



How to reach 100% renewable low-carbon gases in 2050 ?

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Summary



1/ Who is GRDF ?

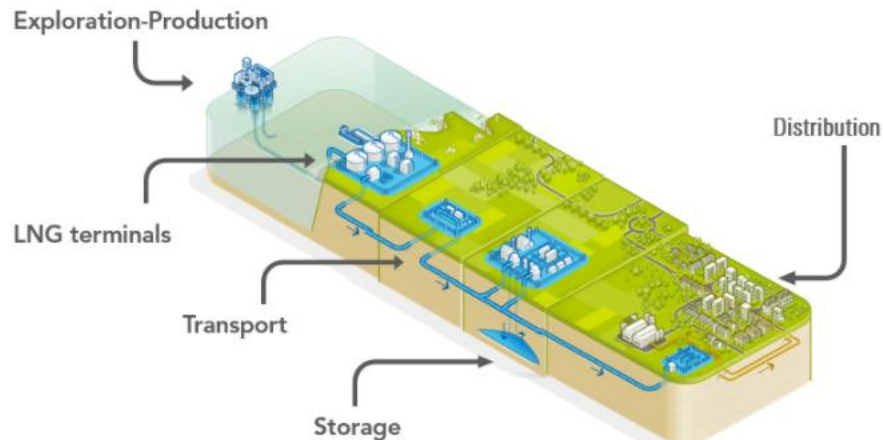
2/ Which revolution for the gas ? Past ? Present ? Futur ?

3/ Anaerobic digestion

4/ News gases : Gasification and Power-to-methane (CO2 reduction)

GRDF is a distributor of gas

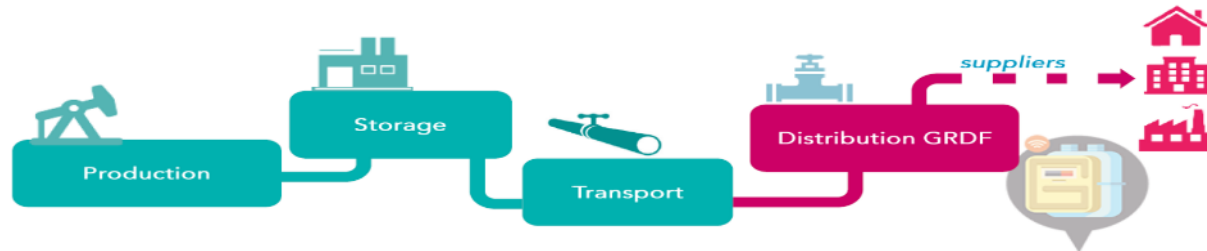
Gas infrastructure: the gas value chain



Born in 2007, GRDF (Gas Réseau Distribution France) is the main French Natural Gas distribution operator

- **Designing, building, maintaining, and operating** of the natural gas distribution network
- **Transmitting** natural gas on behalf of gas suppliers in a completely impartial manner
- **Distributing** natural gas in a completely secure manner
- **Promoting** the use of natural gas and a profitable distribution network's expansion
- **Supporting** renewable gas and gas natural vehicle development

70 years
experience



Key figures

The largest gas network in Europe

200 715 km

natural gas network, i. e. a network that could circles the Earth almost five times!

279 TWh

of natural gas delivered

€973 millions

invested in order to develop, maintain and operate the network

€1 million

every day, dedicated to the network security

A dynamic company

€3,5 billion in revenue

11 475 employees

including

662 student apprentices

Serving the territories

11 M customers in France

9,577 districts

supplied by the natural gas distribution network

77% of the population

lives in a district covered by the GRDF network

226 biomethane injection facilities (@ 27 March 2021)

