

Power-to-Methane

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“Power-to-Methane” is the conversion of intermittent renewable electricity into methane.

The objectives are:

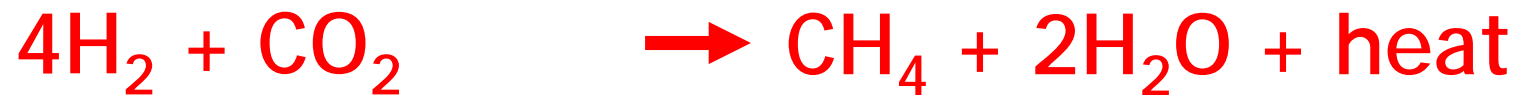
- to contribute to decarbonising the gas grid; and
- to enable increasing roll-out of wind and solar energy by using the gas grid for energy storage.

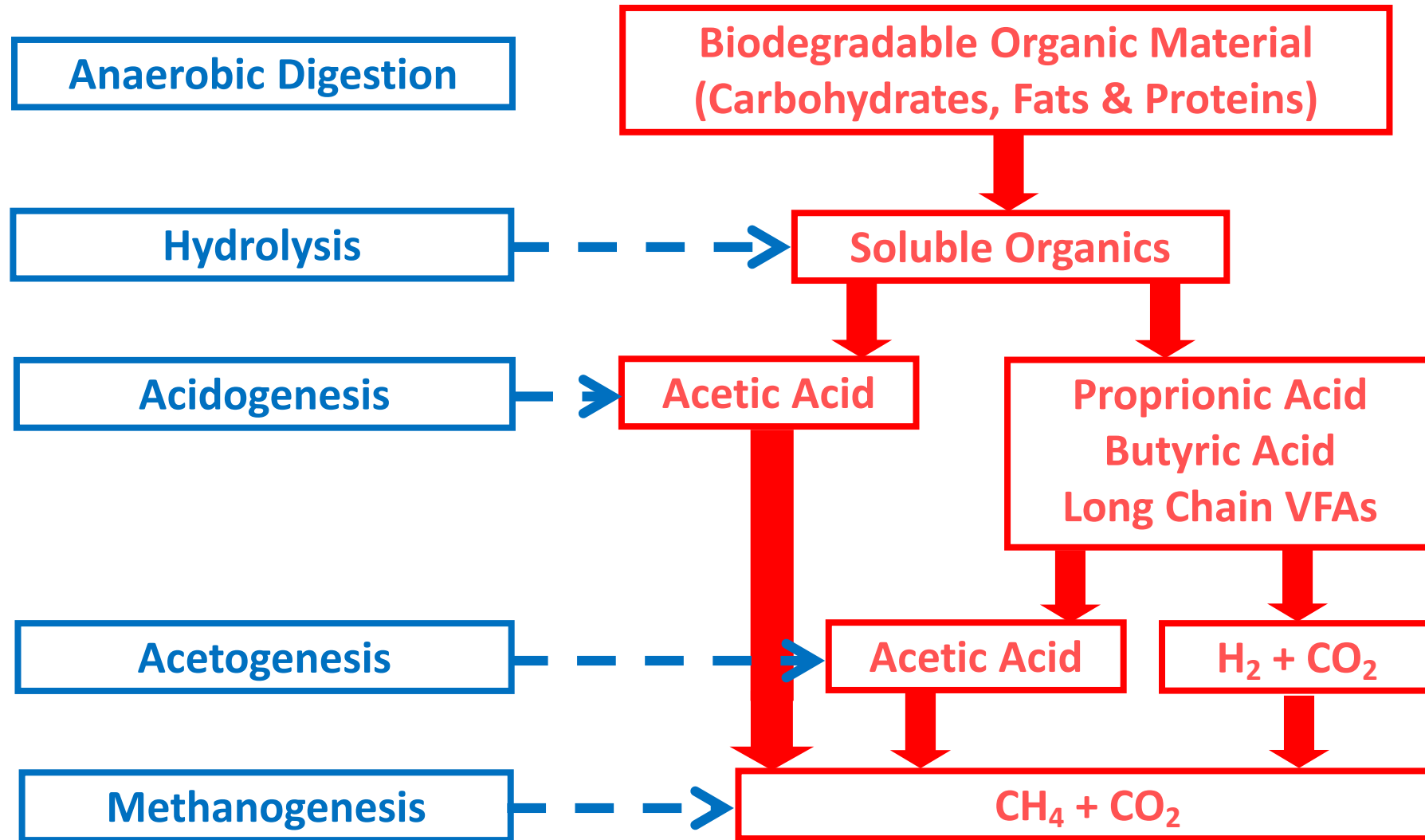
P₂M has two process steps:

