# RENEWABLE HYDROGEN IN TERRITORIAL ECOSYSTEMS
# A KEY SOLUTION FOR ENERGY TRANSITION

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storengy
A company of ENGIE

# STORENGY PROVIDES HIS CUSTOMERS WITH INNOVATIVE PRODUCTS DESIGNED THANKS TO HIS EXPERIENCE AND HIS TECHNICAL OPERATIONAL EXPERTISE

**Natural gas storage**


**Renewable gas production and storage**

**Geothermal solutions**

**Provide flexibility : over 60 years of expertise**

**Innovate and Develop alternative solutions**

**UNIQUE TECHNICAL EXPERTISE + COMMERCIAL OFFER CREATING VALUE = COMPETITIVE ADVANTAGE**

# STORENGY DEVELOPS YOUR TERRITORIAL ENERGY ECOSYSTEMS

Wind, Solar

Renewable electricity

Hydraulic

Geothermal

Renewable heat

Methanisation

Industry

By-products or Recoverable Wastes

$CO_2$, recoverable heat, Hydrogen as a by-product

**Enhance my land potential**

Hydrogen

Hydrogen

Synthetic Methane, Biomethane

Synthetic Methane, Biomethane, Heat, Electricity

**Industrial Hydrogen Consumption**

**Hydrogen Green Mobility**
Buses, Refuse trucks, trains, vehicles, forklifts

**BIO-NGV Green Mobility**
Buses, trucks, vehicles

**Energy uses (Heat, Electricity, Gas)**

**Integrator** **Investor** **Operator** **Pilot** **Expertise**

# STORENGY STRONGLY INVOLVED IN SEVERAL HYDROGEN AND POWER-TO-GAS PROJECTS

**VANGUARD**
*Mobility (refuse trucks)*

**CENTURION** Innovate UK

**Hysecure** Inovyn

**HYCAUNAIS**
*Injection into the gas grid*
*Mobility*

**METHYCENTRE**
*Injection into the gas grid*
*Mobility*

**CHATEAUROUX (HYBER)**
*Mobility (buses, frigovans, trucks, vehicles)*

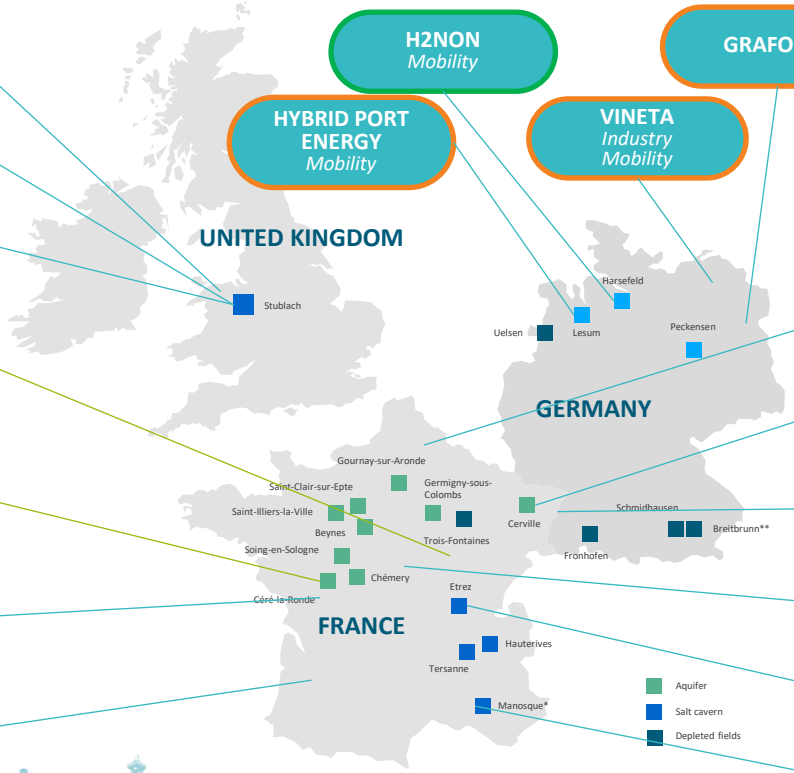
**NOUVELLE-AQUITAINE (MHYNA)**
*Industry*
*Mobility (buses, refuse trucks, Vehicles, trains)*

