



Welcome
to the **Jupiter 1000** project
*First industrial Power-to-Gas
demonstrator in France*



Project Support :

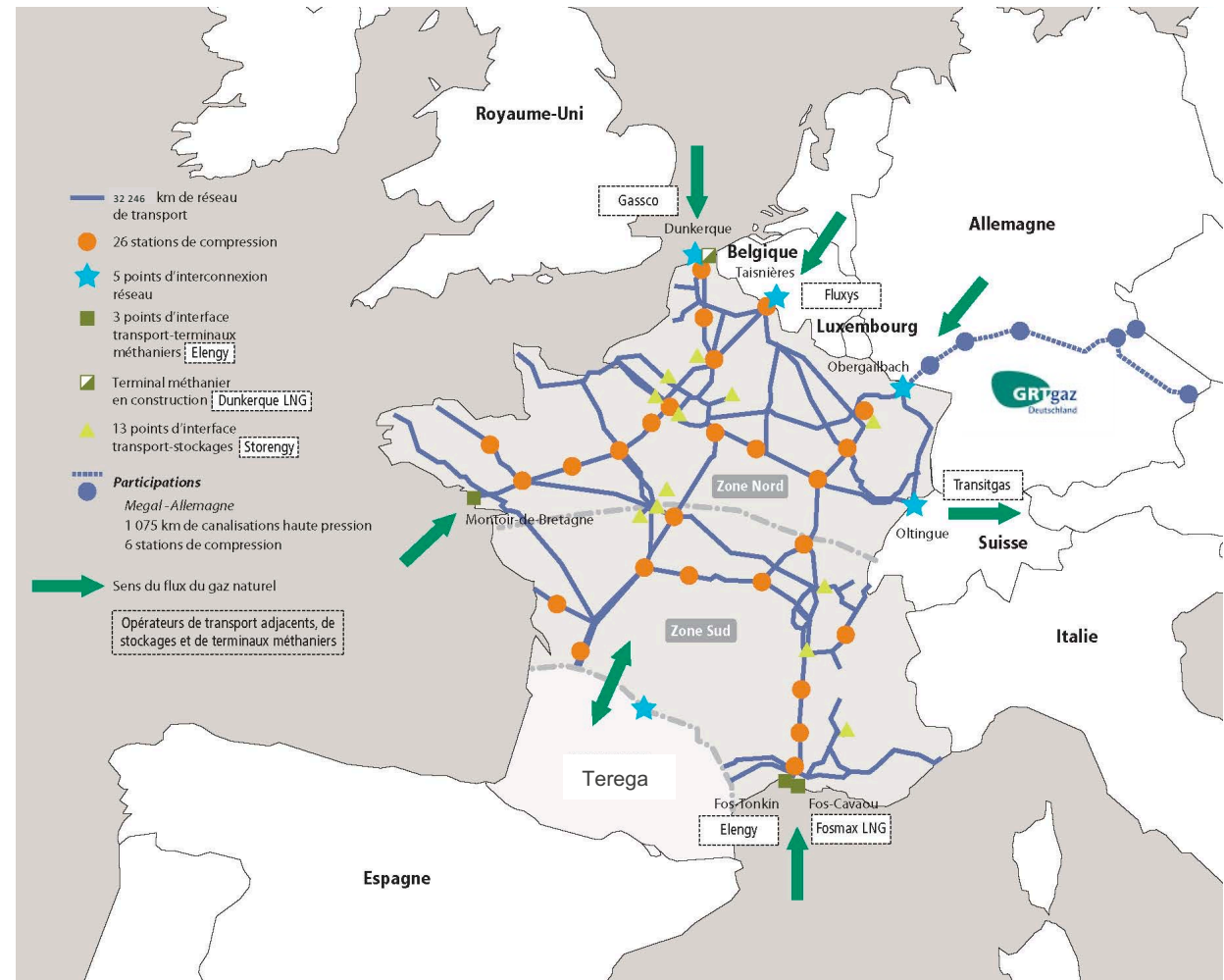


Fonds Européen de Développement Régional



GRTgaz : the main transmission system operator in France

- A regulated gas transmission company
- 3 330 employees
- **32 618 km** of high pressure pipelines
- 26 compression stations
- **708 TWh** of gas transported
- about 4500 gas delivery stations
- 703 industrial actors connected to the grid
- 2,535 billions € of turn over