- The electrolysis of water to hydrogen and oxygen.



- The biomethanation of hydrogen and carbon dioxide to methane.

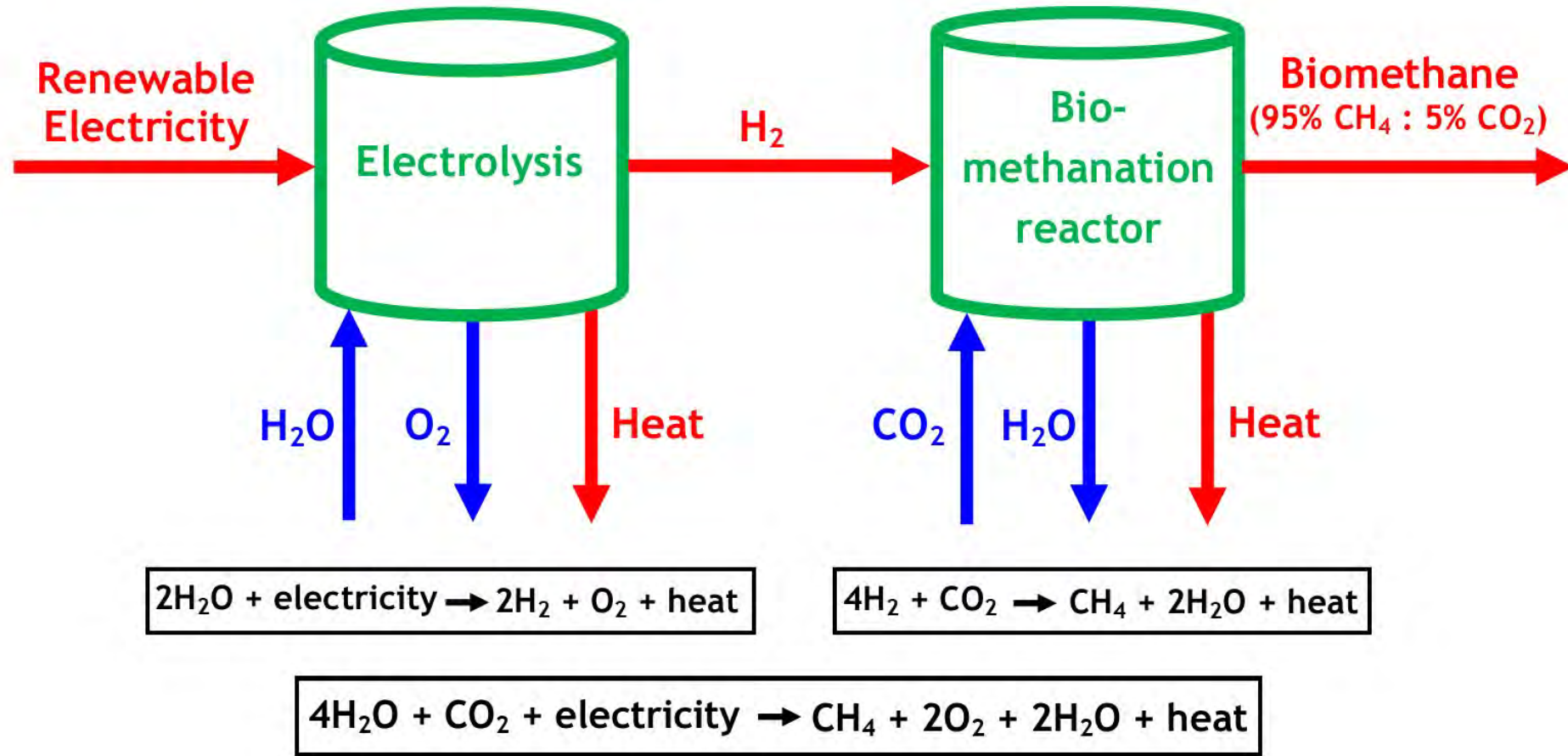




There are two alternative methods for biomethanation:

