

# Renewable Gases in Sustainable Energy Systems



**Geneva, Economic Commission for Europe, Committee on Sustainable Energy**  
**26.09.2019, Daniela Thrän**

Renewable Gas is produced via

- Biochemical conversion from biomass (biogas and upgrading)
- Thermochemical conversion from biomass (gasification and methanation)
- Power-to-Gas (CO<sub>2</sub> from different sources and hydrogen generated from renewable power)

Renewable Gas is characterised by

- Low to negative GHG emissions
- In line with the existing infrastructure

Standards are necessary for:

- Plant operation
- Fuel specification
- Sustainable sourcing and efficient use



Organic input materials

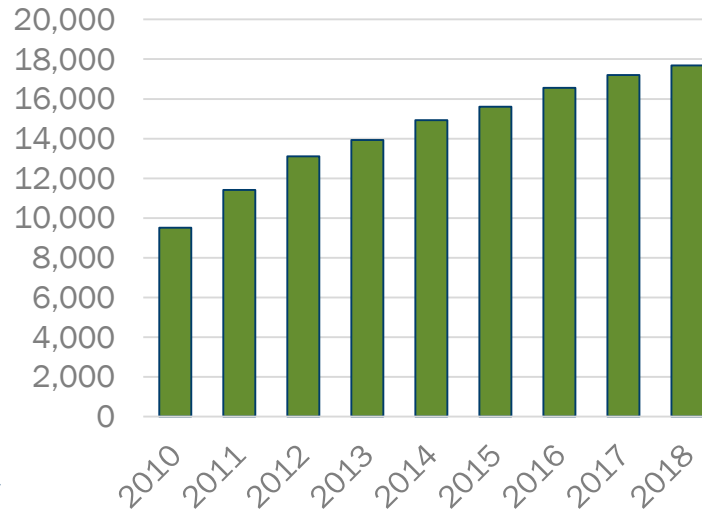


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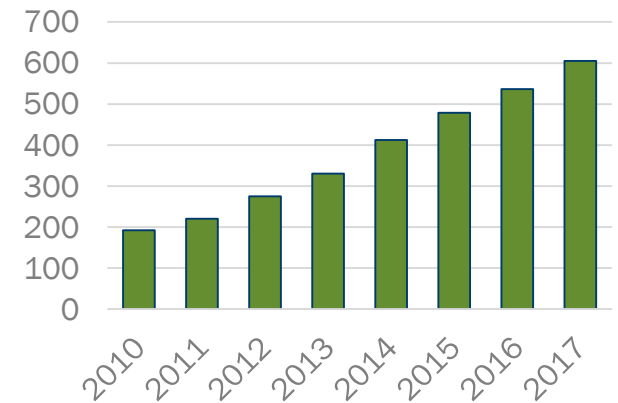
Power and Fuels and organic fertiliser



