Power to Methane

WP2/3: A promising new method for hydrogen delivery to methanogens results in more methane from biomass

Gert Hofstede, Emile Apol, Ronald Wedema, Hans Banning, Jeroen Tideman, Folkert Faber (WPL) and Jan Peter Nap

Excess of renewable electricity from wind turbines or solar panels is used for electrolysis of water. To store this renewable energy as methane, the hydrogen is fed to an anaerobic digester to stimulate biological methanation by hydrogenotrophic methanogens. This workpackage focusses on the best ways for hydrogen delivery and the community changes in a biomethanation reactor as a result of hydrogen supply.

Biological Power to Methane is based on the ability of microorganisms to make methane from (renewable) hydrogen and carbon dioxide (Figure 1).

Results

The addition of hydrogen biogas resulted in both set-ups in more methane per unit biomass (Figure 3 in situ).

In both reactor setups the innovative use of high permeable silicone tubing resulted in sufficient diffusion and hydrogen solubilisation to convert it with carbon dioxide in methane. Adding hydrogen to an experimental reactor (in situ) is therefore attractive.

Future activities

- Taqman assay to study the effects of hydrogen supply on the microbial community
- Scaling up (WP5)
- Further comparison in situ and ex situ