- “Ex-situ” biomethanation:- the injection of hydrogen and carbon dioxide into a high-rate anaerobic reactor populated with hydrogenotrophic microbes; or
- “In-situ” biomethanation:- the injection of hydrogen into a working digester.

Power-to-Methane (“ex-situ”)



MicrobEnergy (part of the Viessmann Group)

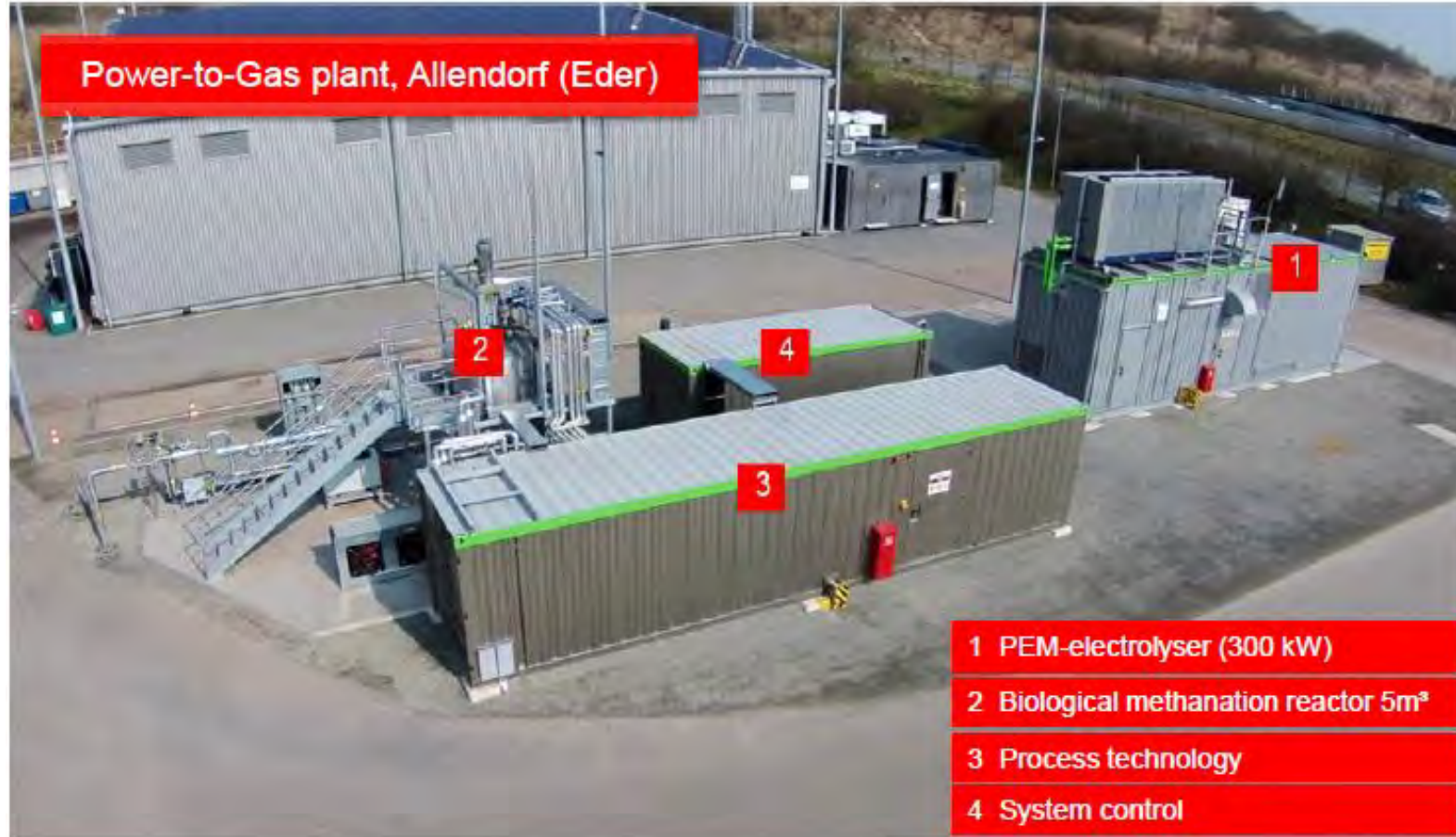


Microorganisms (archaea) in watery ambience (40-70°C)

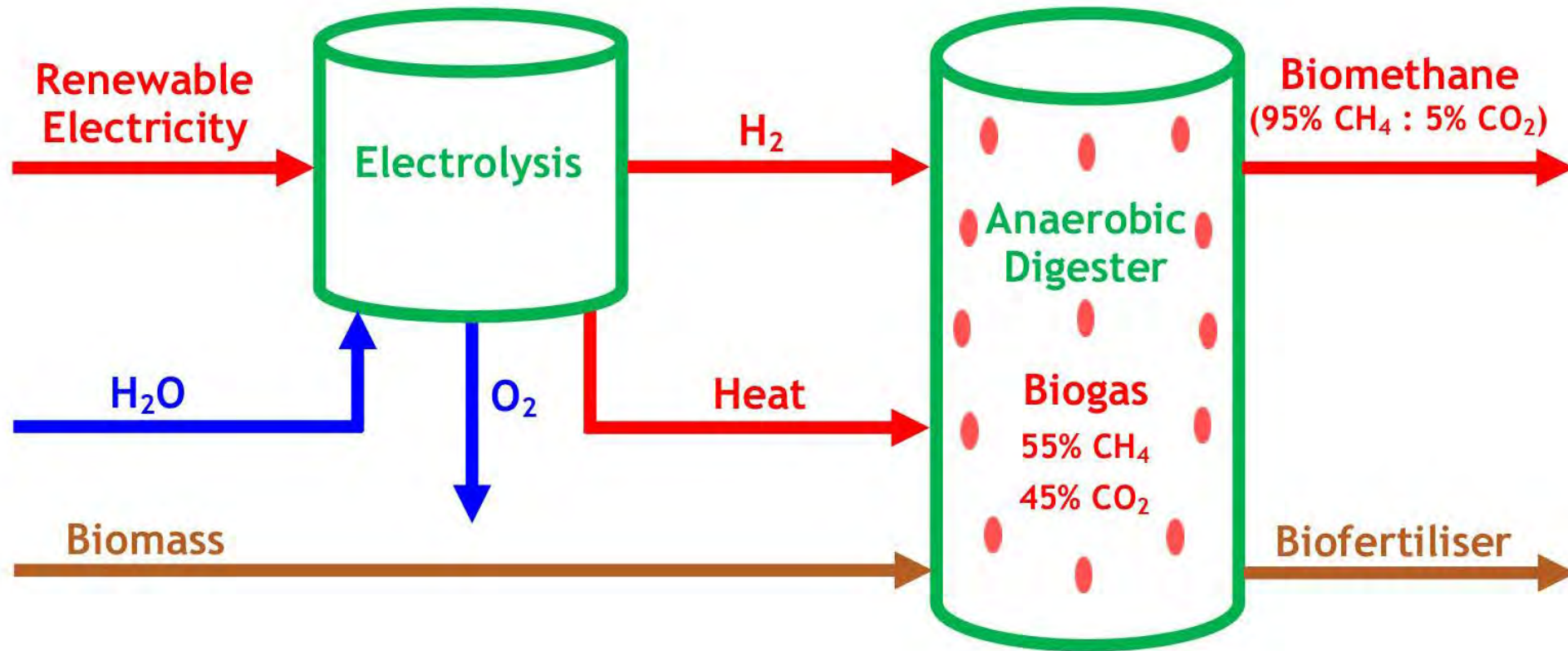


- CH₄-level > 98 %
- High tolerance in purity of input gas
- Fast and flexible load cycles
- Low temperature & low pressure
- Small units – decentralised use possible

