POWER TO GAS

Valorisation of CO_2 into methane

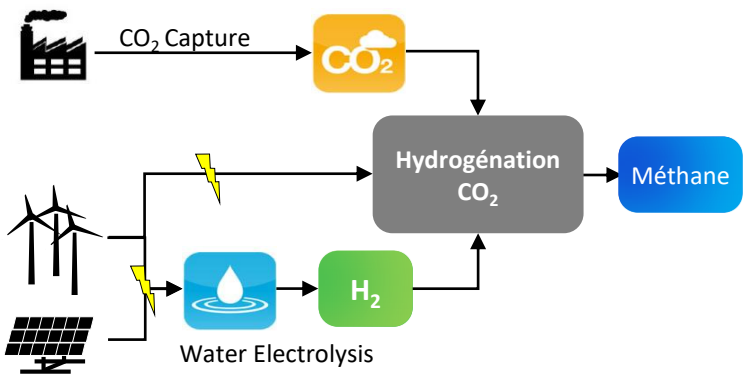
Power-to-gas, conversion of renewable energy into hydrogen gas, is one of the main challenges for the energy transition to succeed. The reaction of hydrogen transformation into methane faces two technological issues:

- Amount of energy needed for the reaction
- Catalysts quality

DESCRIPTION*

- Production and use of ferromagnetic nanoparticles used for the hydrogenation of CO_2 and H_2 to form CH_4

  $CO_2 + 4\ H_2 \longrightarrow CH_4 + 2\ H_2O$ (Sabatier reaction)
- Nanoparticles activation through magnetic hyperthermia (i.e. using a magnetic field), which enable instant and localized heating and avoid problems due to thermal inertia
- Nanoparticles geometry and materials optimized for heat production



TECHNICAL SPECIFICATIONS

Activation	Magnetic Hyperthermia (magnetic field)
Catalysts	Metal Nano Catalysts with strong catalytic activity
Results obtained with lab prototype	Yield: 100% conversion Magnetic Field: 25 mT Flow Rate: 100mL/min

COMPETITIVE ADVANTAGES

- High selectivity
- Yield closed to 100%
- Domestic use possible
- Adapted to intermittent renewables electricity production

APPLICATIONS

- CO_2 Capture and valorization
- Smart Grid and Power to Gas solutions
- Hydrogen transformation

INTELLECTUAL PROPERTY

- Patent pending

DEVELOPMENT STAGE

- Technology validated at lab level

1	2	3	**4**	5	6	7	8	9

- At laboratory scale:
  - Catalysts synthesis at the nanoparticle level
  - CO_2 Hydrogenation reaction validated in batch reactors (<50cL)

LABORATORY

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