Power to Gas
in the Energy Transition

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What is “ Power to Gas “ ?

Power to Gas :

Transformation through electrolysis of surplus of electricity into gas, either hydrogen or methane (through Sabatier reaction)

→ Power to hydrogen (H_2)

→ Power to Synthetic methane (CH_4)

Prospective study focusing on 2050 in France

based on ADEME Vision 2050

1. Assessment of the surpluses generated by
   70 GW of wind power and
   60 W of photovoltaic capacity installed

2. Studies into solutions for using electricity surpluses depending on their technical characteristics.

3. Assessment of minimum electricity surplus that can only be used as H_2.

4. Analysis of the profitability conditions for using surpluses as H_2 injected into the network.

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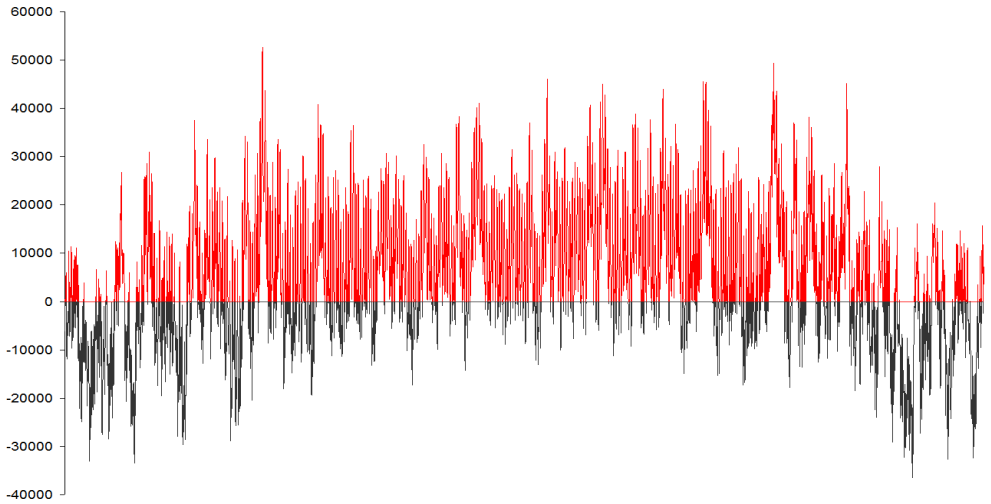
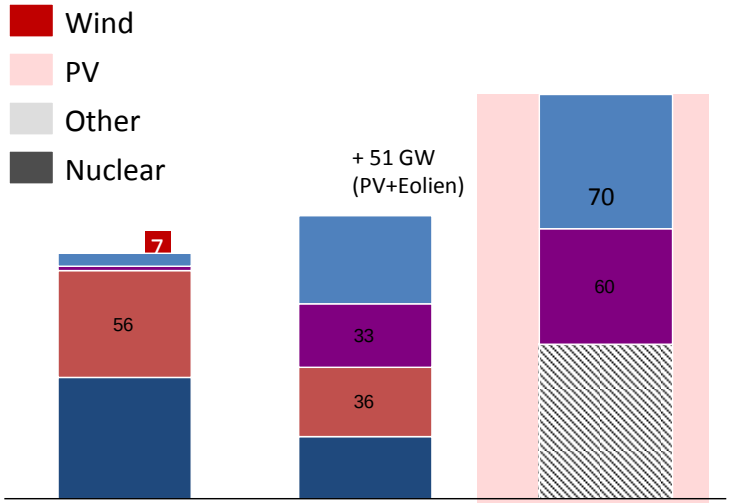
Electricity surpluses are estimated at a level of 75 TWh