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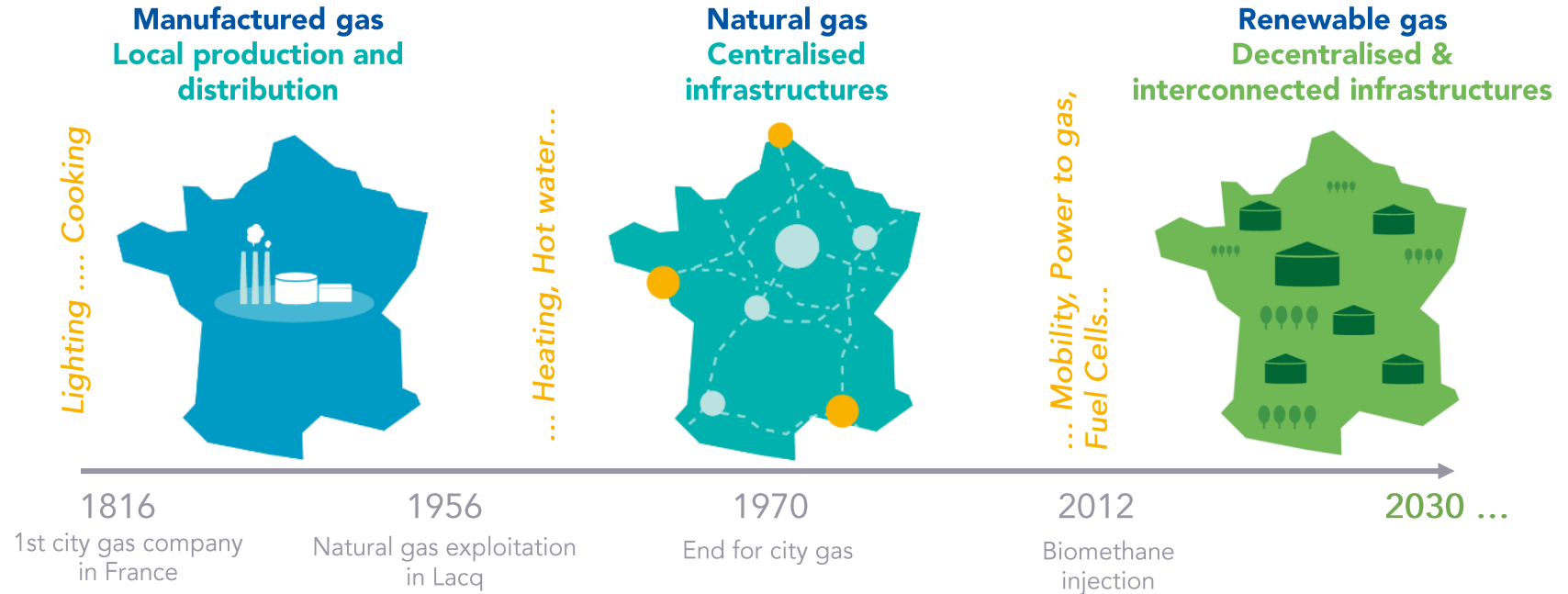
What is the energy consumption en France ?

By year in France...

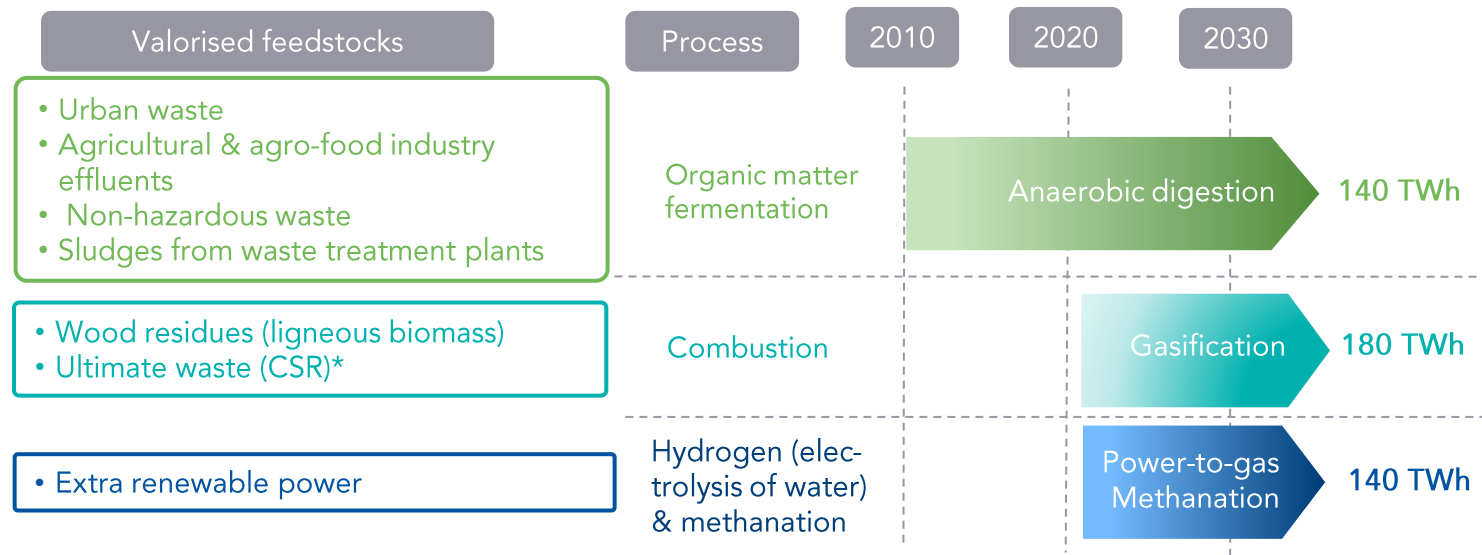
- ❑ Gas : 450 TWh (Heat, cooking, industry...)
- ❑ Electricity : 450 TWh (heat, cooling, TV...)
- ❑ Oil : 800 TWh (Mobility)
- ❑ Coal : 68 TWh (industry)

