

100% renewable energy utilization with methanation

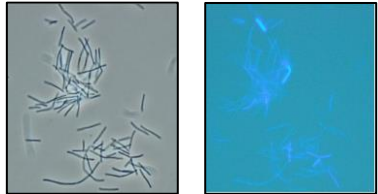
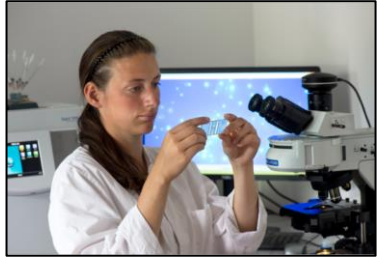
biomass based gases and methanation as key for
hydrogen economy and further expansion
of wind and PV plants



Michael Riebesecker
MicroPyros GmbH
m.riebesecker@micropyros.de
+49 1517 2313 207

History of MicroPyros - Development of methanation of electrolytically and thermochemically produced hydrogen on various projects

Lab scale



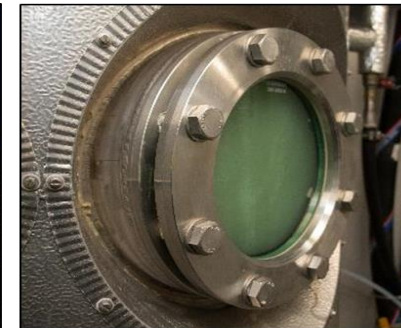
Straubing wastewater treatment plant, 2013; Microscopic quality control of microorganisms.

Pilot plant scale



Straubing wastewater treatment plant, 2015; Pilot-scale methanation plant, CO₂ supply from the wastewater treatment plant.

Industrial scale plant



Biowaste digestion plant in Altenstadt, 2019; Methanation plant with 200 kW - utilization of biogas from biowaste

100% grid utilization

- In areas with high power generation by PV and wind and thus high power grid utilization, Power to Gas plants make sense in order to fully utilize all existing transport infrastructure.



High additional expense due to construction of medium/high voltage power grid in weakly developed regions or large fluctuating electricity production. Coupling of biological methanation with H_2 production technologies enables the use of CO_2 and energy rich gases in case of electricity surplus and use of electricity peaks to produce a CO_2 neutral gas.



The necessity of renewable gas

- Climate modelers now assume that reaching the 1.5°C target is no longer possible without DAC. BECCS can be a form of DAC

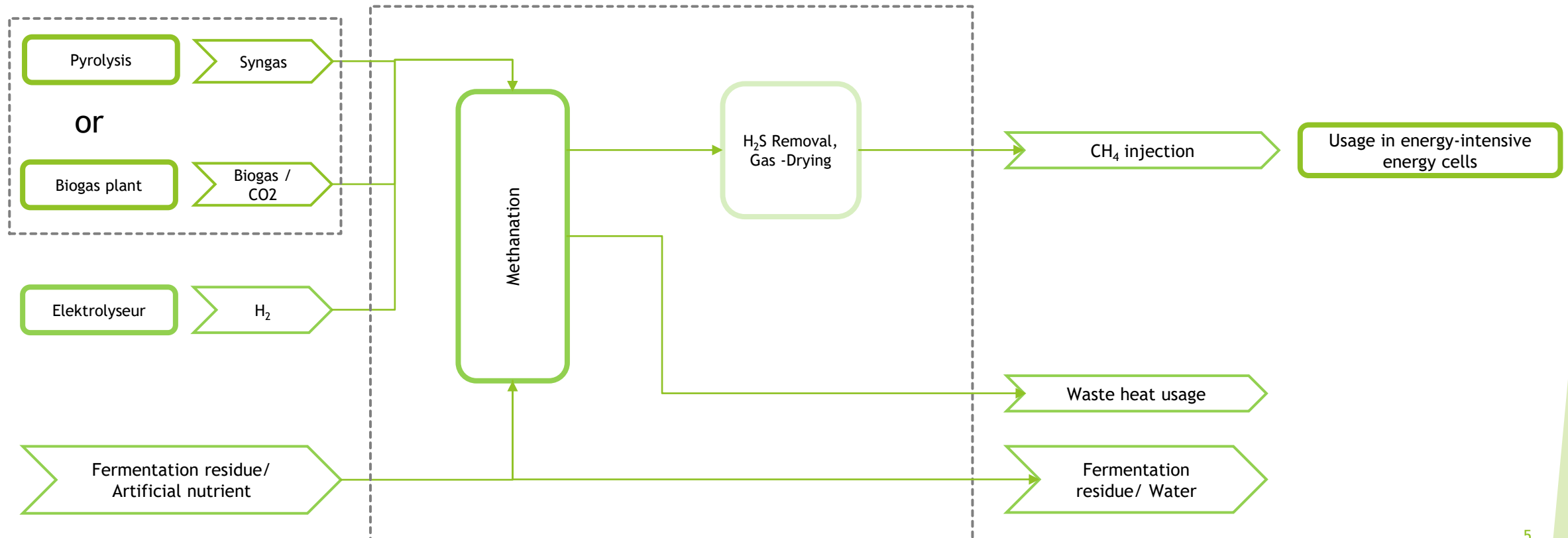


Baseline scenario means that no further efforts are made to limit emissions and thus 450ppm CO₂eq in the atmosphere is reached by 2030. To stay below 1.5°C, the CO₂ concentration must remain below 450ppm. Despite quadrupling the share of renewables, through faster improvement of energy efficiency, etc., fossil energy with CCS or bioenergy with CCS (BECCS) is needed to reach 450ppm CO₂.