Shareholders:

61 % 

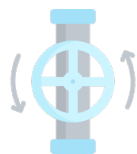
39 % Société d'Infrastructures Gazières



(2023 data – France only - see www.grtgaz.com)

Power-to-Gas : heart of an integrated strategy for Energy Transition

Gas Grid decarbonization



- Replace fossil gas by **renewable ones** (H2 or synthetic methane)
- **Adapt infrastructure and equipment**



- Experiment capture and **recycling of CO₂**

Power Grid support



- **Give a value** to electric surpluses due to intermittent renewable production
- Support **power grid stability**
- **Energy system optimization and Synergy**

Territorial development



- Replace imports with **local production**
- **Reduce the country's energy dependency**
- Develop **technological exports and local employment**

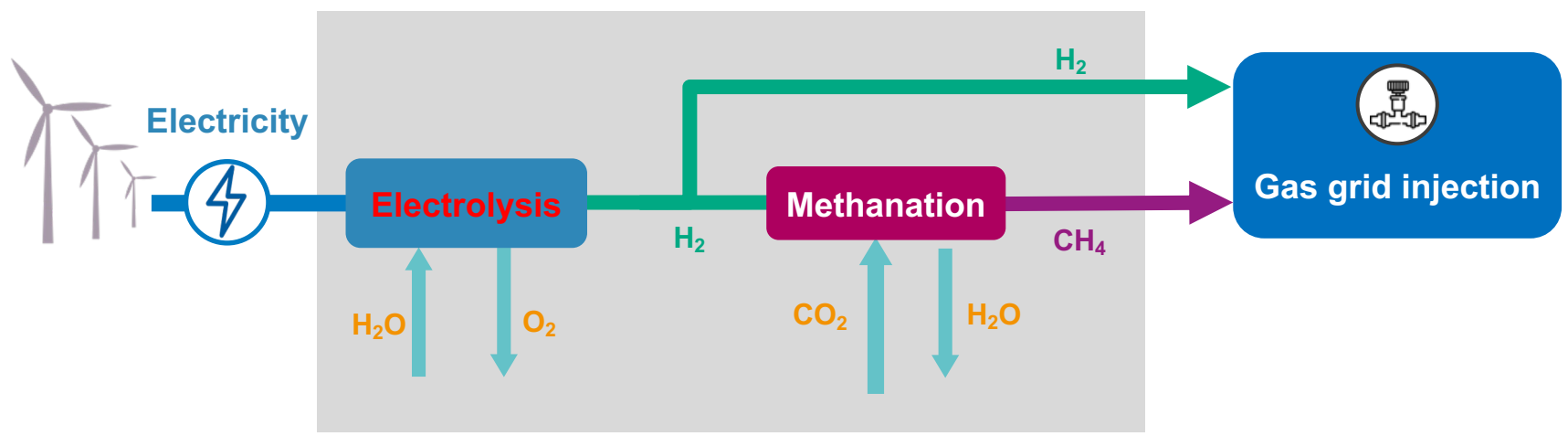
A strategy of grid integration at a country level, and the aim of global efficiency

About 50 projects spotted around Power to Gas technologies, mainly in Europe...

From Power ... to Gas !

When the gas grid offers the capacity to store massive renewable electrical surpluses

Power-to-Gas Jupiter 1000 process



Methanation improves synergies, with the possibility to store bigger volumes

Objectives of the demonstrator Jupiter 1000

The best way to convince is to achieve a proof



**Validate the processes
+ integration of a new gas
into the gas system**

- Validate the technologies :
electrolysers, methanation and CO2 capture
- Experiment hydrogen injection into the gas
grid
- Confirm the flexibility offered to support the
power grid