TWh : (TerraWatt Hour)

Vision & Strategy : towards the third gas revolution

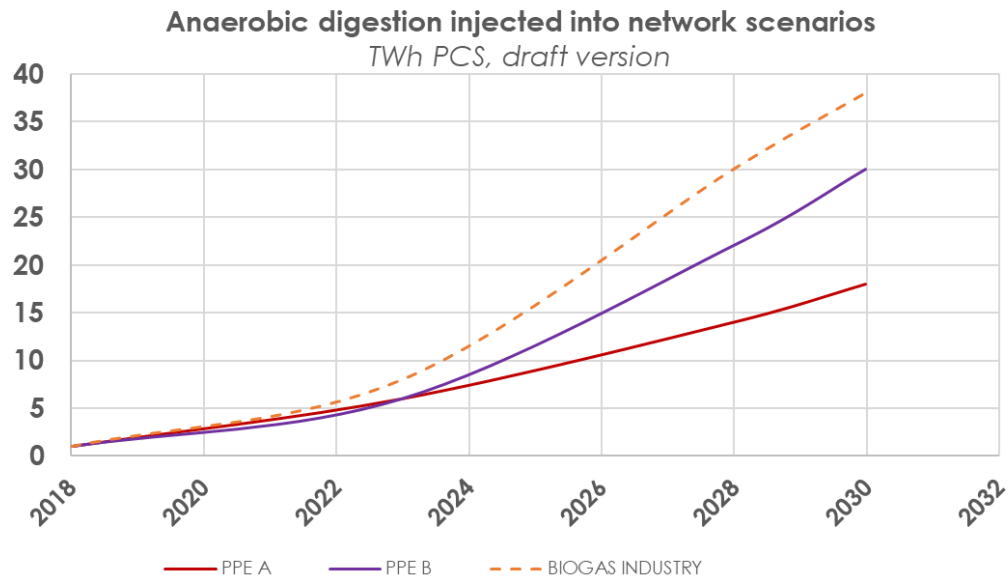


A potential of 460 TWh of renewable gas in 2050



According to the ADEME (Environment & Energy management Agency), 100% of the gas could be renewable in 2050

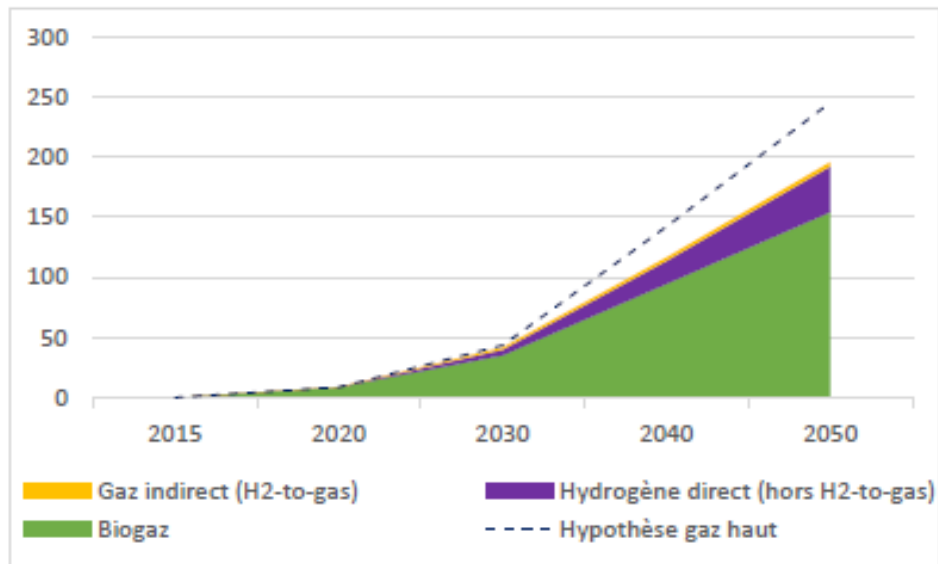
France is legally committed to reach at least 10% of biogas in total gas consumption in 2030