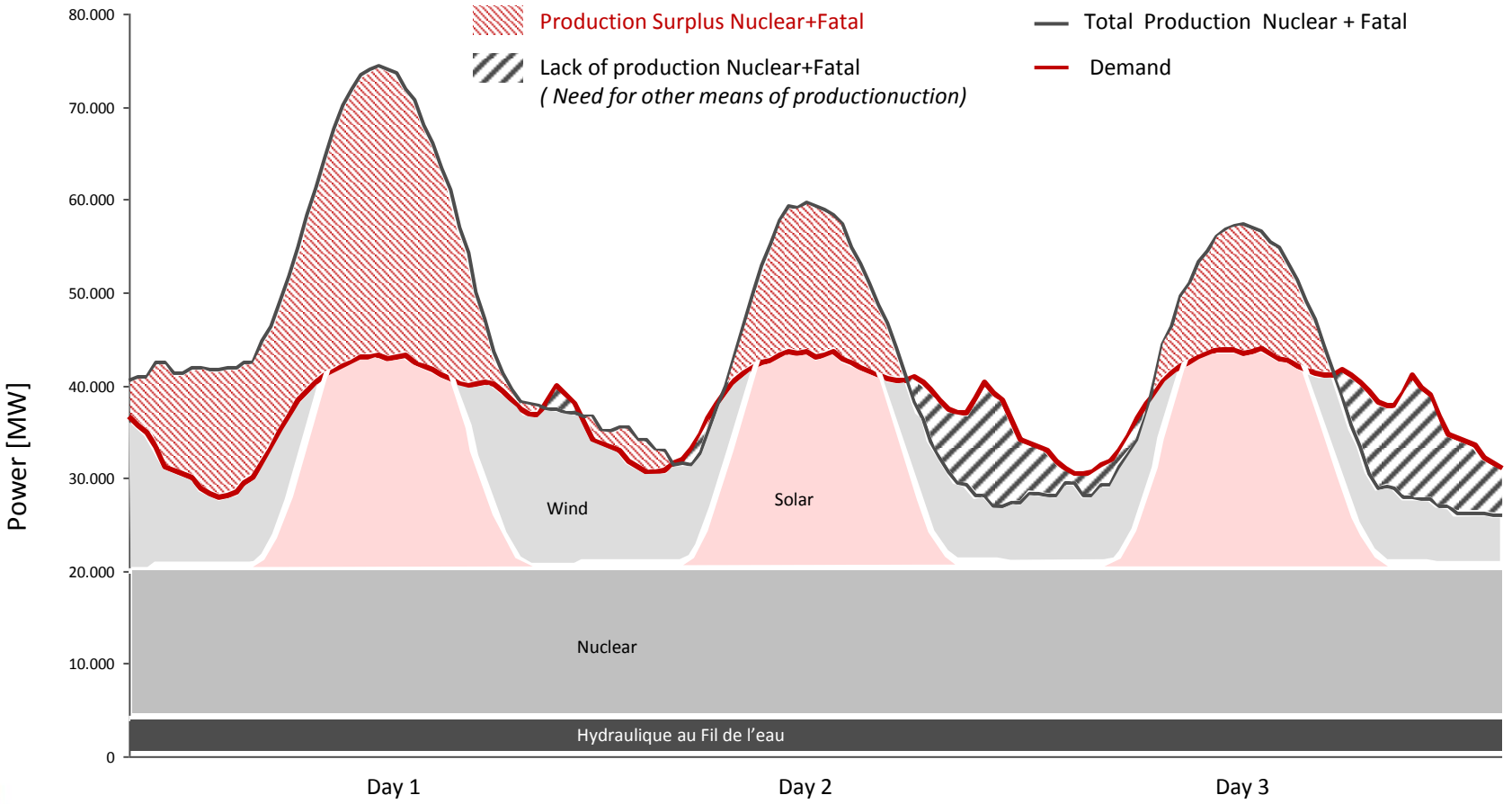
ADEME VISIONS



Inner demand	~ 485 TWh	~ 392 TWh	~ 381 TWh