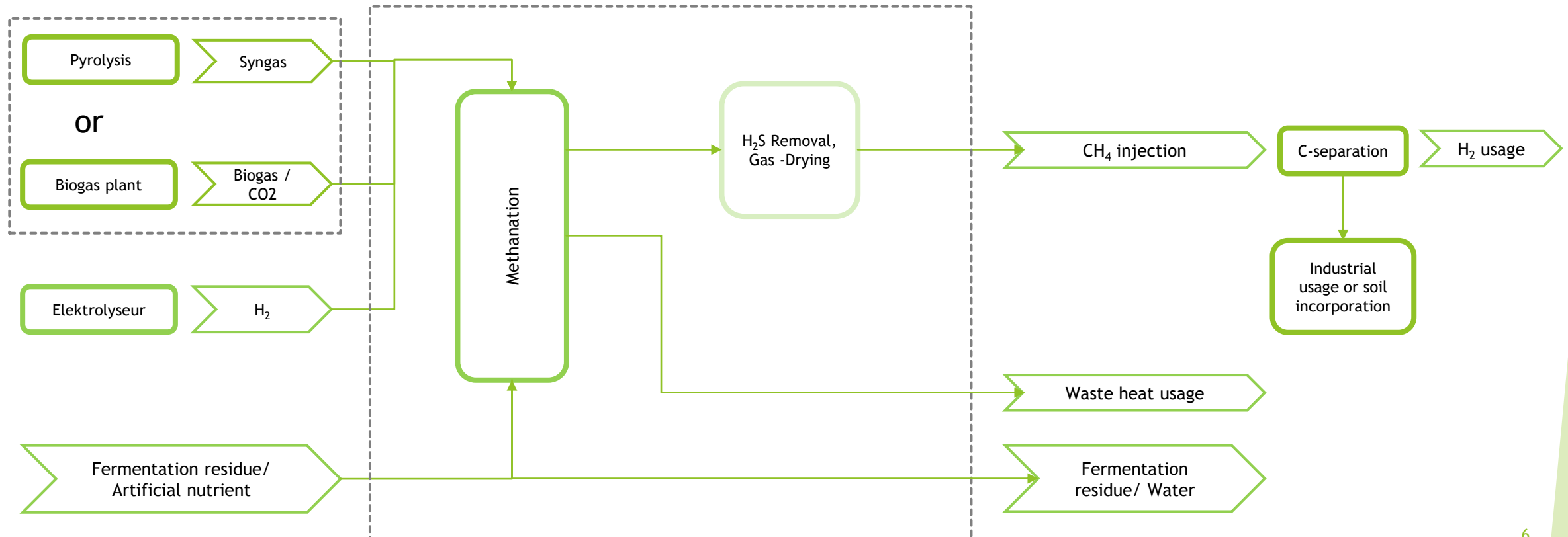
Combination syngas with Methanation

- Biological methanation ensures the safe purchase of the surplus electricity by feeding the energy volumes into the existing gas grid



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Power to Gas

- Multiple application



Waste/Water utilization

Biogas is produced from liquid organic residues (such as biowaste/sewage sludge/biomass) under anaerobic conditions.

Waste disposal via fermentation/gasification or incineration

MicroPyros can methanize these gases

CO₂-intensive industries

e.g., cement, ceramics and glass production.

Possibility of a CO₂-neutral economy



Natural gas system

Hydrogen production from electricity and waste at sites with high electricity generation.

Important for storing climate-friendly energy and leveraging existing infrastructure to store and distribute renewables.

Hydrogen production from biomethane at sites with high hydrogen

Summary

- 100% CO₂ neutral energy

Increasing the output of low-cost and efficient electricity production with PV and wind increases fluctuating

Electricity generation and the need for flexible electricity production and storage

Use robust anaerobic hydrogenotrophic methanogens (archaea) to methanate CO₂ at low electricity prices and transporting CO₂ neutral gas in existing infrastructure

Michael Riebesecker

Process engineering

+49 9421/1896113

+49 1517 23 13207

m.riebesecker@micropyros.de

Herbert Huber

CEO

+49 9421/1896113

h.huber@micropyros.de

MicroPyros GmbH

Europaring 4

94315 Straubing

www.micropyros.de

MicroPyros BioEnerTec GmbH, Europaring 4, 94315 Straubing, Germany

Geschäftsführung/CEO: Herbert Huber Rechtsform: GmbH – Sitz Straubing; Handelsregister Straubing – HRB 13067 Straubing; USt-IdNr. DE 34 18 04 514