MicrobEnergy Allendorf Demonstration Plant

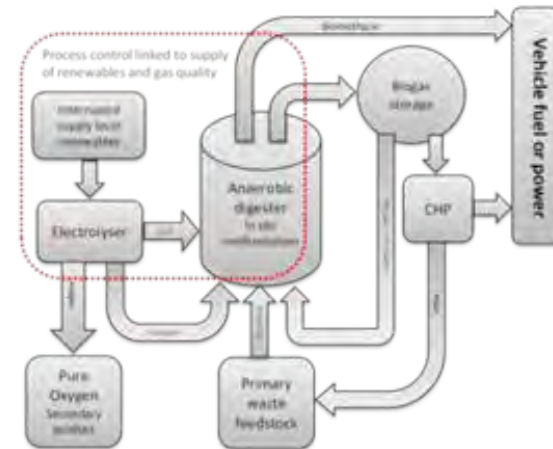


Power-to-Methane (“in-situ”)



IBCat H₂AD

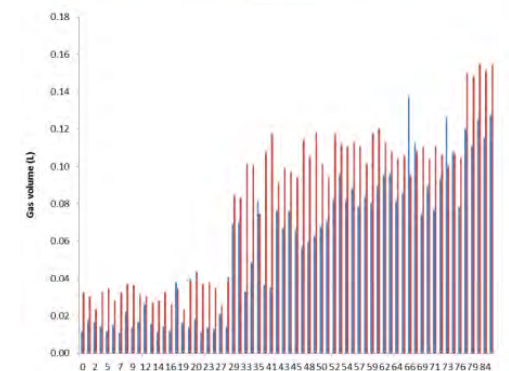
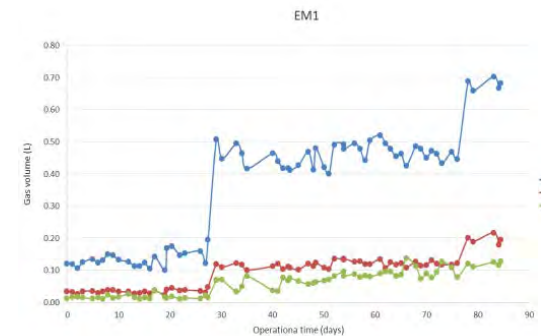
- Industrial Biotechnology Catalyst project, £2.3m, 2015-2019.
- Coordinator - University of Southampton.
- University partners - Sheffield and York.
- Industrial partners - United Utilities, ITM Power and Lutra.



In situ configuration e.g. on farm use

IBCat H₂AD

- Laboratory studies to optimise operation of in-situ and ex-situ biomethanation;
- Advanced genomics studies to map microbe community structure changes and functionality;
- Process optimisation and modelling P₂M scenarios in conjunction with industrial partners to develop economic projections;



Lutra H₂AD In-Situ Pilot Project

- 1500-litre pilot AD plant;
- Feedstock:- cow slurry;
- Hydrogen injection to commence in May 2018;
- Objective:- to produce biogas @90 to 95% CH₄.