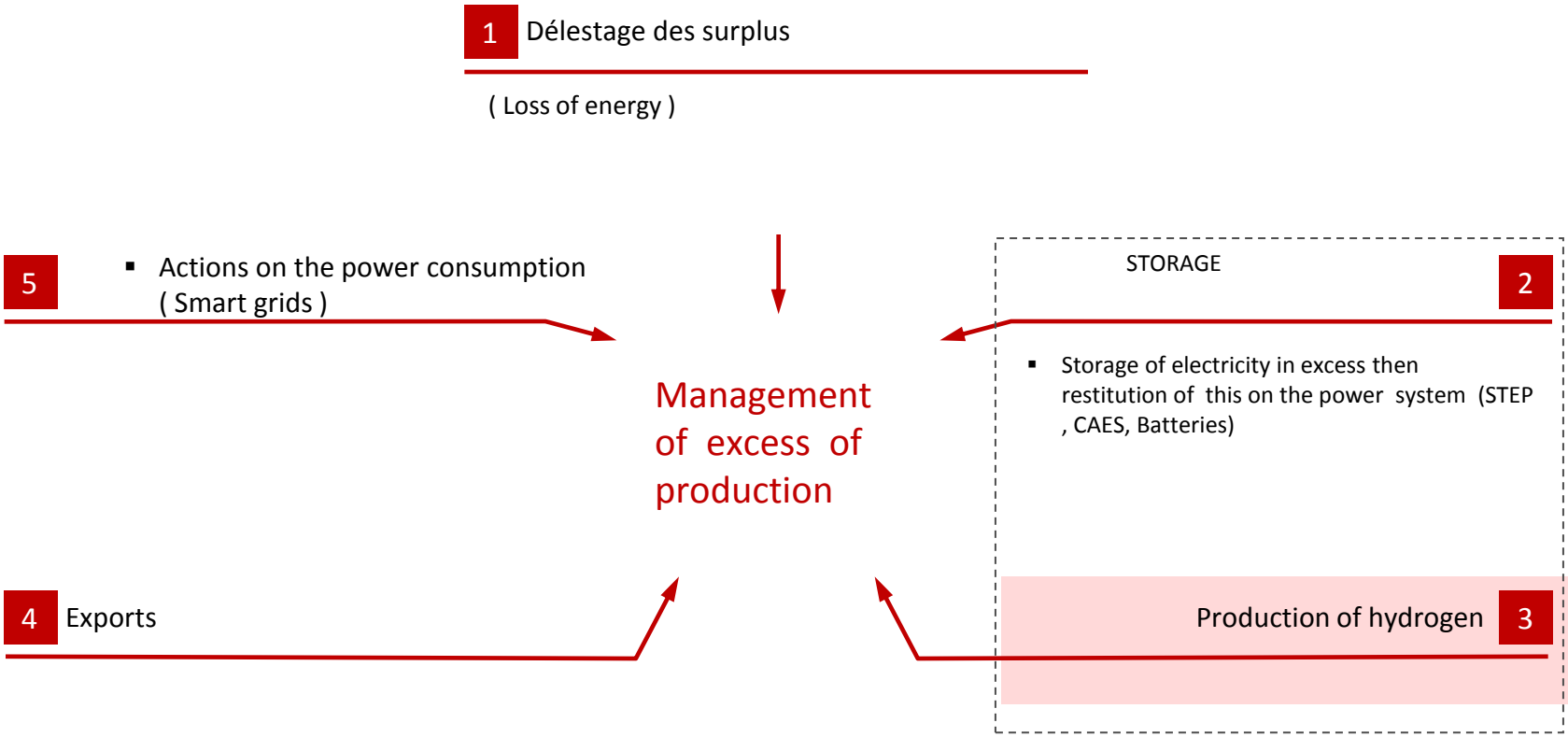
Modelling supply / demand balancing on an hourly basis