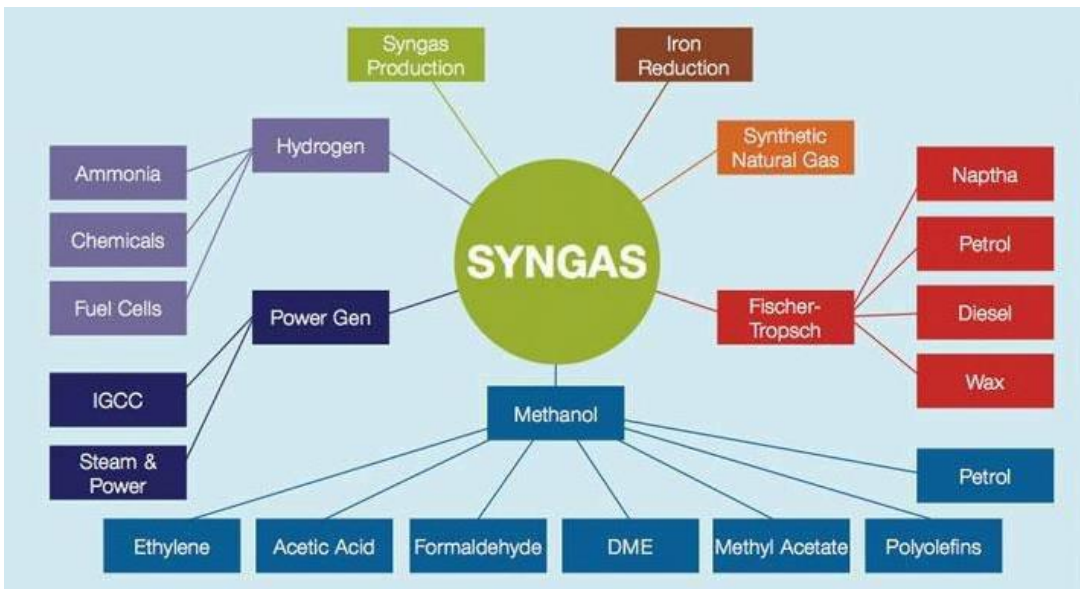
Global Biogas Capacity in MW



Global Biomethane Production Capacity in MW



Source: Data from IRENA , IEA Bioenergy: Task 37: 2018 : 5- calculated with assumption 8000 full load hours



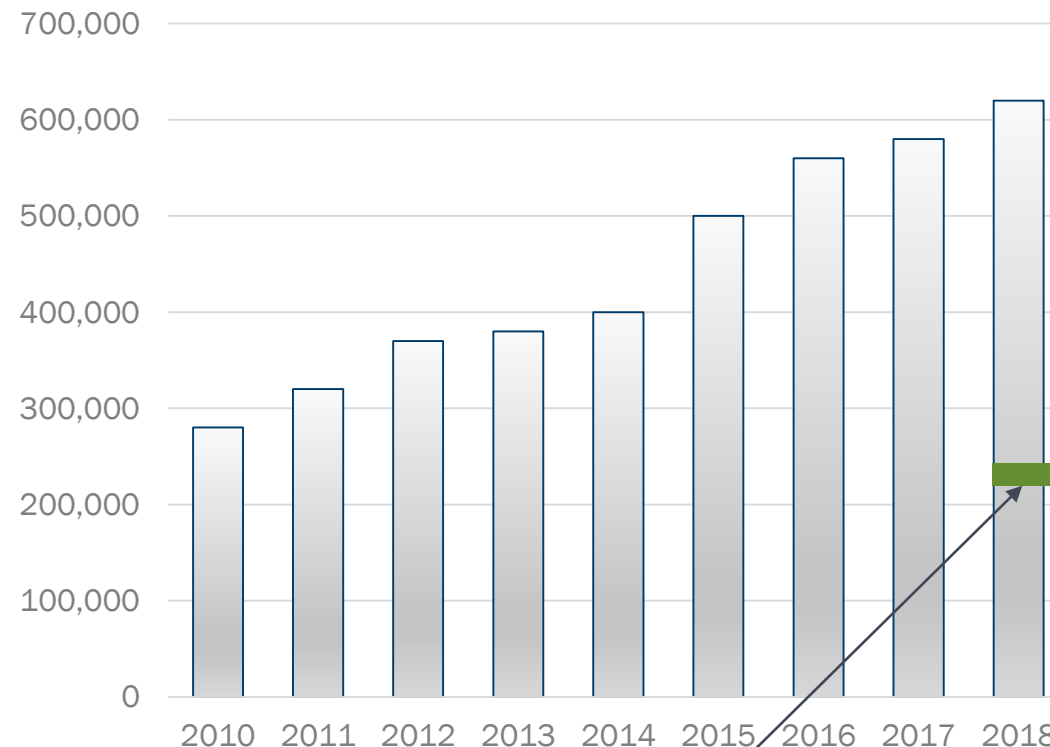
Source: globalsyngas.org



Source: storeandgo.info

- Demonstration site in Germany
- operational
- 1,400 m<sup>3</sup> SNG per day
- Grid feed in since 2019