- France government is currently updating its energy policy and strategy, with updated renewables production targets.
- For biogas, the draft version, which should be officially enacted in the coming weeks, reinforces the current **10% objective of biogas in total gas consumption**.
 - Around **30 TWh** of biomethane produced by anaerobic digestion and injected into networks in 2030
- This objective is still lower than the target of **38 TWh** the biogas industry is promoting, mainly due to budget support constraints.

Renewable gas production outlook in 2050

H2 and renewable gas French production between 2015 and 2050
TWh PCS



- In order France to reach carbon neutrality in 2050, **between 190 and 250 TWh** of renewable gas and H2 will have to be produced, with a large part of anaerobic digestion
- **Almost 100% of the gas consumption in 2050 will then be decarbonized** (with the help of CCS/CCU)
- Some others studies will have to be done to evaluate what additional power-to-gas volumes could be produced.

Source : SNBC

Summary



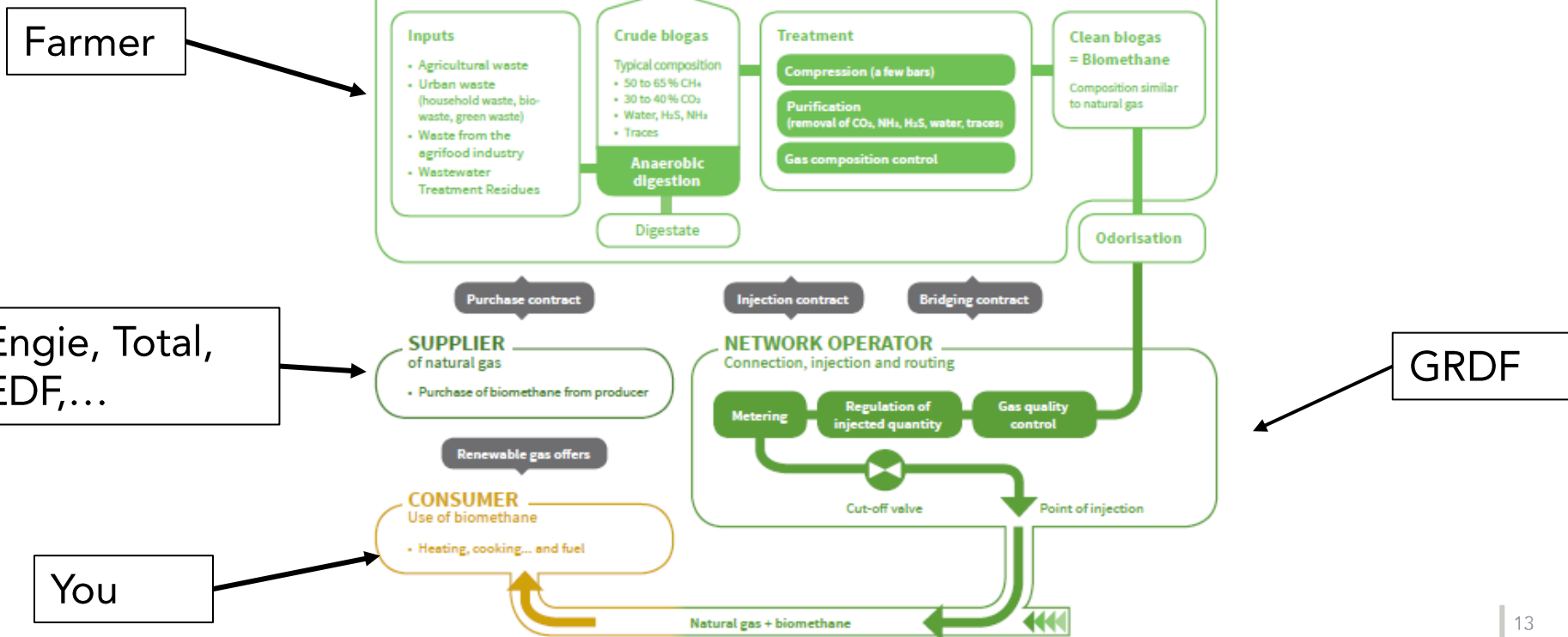
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From Waste to Biomethane injection