Simulation of the variability (wind, PV, demand) on the basis of historical data

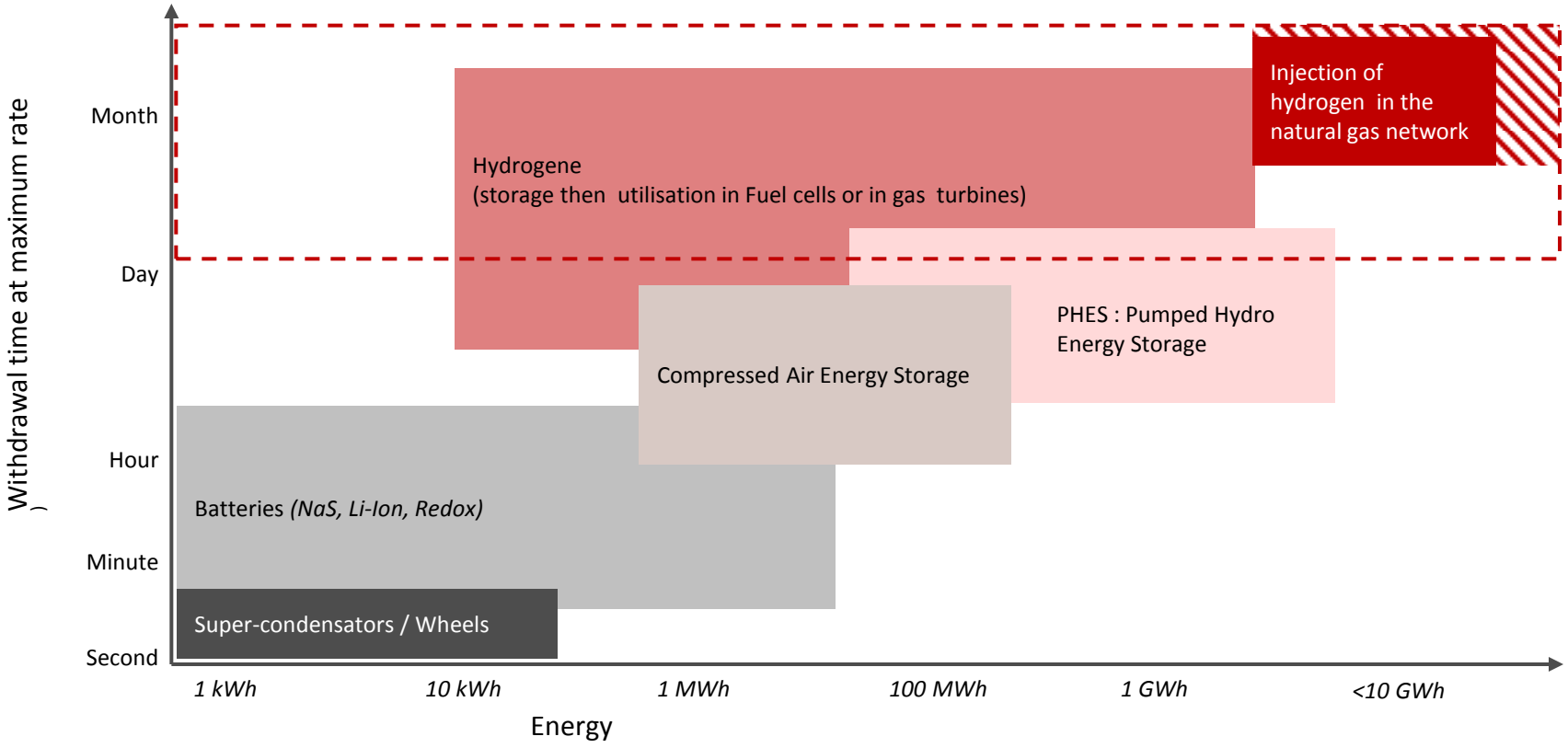


Source: Modelling and Analyses E-CUBE Strategy Consultants

Various solutions can be envisaged in order to cope with these surplusses of production



Thanks to its characteristics, hydrogen seems to be the most appropriate technology to store electricity over long periods of time



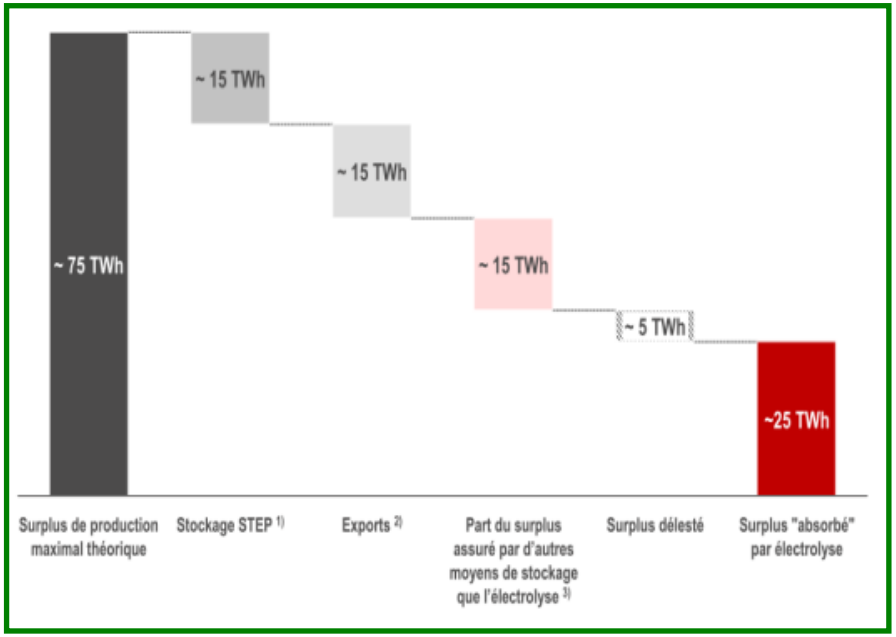
Main results

based on ADEME Vision 2050

→ **80% of electricity surplus are produced during Periods of 12 hours or more**

→ **H_2 production potential of at least 20 TWh/year**,
= 2 nuclear power plants and 9 % of France's total gas consumption in 2050 (based on Ademe Vision 2050).

→ **Injecting renewable gas into the networks** is one of the most economically viable ways of using it.