Global Syngas capacity in MW



Source: Data from globalsyngas.org

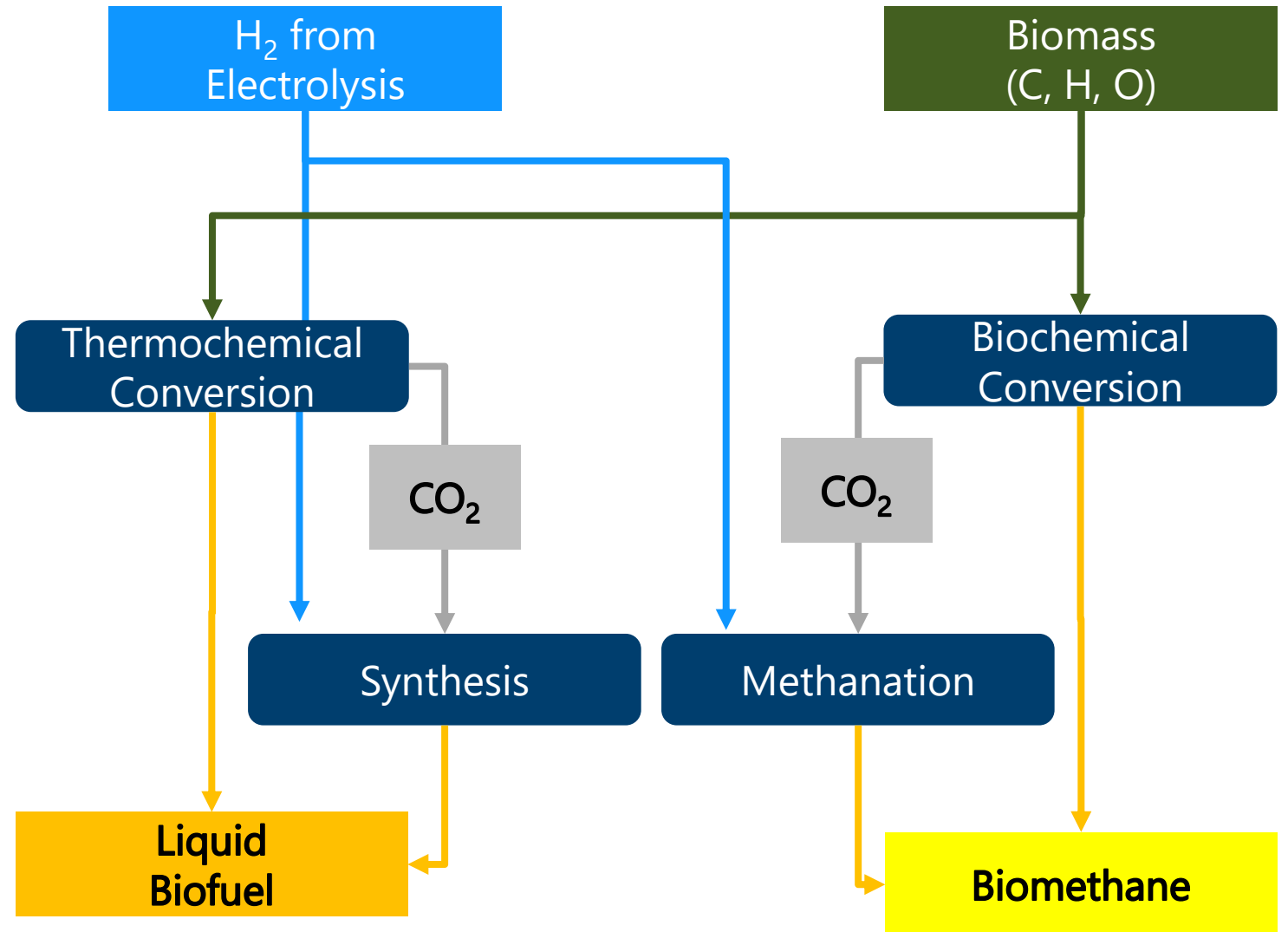
10.6% synthetic natural gas & 1% from biomass