**Launch
the Power-To-Gas
sector in France**

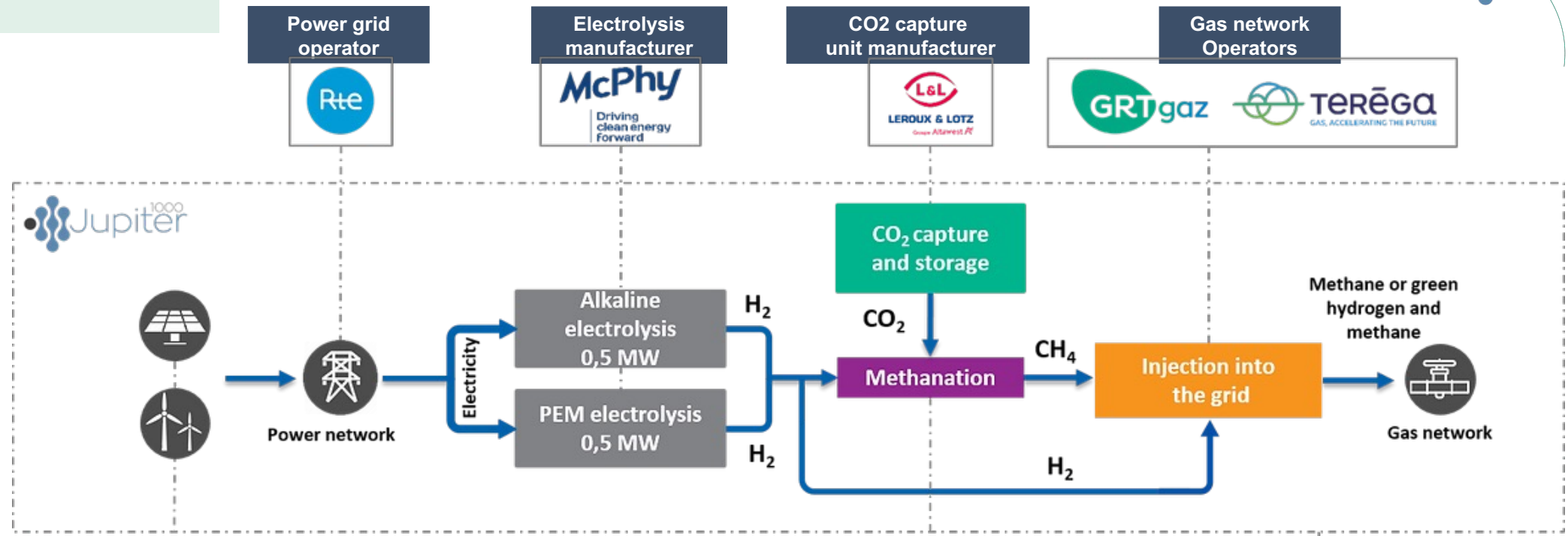
- Help to build suitable conditions for
the emergence of a new industrial
sector
- Feed the debate :
 - o Environmental benefits
 - o Impact of CO2 quality
 - o Guaranties of Origin
 - o ...



