Co-funded by the European Union

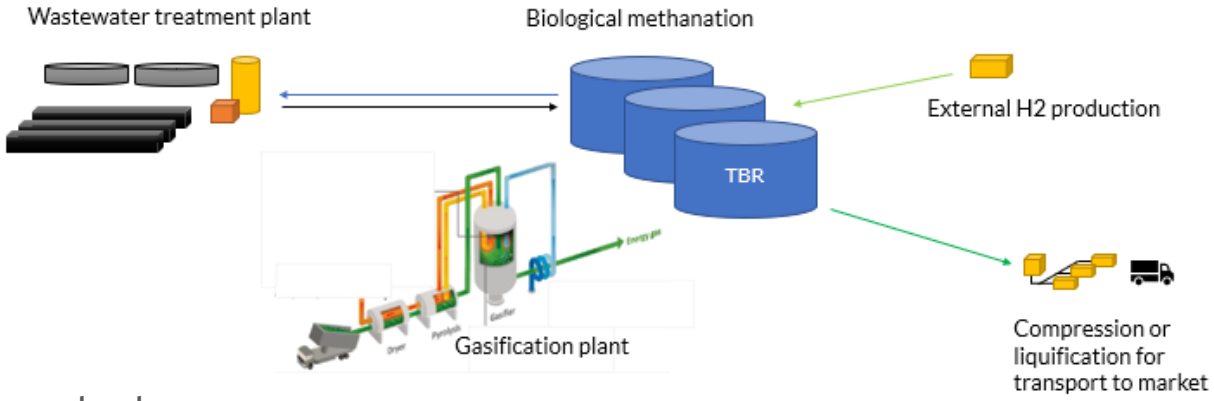
Challenges and criticalities of technology

Syngas

- Multiple applications for syngas (on-site user, catalytic methanation, methanol, H2, aviation fuel)
- In competition with other technologies pathways for the syngas
- 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

Co-funded by
the European Union

What done so far

- Lab scale experimental campaign
- Data collection from 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

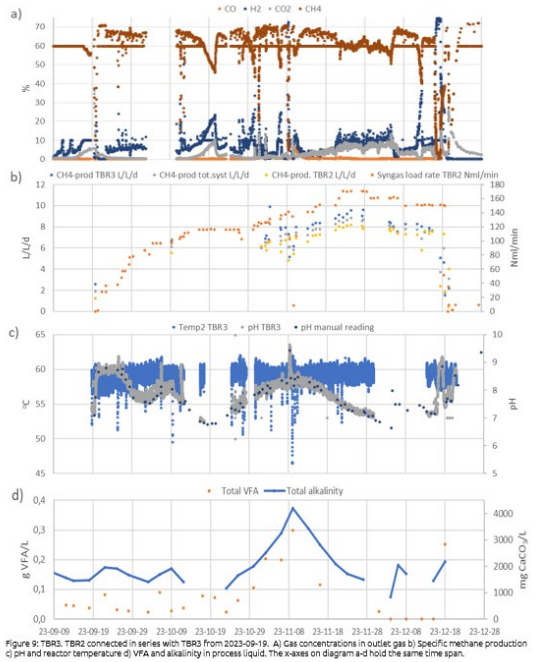
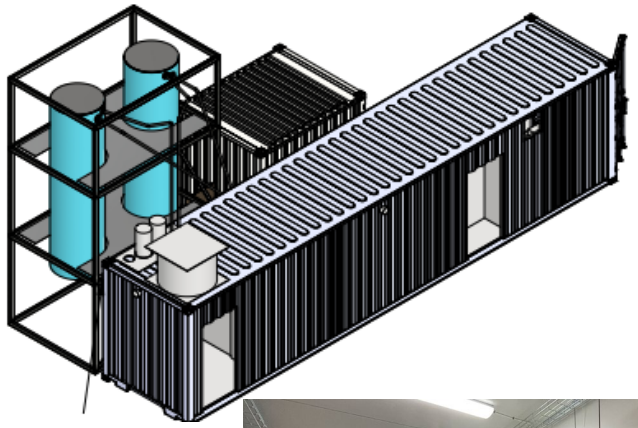


Figure 9: TBR3, TBR2 connected in series with TBR3 from 2023-09-19. A) Gas concentrations in outlet gas b) Specific methane production c) pH and reactor temperature d) VFA and alkalinity in process liquid. The x-axes on diagram a-d hold the same time span.



Co-funded by
the European Union

Future activities

- Site commissioning and start up
- Building the “electrolyzer and H2 system” part of the testbed
- Steady state trials and demonstration run
- Data collection from pilot scale experiments
- **The Swedish Gas Association** will be working on the groundworks for supporting policy.

Co-funded by
the European Union

#Biomethaverse

Thank you!

Follow Biomethaverse:

www.biomethaverse.eu

@European_Biogas

@European Biogas Association

Contact: Karin Berg, RISE
Email: karin.berg@ri.se

Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

Co-funded by
the European Union