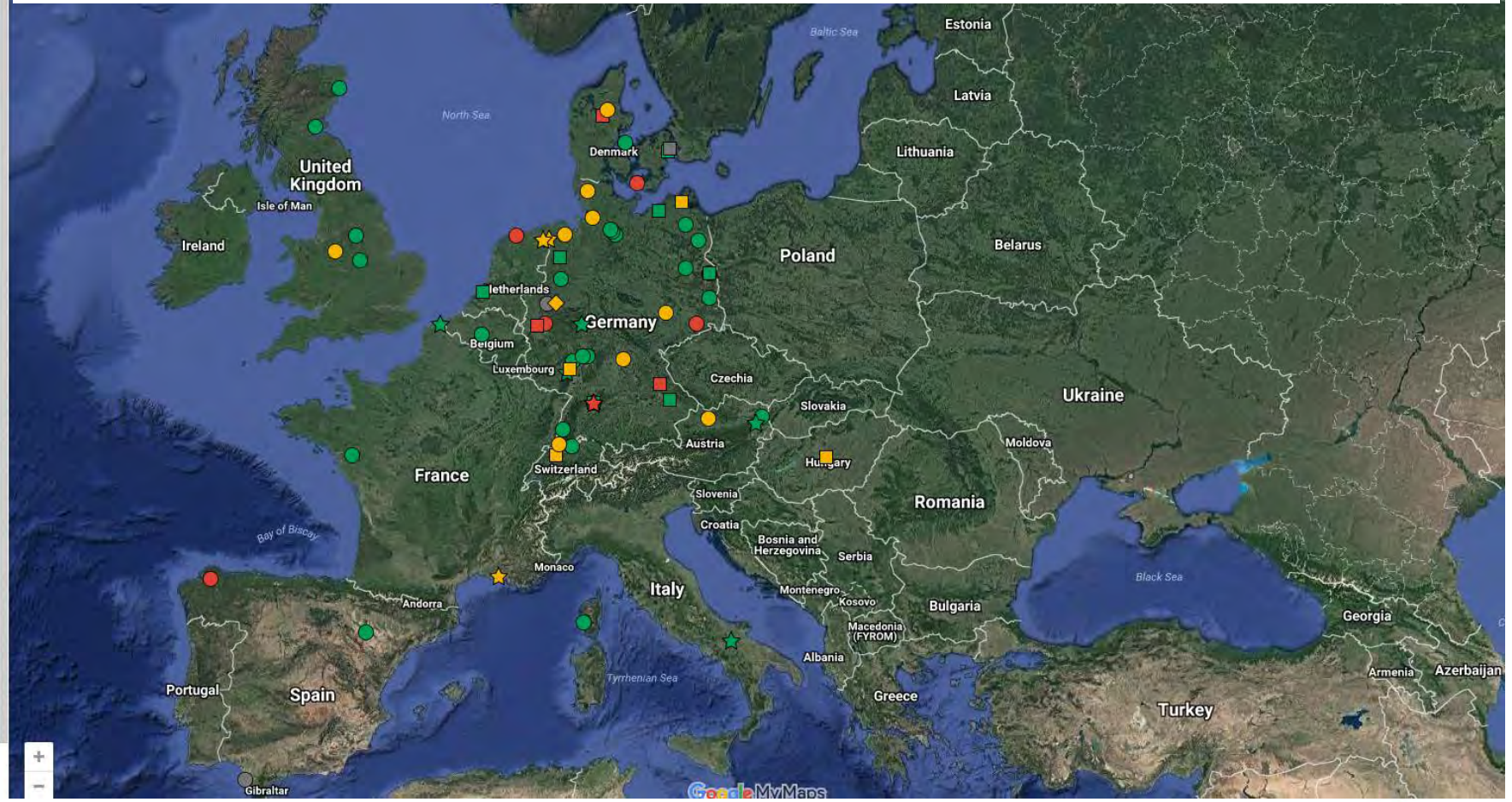


Power-to-Gas Projects in Europe

Power-to-Gas Demonstrat... 🔍

Map showing Power-to-Gas demonstration projects
12,955 views
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- Operational okt 2016
 - Hydrogen
 - Methane
 - ★ Hydrogen & Methane
- Unknown okt 2016
 - Hydrogen
 - Methane
- Finished okt 2016
 - Hydrogen
 - Methane
 - ★ Hydrogen & Methane
- Planned feb 2017
- Nieuw planned.xlsx
 - Hydrogen
 - Methane
 - ★ Hydrogen & Methane
 - ◆ Methanol



- P₂M has the potential to help decarbonise the gas grid.
- P₂M has the potential to enable increased growth of wind and solar renewables.

Thank you
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