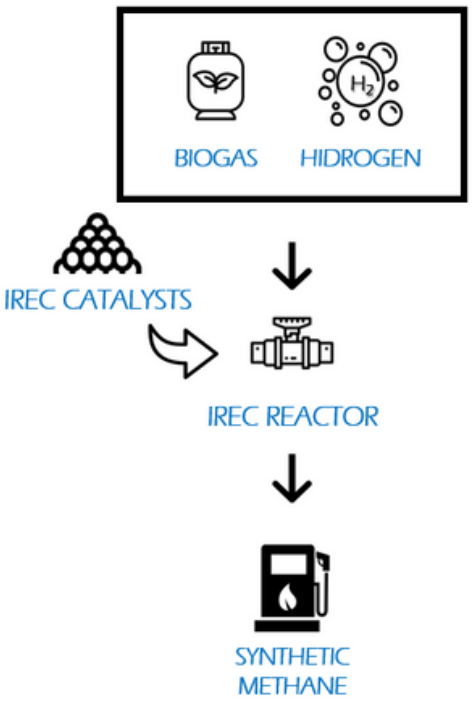
SYNTHETIC NATURAL GAS PRODUCTION

TO CONVERT CARBON DIOXIDE INTO RENEWABLE NATURAL GAS

IREC
Shaping Energy for a Sustainable Future

THE CONCEPT



ADDED VALUE

- Lower upfront and operational costs
- Tolerance to impurities

TRL

6

PATENTED

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PRODUCT DESCRIPTION

- Designed and constructed an in-house **catalytic chemical reactor** prototype for **methanation**
- Developed own catalysts to convert **carbon dioxide** into **renewable natural gas** to increase the efficiency of the reaction into methane
- The reactor works **autothermally**, reducing reliance on external energy sources: increases the reactor energy efficiency and reduces the costs
- The process produces synthetic natural gas of quality **equivalent to natural gas** from the grid

APPLICATIONS

- Biogas or combustion fumes valorisation
- Gas vehicle mobility
- Injection of synthetic gas into natural gas grid
- Chemical storage of renewable energy
- Valorisation of CO_2- circular economy with GHGs reduction

DESIRED PARTNERS

- Reactor engineering companies
- End-users, such as energy industry/companies/utilities
- Investors or accelerators

EXPECTED BENEFITS

- Catalyst 25 % more active
- 60 % reduction in CO_2 emissions
- Lower CAPEX/OPEX
- Easily scalable

technical details

KEY ELEMENTS OF THE INNOVATION

- Autothermal methanation process that uses the heat generated by the methanation reaction to maintain the optimal temperature for the catalytic process
- Flexibility to work with different biogas composition and volume flowrates
- The catalyst is tailored for (micro)reactor specifications (0.2–3 mm), with porosity (100–200 m^2/g) and optimized metal loading (10–25%) for efficient biogas applications.

CARBON RECYCLING

- Production of synthetic fuels from carbon of biogenic origin or by reuse of carbon dioxide and water
- Feasible incorporation of hydrogen to the current gas grid by its conversion to methane
- Use these synthetic fuels as a large-scale energy storage that allows to increase the share of non-fossil-source energies
- Development of a circular economy around carbon dioxide emissions contributing to its effective reduction through the use of a closed loop of carbon of biogenic origin
- Energy interconnection between the electricity and gas networks, and promotion of new options and opportunities for the development of new energy models
- Use of biomass and other sources of waste with organic content such as sewage sludge and/or slurry contributing to environmental improvements

IMPLEMENTATION

Catalysts and autothermal reactor validated in biomethane pilot plants in real conditions, using other infrastructures and own technology: Waste water treatment plant (EDAR, Sabadell), Energy lab 2.0 KIT (Karlsruhe), waste management plant in Mas Barberans (Tarragona).

Methanation unit in EDAR (Sabadell)

Biomethane reactor in Mas Barberans (Tarragona)

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