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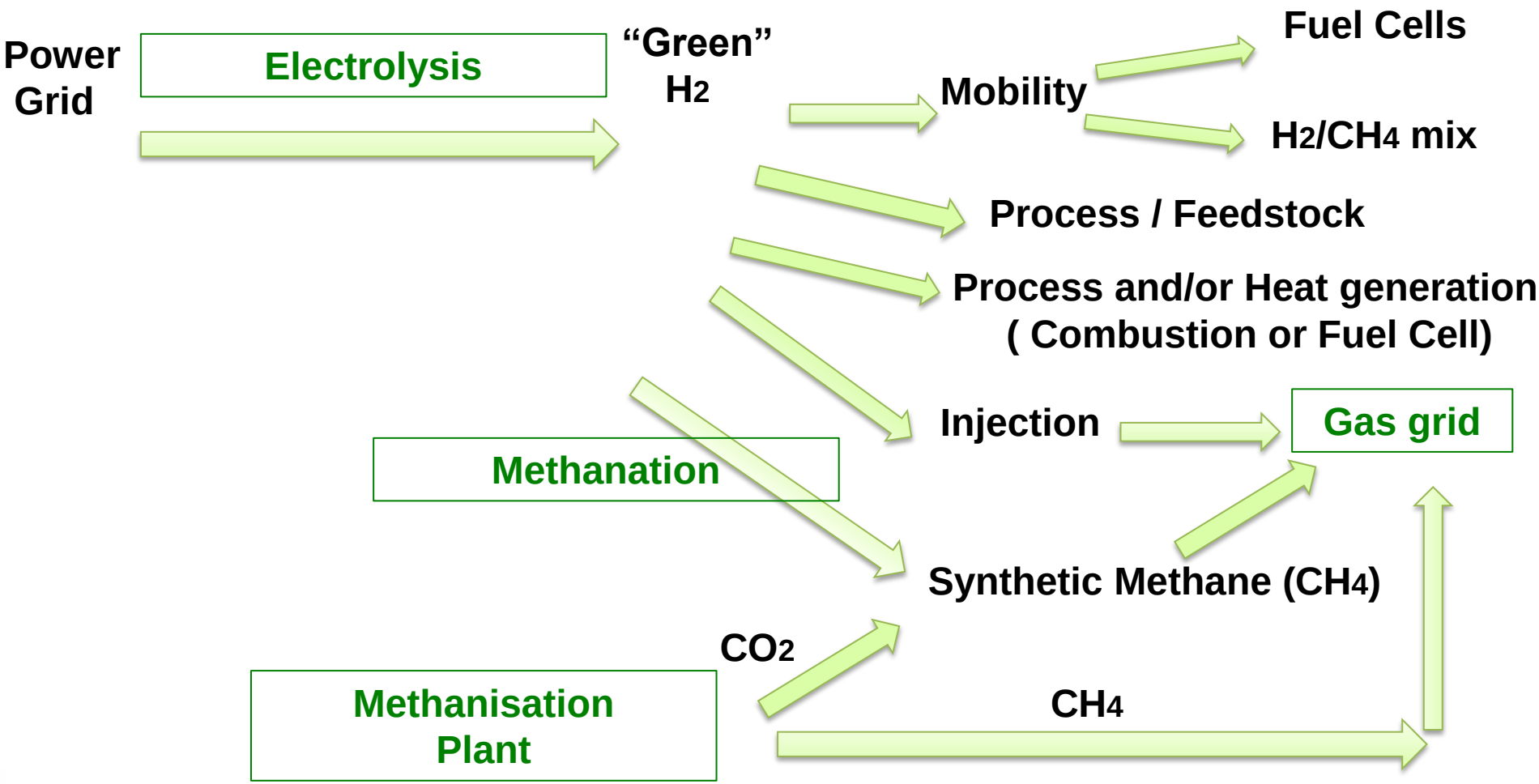
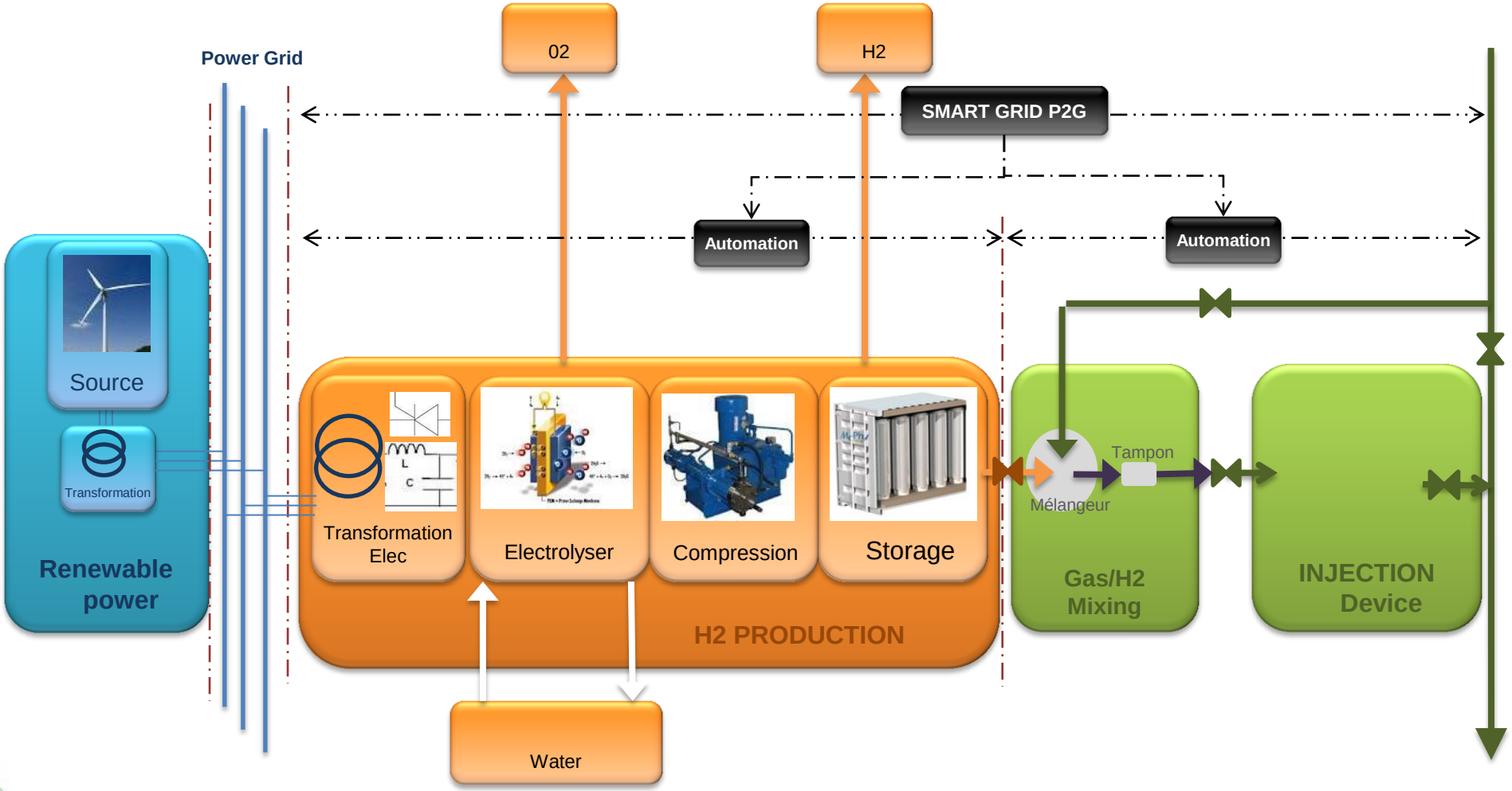
« Green » Hydrogen