**Explore the
Business Model**

Jupiter 1000 - P2G players working together

The project is the result of the collaboration of 9 French industrial partners



Power grid operator
Rte

Electrolysis manufacturer
McPhy
Driving clean energy Forward

CO2 capture unit manufacturer
L&L
LEROUX & LOTZ
Group Altairvest PE

Gas network Operators
GRTgaz TEREGA
GAS, ACCELERATING THE FUTURE

Power producer
CAR

CMA CGM

Methanation manufacturer
KHIMOD ILCEN
cea

Marseille Fos

Harbour developer

1 MW_e
for 2 electrolyzers

200
Nm³/h of hydrogen

1 to 2 %
Average H₂ rate ...
Max 6 %

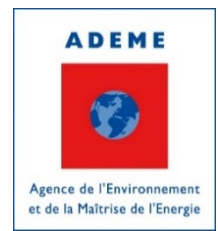
25
m³/h of methane

4 years
for tests

*Proton Exchange Membrane

The project is helped by local and institutional players

Financial support



Institutional partners



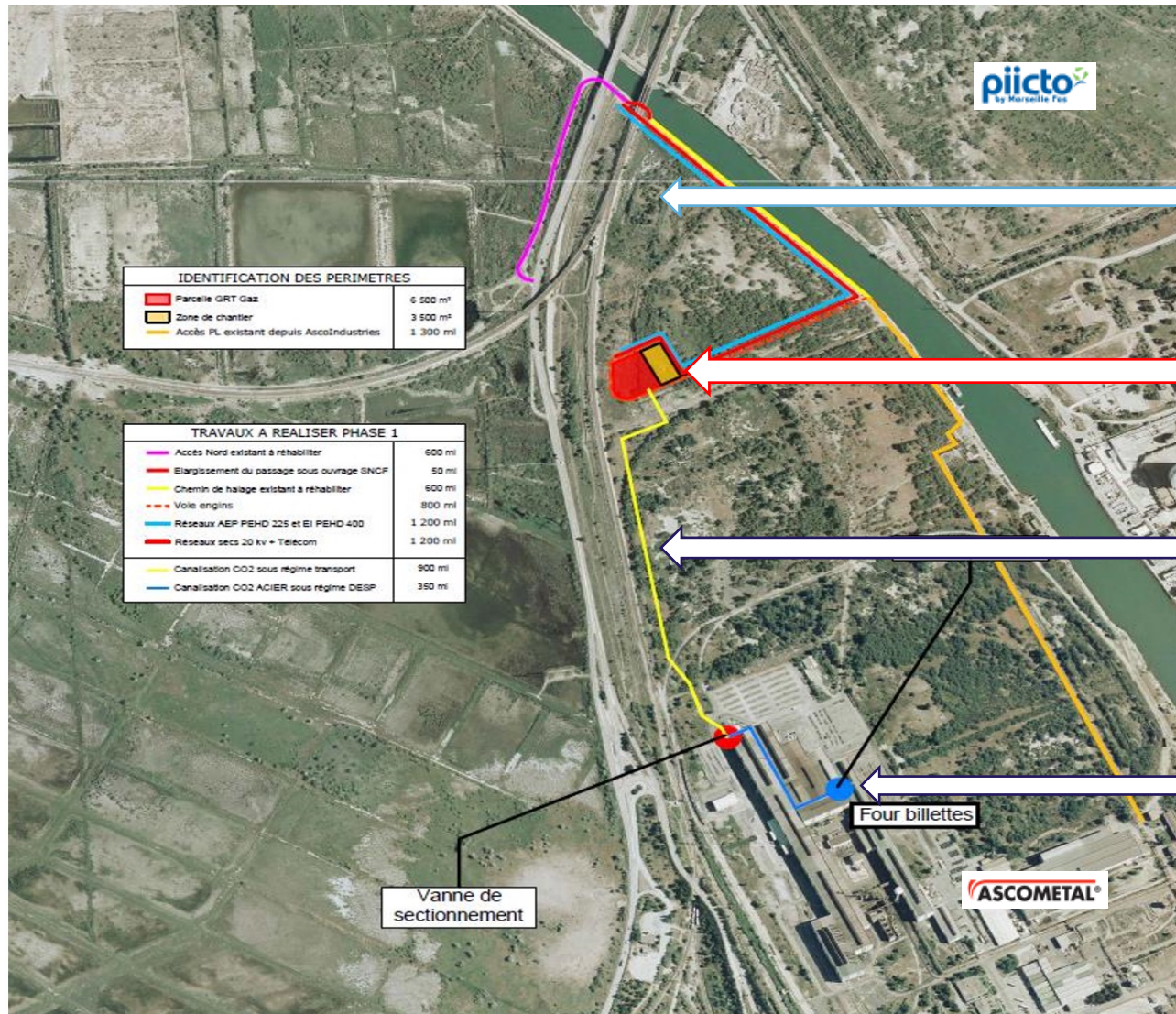
And with the active participation of industrial neighbours