Anaerobic digestion : an ally for the circular economy and energy transition



Climate

Biomethane emits 23,4gCO₂/KWh, compared to 18 gCO₂/KWh for wind and 60,3 gCO₂/KWh for PV

Competitiveness

Decreases energy imports (70TWh) saving € 2 billion in France by 2030

Job creation

7 to 10 jobs created for each unit of biomethane production

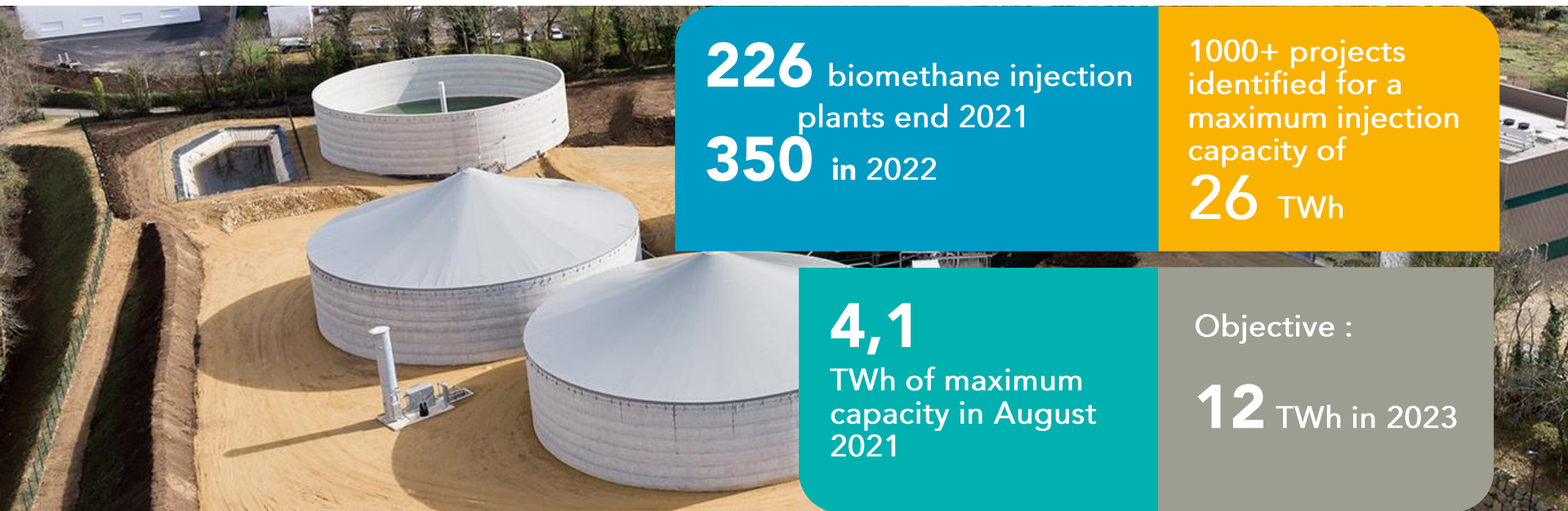
Sustainable agriculture

95% of waste transformed into digestate will be used as natural fertilizer

Anaerobic digestion provides high benefits to agricultural sector



Anaerobic digestion in France: a confirmed dynamic



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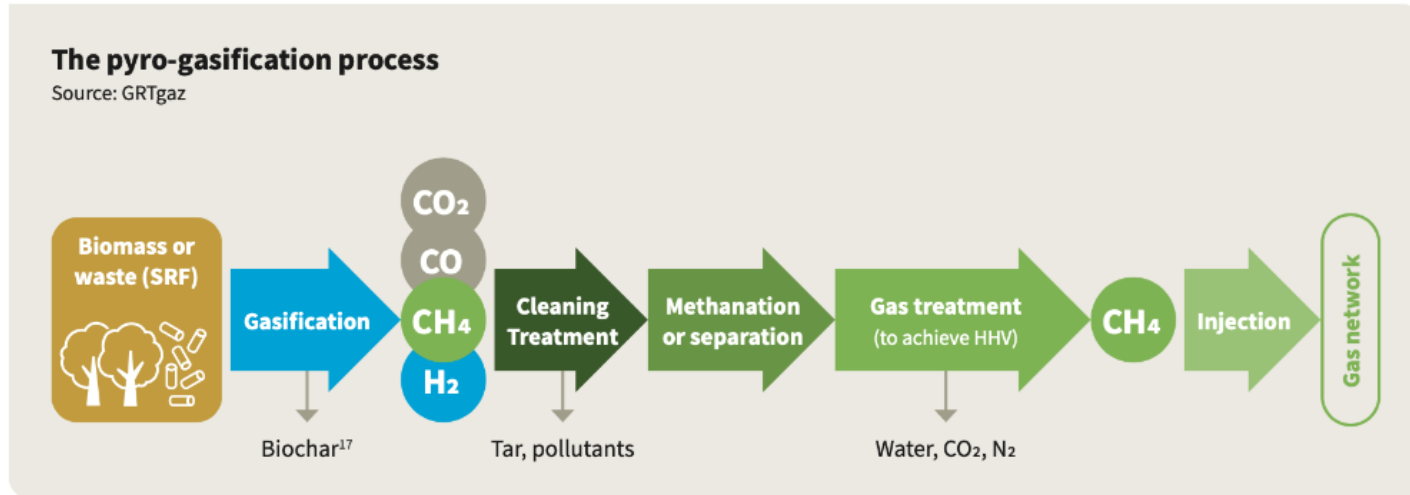
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Gasification

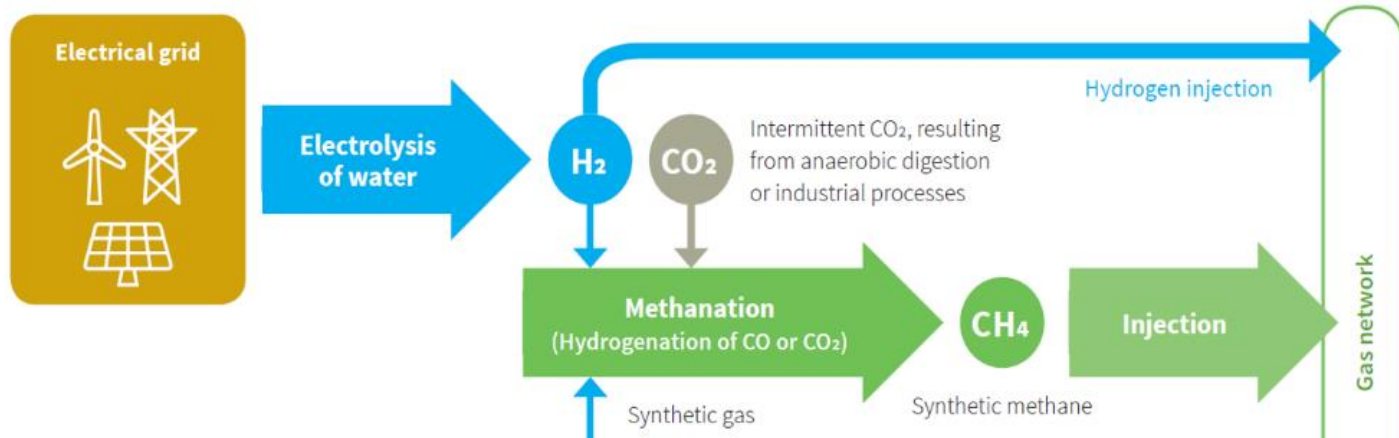
In the gasification process, **dry organic matter** – such as wood – is heated to **temperatures in the order of 1000° C**. A very small amount of oxygen is added (this can be in the form of air, a pure oxygen stream, carbon dioxide or steam) in order to allow the thermo-chemical reaction to occur, but in a low enough quantity to prevent any combustion from occurring.



Power-to-methane

Renewable energy facilities often produce more electricity than the power grid immediately needs. “Power-to-Gas” – often known as P2G – provides a method of storing the energy until it is required, allowing carbon-free energy to be used when it is needed, not just when it is generated.

Surplus renewable electricity is transformed into hydrogen by the electrolysis of water. The hydrogen can then be injected as is directly into the natural gas network, or it can be converted into synthetic methane through the industrial process of methanation, which consists in combining hydrogen with CO₂.



R&D for new process of CO₂ reduction to CH₄

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- Paris France.

Research Group "REACTE"
" Reactivity and Catalysis using
electron transfers "