H_2 demonstration project



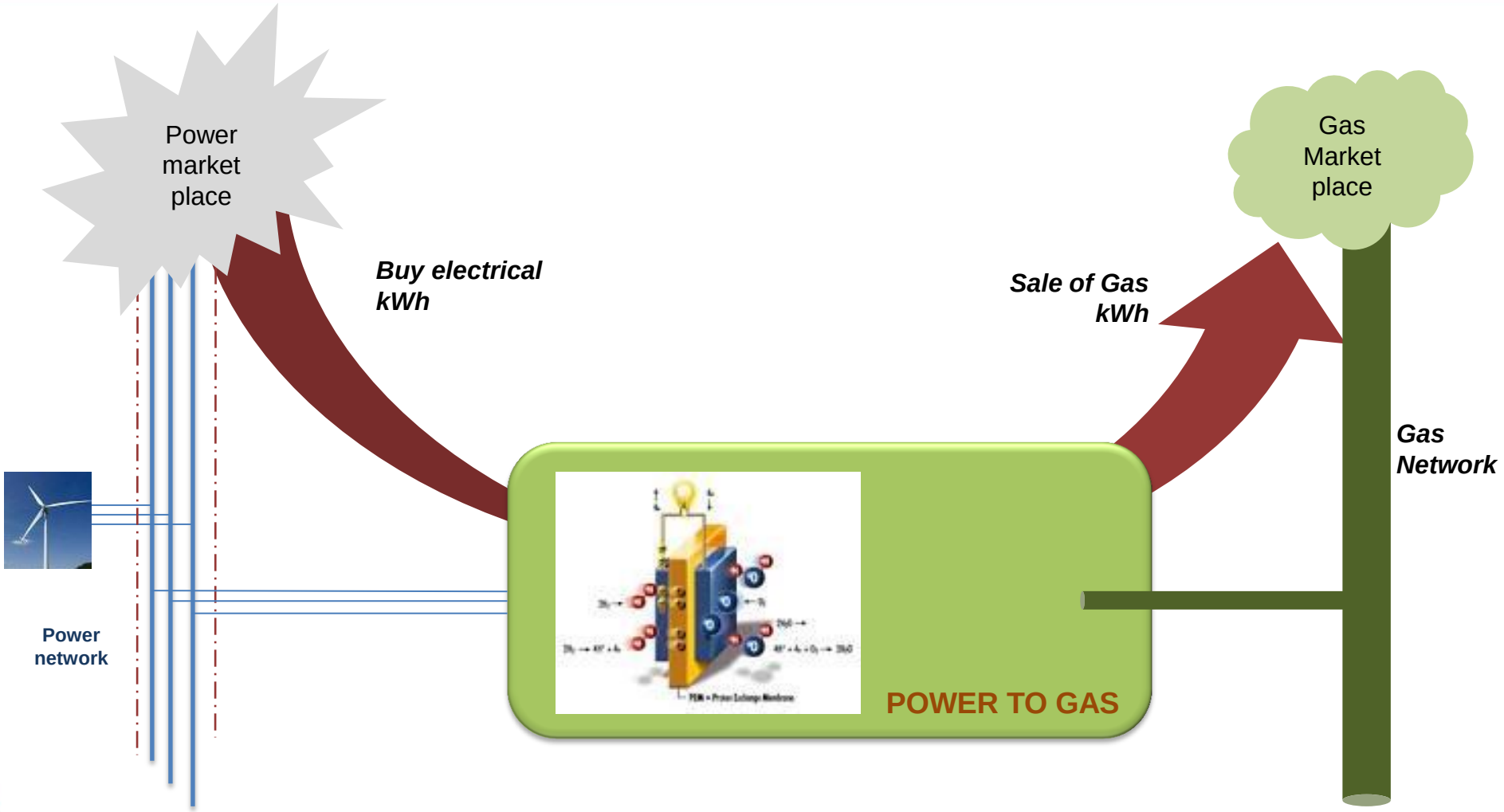
H_2 demonstration project : objectives

- Time period : 2014 – 2018
- Size of electrolyser : 1 MW

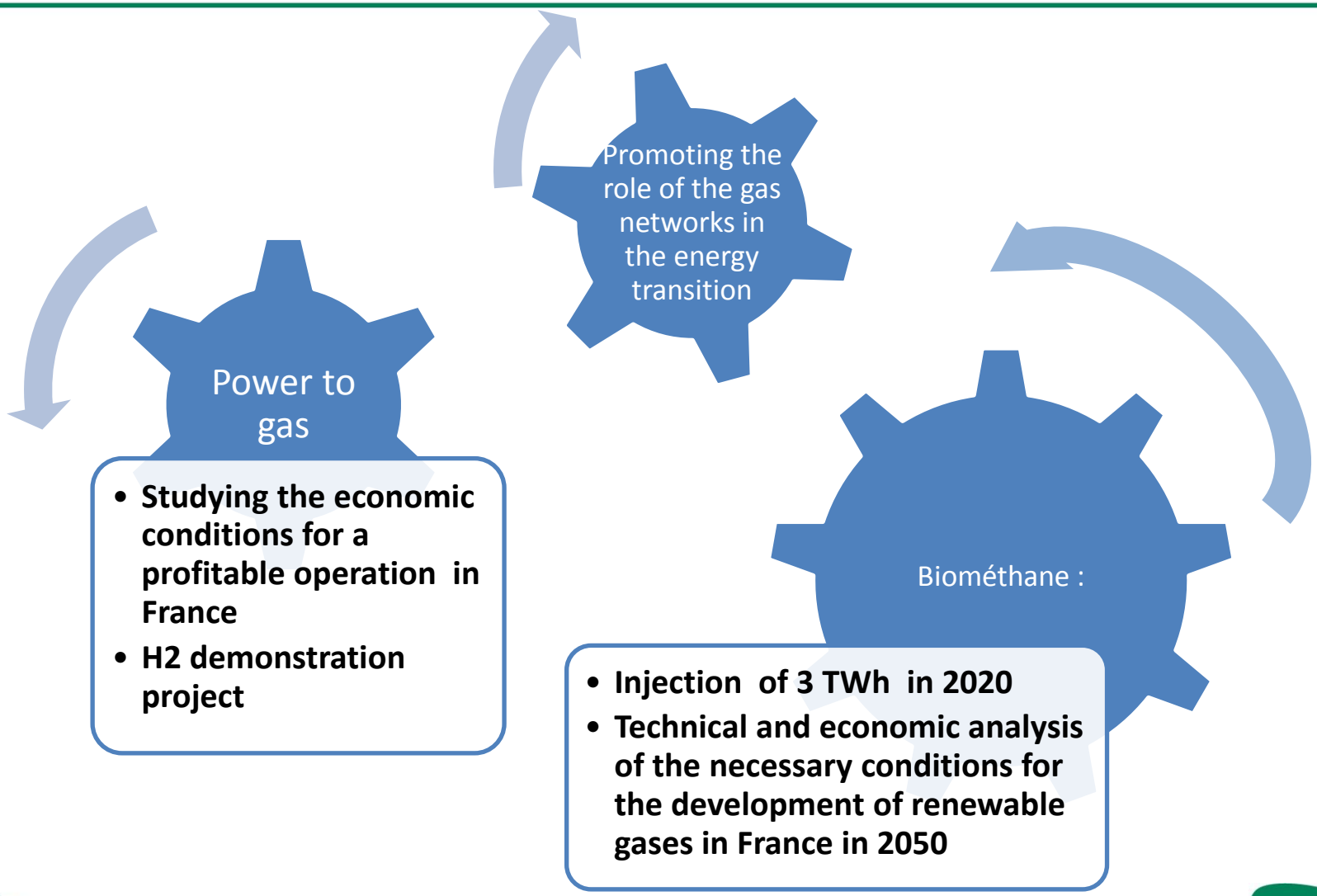
- Test of * Electrolyser - alcaline
  - pressure alcaline
  - PEM
  - High temperature (?)
  * Response to different electricity regimes (flexibility)
  * Synthetic methane production