The project is integrated in an environment supportive for innovative projects



CO₂ pipeline



Innovex Platform

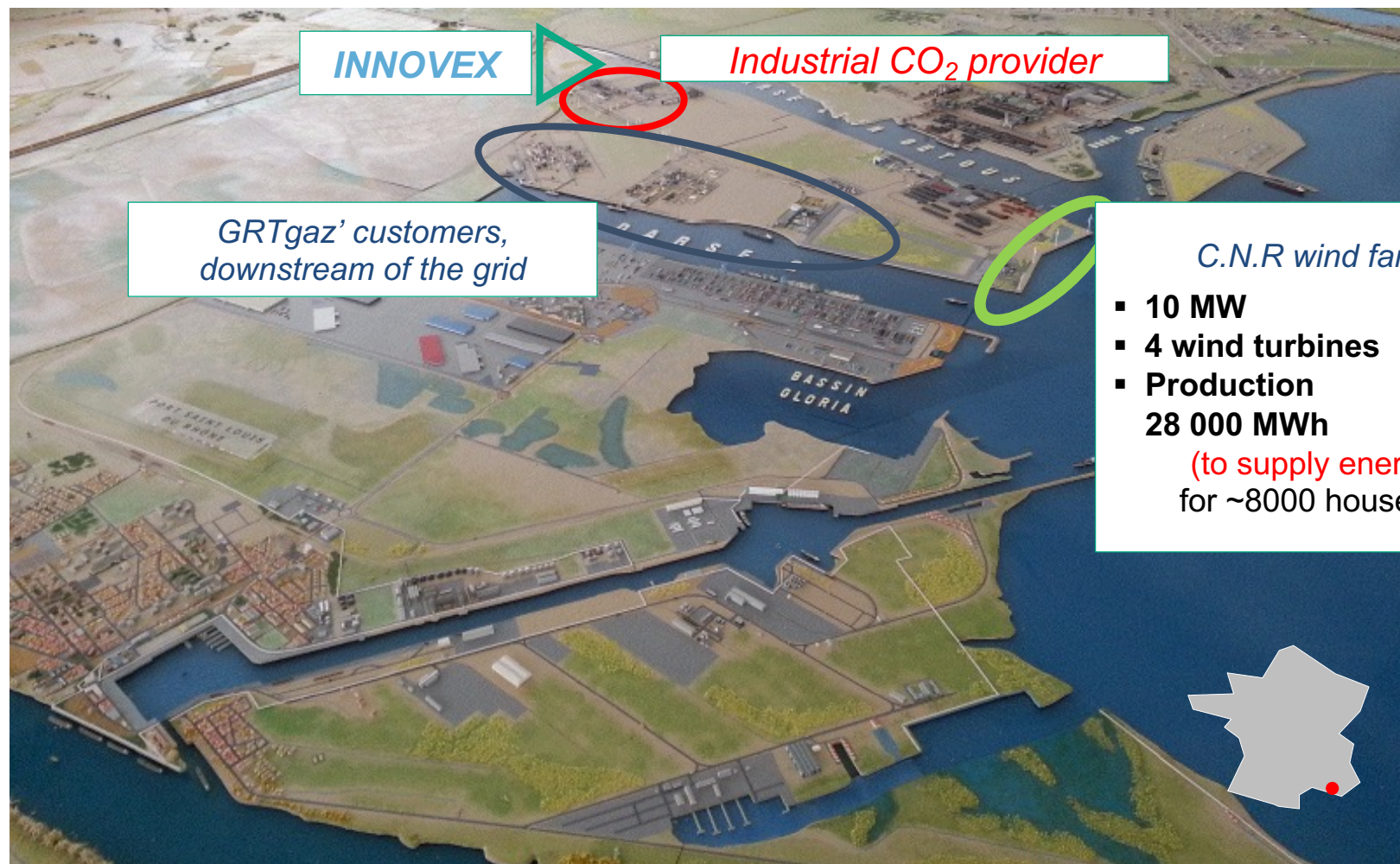
Jupiter¹⁰⁰⁰

CO₂ Pipeline

CO₂ Capture

An environment supportive for innovative projects

- The project is developed on the INNOVEX platform, up to increase synergies with the industrial neighbourhood
- Jupiter 1000 collaborates with industrial customers



The situation today ...