**H2NON**
*Mobility*

**GRAFORCE**

**HYBRID PORT ENERGY**
*Mobility*

**VINETA**
*Industry*
*Mobility*




**HAUTS-DE-FRANCE (ETHYR H2 HDF)**
*Industry*
*Mobility (buses, vehicles, forklifts)*

**EMIL'HY (Grand Est)**
*Industry*
*Mobility*

**HYCOLOGIE**
*Industry*
*Mobility (trains, buses, vehicles, boats)*

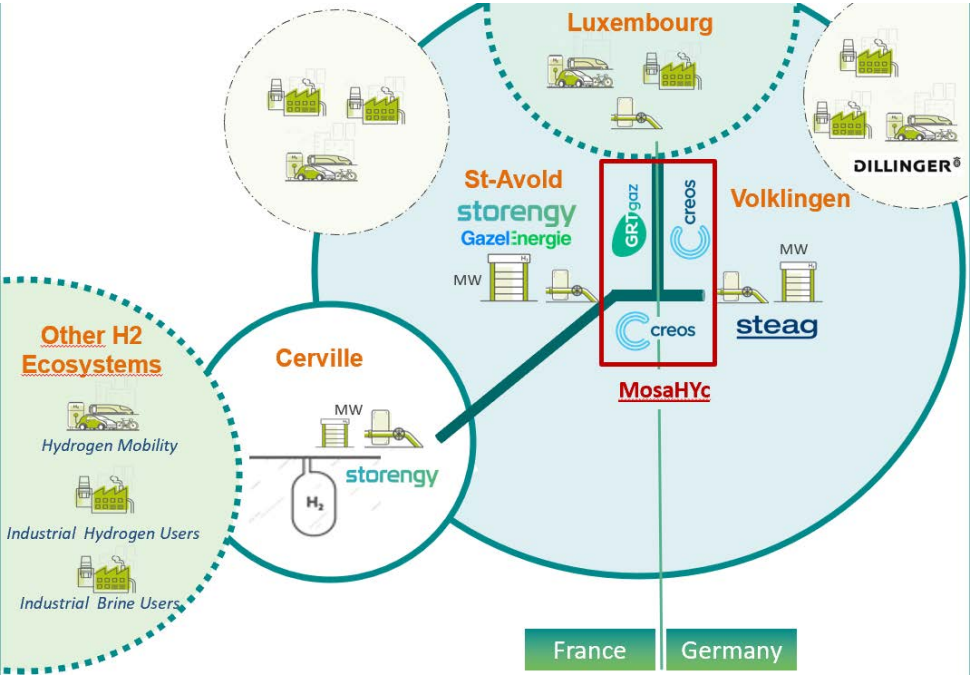
**BOURGOGNE FRANCHE-COMTE**
*Mobility (refuse trucks)*

**HYPSTER**
*Industry*
*Mobility*

**HYGREEN PROVENCE**
*Industry*
*Mobility*

- Hydrogen
- Synthetic Methane
- Production and storage of hydrogen above ground for industrial and mobility uses
- Projects with Underground Hydrogen Storage

# EMIL'HY, A RENEWABLE H2 FRANCO-GERMAN PROJECT WITH A WHOLE VALUE CHAIN




| | 2023 | 2025 |
|---|---|---|
| **Electrolyser** | Up to 5+2 MW (electrolysers in Saint-Avold and in Cerville) | 50 to 100 MW |
| **Storage** | N/A | 1 or several salt caverns at Cerville (≥ 9 tons of hydrogen) |
| **Pipeline** | Synergy with MosaHyc project | Dedicated H2 pipeline from Saint-Avold to Cerville + synergy with MosaHYc |

**Link with several Franco-German projects with H2 industrial and clean mobility uses :**

- German project at Völklingen (17 MW, STEAG),
- Hycologie project in France (Grand Est, Storengy),
- Hycaunais project in France (Auxerre, Storengy).

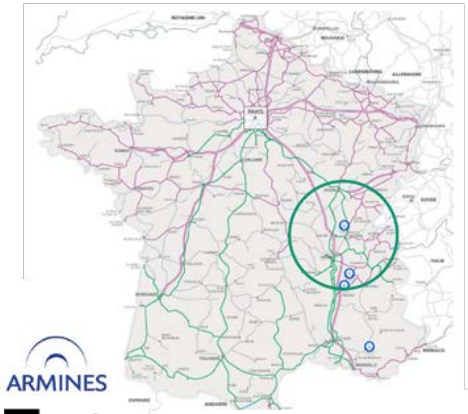
**Uses :**

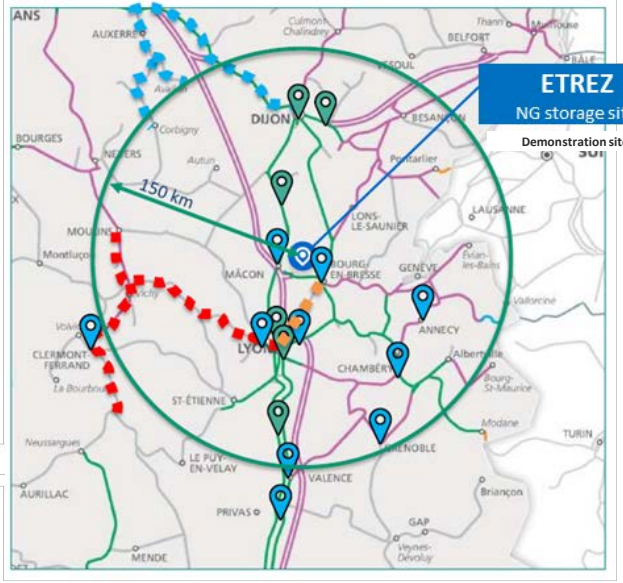
- Industrial consumption in France + Dillinger in Germany,
- Hydrogen mobility (Trains, Buses, Refuse Trucks, vehicles, etc.) in several cities. 15 buses already planned on the territory.
- H2 storage and back-up of Cerville shared between all neighbouring or linked projects.