- Value chain / business model
- Regulation (gas quality)

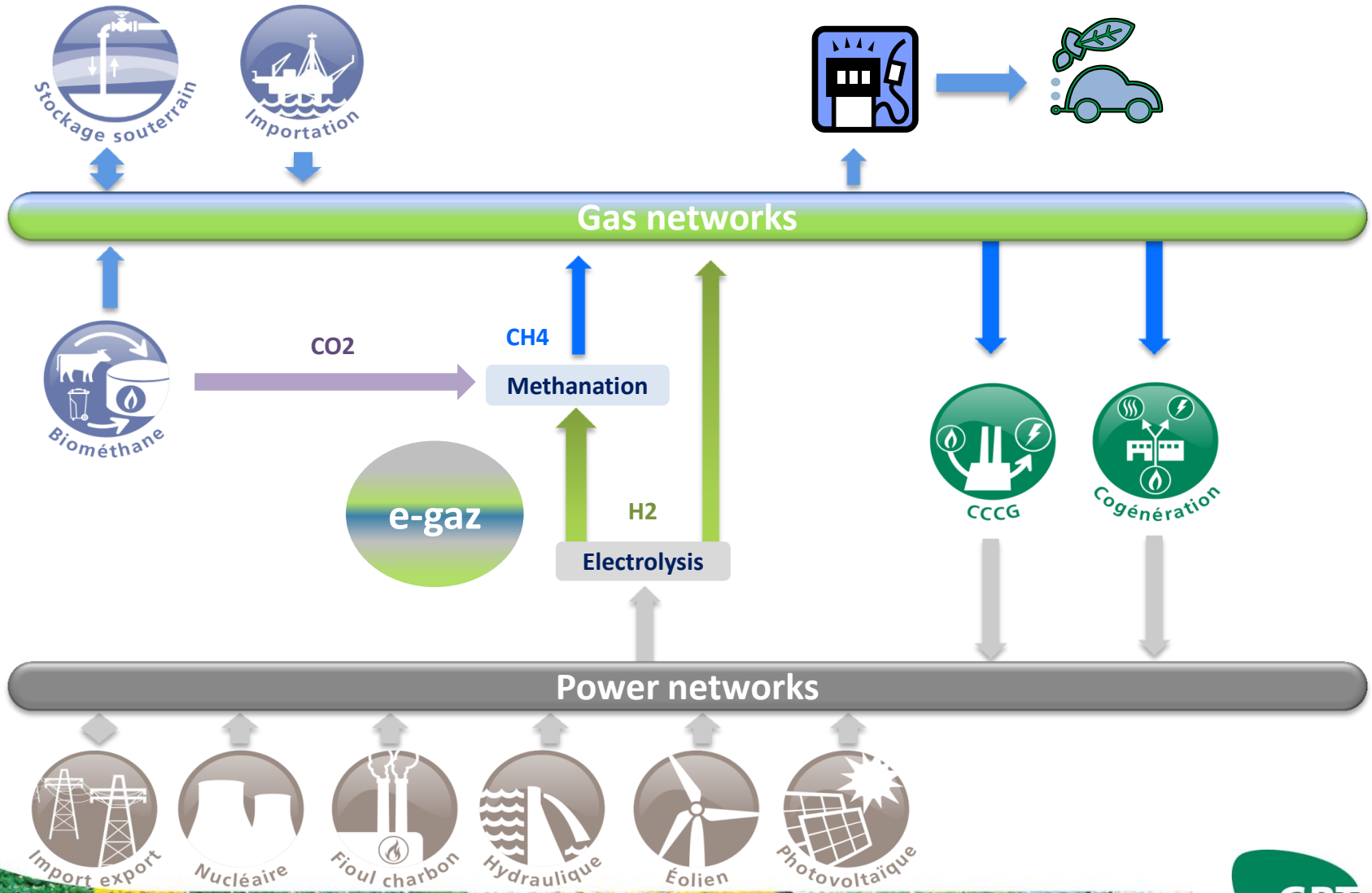
One of the business models ...



CONCLUSION


Promoting the role of the gas networks in the energy transition
Power to gas
• Studying the economic conditions for a profitable operation in France
• H2 demonstration project
Biométhane :
• Injection of 3 TWh in 2020
• Technical and economic analysis of the necessary conditions for the development of renewable gases in France in 2050

Gas infrastructure – an essential component of a global sustainable energy system



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Thank you for your attention