Biomass is a source of renewable / climate neutral carbon

Several Bioenergy-Applications release CO<sub>2</sub>-rich exhaust (mainly biochemical conversion, such as bioethanol or biomethane)

For some advanced Biofuel-Concepts H<sub>2</sub> can be added to the process to increase the carbon-efficiency (in most cases thermochemical Conversion)

Renewable sources typically have a hydrogen-deficit in terms of stoichiometric turnover into fuels or methane



## Preconditions for efficient system integration:

- Availability of renewable power for low carbon footprints
- Continuous production of CO<sub>2</sub> for high full load hours of the Electrolyser-unit for low specific costs
- Ideally a available heat-sink for thermal losses

## Advantages Bio-PtG Plants (Electrolyser + Biomethane):

- Closed carbon-cycle
- High-CO<sub>2</sub>-Concentrations, so way less effort to „collect“ carbon comparing to direct-air-capture
- Existing Energy-Infrastructure for power and gas
- Useful heat utilisation for process energy



BioCat Pilot Plant near Copenhagen, DK, ©Electrochaea GmbH,  
<http://www.electrochaea.com>

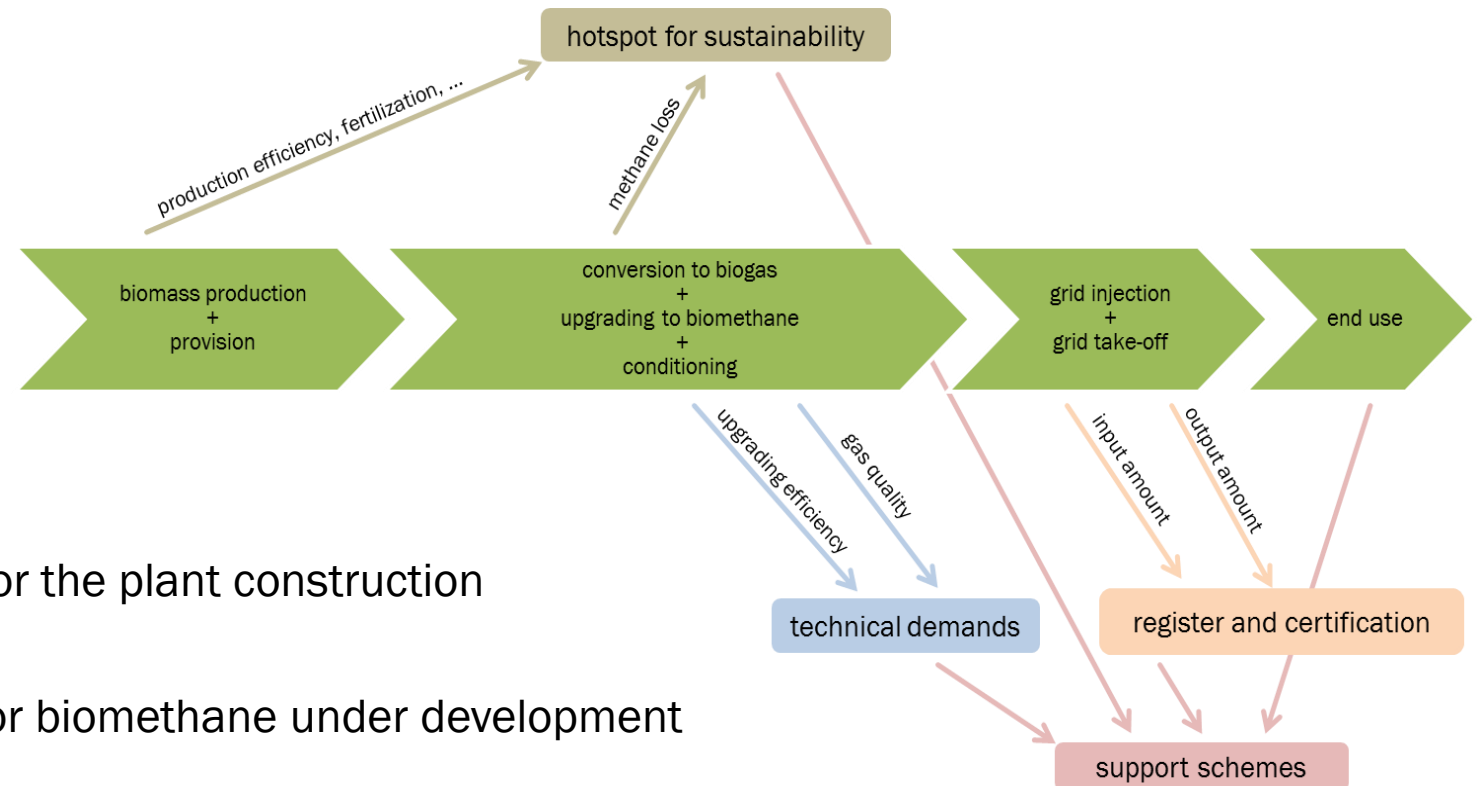
- 1-MW commercial-scale field trial Plant
- Biological methanisation reactor
- Wastewater treatment plant outside Copenhagen
- Use excess wind energy
- Produce pipeline-grade renewable gas