The alkaline electrolyser



The PEM electrolyser



The methanation device is settled

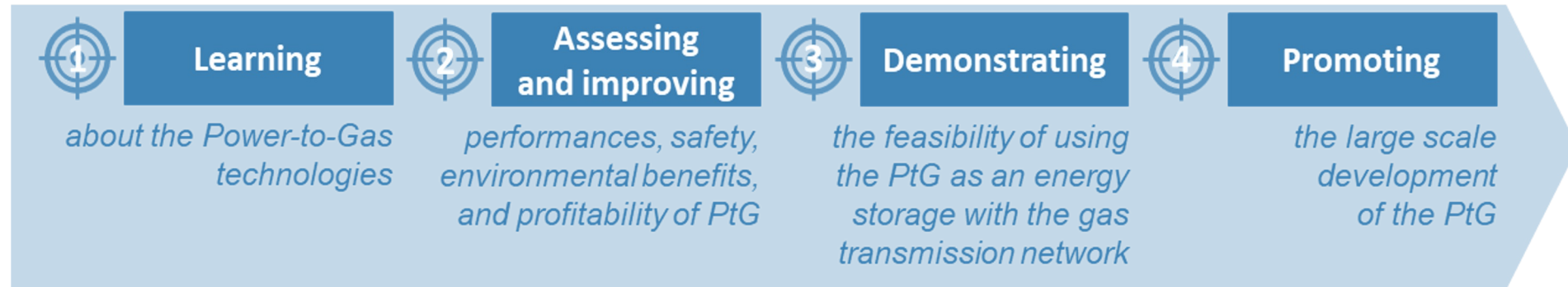


Hydrogen is injected in the grid since 02 2020


The best way to convince is to achieve a proof of concept.

Research & Development objectives and activities

Our objectives




Our activities

 **Performance of the assets**


- Measuring the **performances of the technologies**
- Testing a **smart remote control of the facilities**
- Evaluating the **economic and environmental benefits**

 **Reliability and durability**

- Learning from **the on-site field feedback**
- Preventing **failures** and protecting from their consequences
- Managing the **ageing of critical parts**

 **Impacts of H₂ on assets**

- Monitoring effects on the **equipment items**
- Monitoring effects on the **pipelines**
- Monitoring effects for **downstream consumers**

 **State of the art and good practice**

- Identifying **technological trends**
- Providing **educational equipment**
- Promoting **good safety practice**

Planning of R&D activities

End of tests & studies : 2024



	<h2>Performance of the assets</h2>	2022 and 2023	<ul style="list-style-type: none"> ➤ End of alkaline electrolyser testing ➤ Tests on the PEM electrolyser, the methanation plant, the "smart" remote control ➤ Update of preliminary studies/analyses with real data and feedback
First lesson-learned	<ul style="list-style-type: none"> ✓ Alkaline & PEM electrolyser tests ✓ Preliminary technical and economic study ✓ Preliminary life cycle assessment (LCA) 		
	<h2>Reliability and durability</h2>	2022 and 2023	<ul style="list-style-type: none"> ➤ Continued monitoring of incidents and failures ➤ Investigation of the most critical failures ➤ Reliability analysis of technologies
First lesson-learned	<ul style="list-style-type: none"> ✓ Implementation of incident and failure monitoring ✓ First studies on the reliability of equipment ✓ Bibliographical study on degradations 		
	<h2>Impacts of H₂ on assets</h2>	2022 and 2023	<ul style="list-style-type: none"> ➤ Continued testing (sampling) ➤ Continued exchanges with downstream users ➤ Specific measurements at the gas network outlet
First lesson-learned	<ul style="list-style-type: none"> ✓ First tests (test tubes, sleeves, inspections), and exchanges with downstream users ✓ To date, no noticeable effects of H₂ on pipes and industrial customers.(hydrogen volume <2%) 		
	<h2>State of the art and good practices</h2>	2022 and 2023	<ul style="list-style-type: none"> ➤ Continuation of the state of the art on Power-to-Gas ➤ Generic "risk study" of Power-to-Gas ➤ Tests and measurements on H₂ leakage control ➤ Recommendations for the design, operation and maintenance of a Power-to-Gas installation
First lesson-learned	<ul style="list-style-type: none"> ✓ First achievements on the state of the art ✓ Organization of work on risk analysis ✓ Development of H₂ safety training 		

And after 2024 ?

2 main focus areas to be considered

Platform for GRTgaz and other gas transmission system operators

Test center for hydrogen equipment (electrolyser, gas analysers, valves...)



