

Development of a biogas-based power to methane technology



Ph.D. student: Brian D. Jønson | Supervisor: Jin Mi Triolo

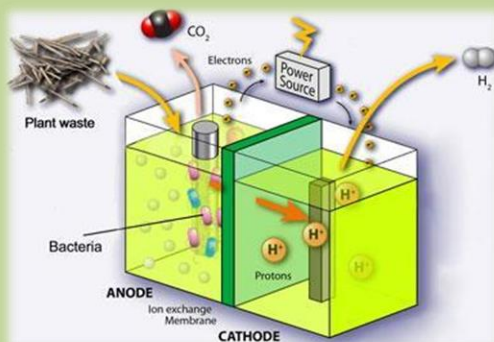
Background for the project

With the increased focus on renewable energy, the European union has stated energy strategies which sets the goal for 2050 to be 80-85% reducing in greenhouse gas emissions. With these strategies, the focus and production of renewable energy have increased. Two of the renewable energies which are in focus are wind power and biogas. The challenge with wind power is the production of electricity, which is hard to store when producing large amounts in excess. This challenge can be overcome by power-to-gas technology, which utilizes the electricity, i.e. in electrolysis – where the electricity is used to produce H_2 . This H_2 can then be utilized in different ways, one way could be biomethanation with a biotrickling filter.

The advantage with biogas is the ability to store the methane after upgrading. But conventional biogas upgrading methods do not utilize the full potential of the biogas. Novel technologies, such as biomethanation and the usage of algae, will utilize the CO_2 and produce more CH_4 . This will increase the yield and also make biogas production CO_2 negative.

Motivation for the project

Power to methane technologies, e.g. biomethanation in a biotrickling filter, are technologies that will support the energy strategies by utilizing the CO_2 available in the world. Technologies like this will help utilizing the green electricity that is in excess. Other technologies to utilize the CO_2 will also help boost the renewable energies.



Microbial Electrolysis Cell. Source: www.chemistryworld.com

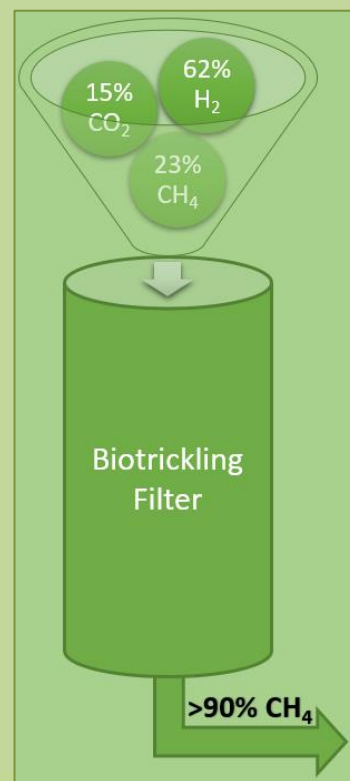


Illustration of Biotrickling Filter

Overall objective of the project

The aim for this Ph.D. is to develop a package which can help upscaling a biotrickling filter from lab-scale to full-scale. This method will provide knowledge about the gaps that exist in upscaling to full-scale. Other power-to-gas methods, such as Microbial Electrolysis Cell (illustrated above), could be investigated to see if they can be implementable with the biotrickling filter.

Specific objective

- Development and testing of lab-scale reactors
- Operation and assessment of pilot scale reactors
- Investigation of other power-to-gas methods