## Focus on German sector:

- Many different regulations and authorities which have to be considered when planning and operating a biogas plant (no overall permission yet)
- Many regulations are in the phase of amendments, which is difficult to handle for the plant operators

## International:

- Standards on natural gas in case of feeding biomethane to the grid
- In Europe: two different standards for grid injection and automotive specification at European level (CEN/TC 408)
- No international standard available for the plant construction or operation yet, but some activities
- International certification schemes for biomethane under development



## ISO/TC 255: Biomass gasification

- WG 1: Biogas – Biogas production, conditioning, upgrading and utilization – Terms, definitions and classification scheme
- WG 2: Flares for combustion of biogas
- WG 3: Household Biogas System Requirements
- WG 4: Safety and Environment Guidelines for Biogas
- WG 5: Biogas systems – non-household and non-gasification

The technical committee on biogas (ISO/TC 255) WG 1 was established in 2011 in order to

- provide liberalization and facilitation for international trade of biogas systems,
- contribute to international cooperation on technical regulations, standards and assessment procedures,
- curb discriminatory technical requirements as the main form of trade protectionism, and
- reduce and eliminate the technical barriers for international trade of biogas systems



- On EU levels, projects for sustainability certification of renewable gases are mostly driven by the Renewable Energy Directive (RED)
- Since the Directive is (so far) mainly addressing the transport sector, little experience does exist with “real life” certification in the biogas sector (some examples do exist mainly in GER and IT)
- Main challenges for a large scale implementation of sustainability certification of renewable gases (until now):
  - Complexity of the value chains
  - Not mandatory
  - Existing certification solutions are not complete yet
- But: several projects and pilots are currently working on the development of practical and coherent solutions for the sustainability certification of renewable gases

- The implementation of the RED2 will expand the concept of sustainability certification to all bioenergy within the EU (in theory) → demand for applicable certification solutions for renewable gases increases
- Numerous research and demonstration projects have developed elements for appropriate certification frameworks that are coherent with the existing RED-legislation
- Examples:

## GHG accounting within certification



## Renewable Gas certification and Registries



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Wellinger, A., *D3.7 | Report on the practical experiences with the application of European Biomethane Standards*, Deliverable from the BIOSURF (BIOMethane as SUsustainable and Renewable Fuel) project, 2017.