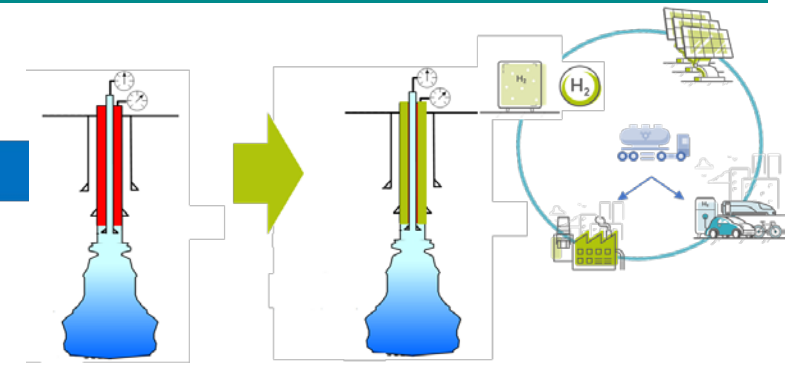
# HYPSTER: PAVE THE WAY FOR MASSIVE HYDROGEN PRODUCTION & STORAGE IN EUROPE

***Industrial-scale operation of H2 production & cyclic H2 storage in salt caverns to support the emergence of the hydrogen energy economy in Europe***

## A site in interaction with a local hydrogen ecosystems




Current non-operated EZ53 salt cavern

**1 MW electrolysis**
**Up to 40 tons H2 storage capacity (cyclic storage)**
**H2 transport materials to deliver local clients: industry and mobility**

**Supply H2 to local customers : industrials and refueling stations**

**Provide renewable hydrogen back-up on the territory**

**A project supported by local H2 ecosystems**

Are you interested in hydrogen (mobility, industrial consumption…)?

Let’s talk about it !

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# APPENDICES

# HYCOLOGIE : HYDROGEN PRODUCED LOCALLY BY ELECTROLYSIS OF BRINE FOR THE NEEDS OF GRAND EST REGION

**Description**

Hydrogen is the by-product of the electrolysis of brine process of a local enterprise. It will be used by a neighbouring industrial consumer and by public and regional hydrogen mobility.

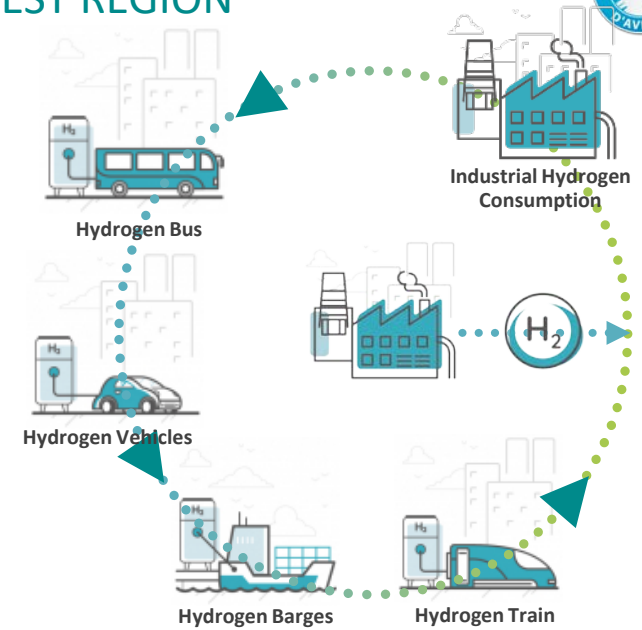
**Objectives**

- ✓ Create a circular economy by recovering waste hydrogen
- ✓ Improve carbon footprint of the transport and industrial sector in the region
- ✓ Develop an innovative, effective and replicable hydrogen ecosystem

**Stakeholdes**

- ✓ **PPC (POTASSE ET PRODUITS CHIMIQUES)**
- ✓ **ENGIE (STORENGY, ENGIE COFELY)**
- ✓ **PETR (Pays Thur Doller)**

With the support of **Pôle Véhicule du Futur**




**Capacity : 500 tons of hydrogen / year (4 MW)**

**Winner of ADEME H2 Industry Call for Projects (June 2019)**

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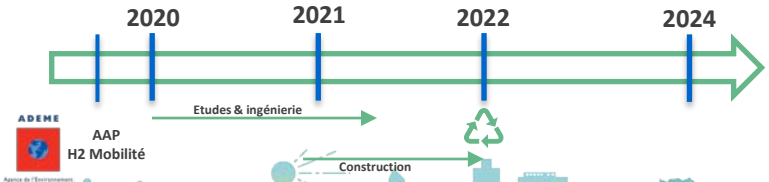
# HYBER : ÉCOSYSTÈME DE MOBILITÉ HYDROGÈNE DE L'INDRE


- Les partenaires du projet

- Les chiffres clés

**100%** d'énergie renouvelable
**130 tonnes d' $H_2$** par an
**6 bus et + de 100 véhicules $H_2$** à horizon 2022
**950 tonnes d'émission $CO_2$** évitées par an

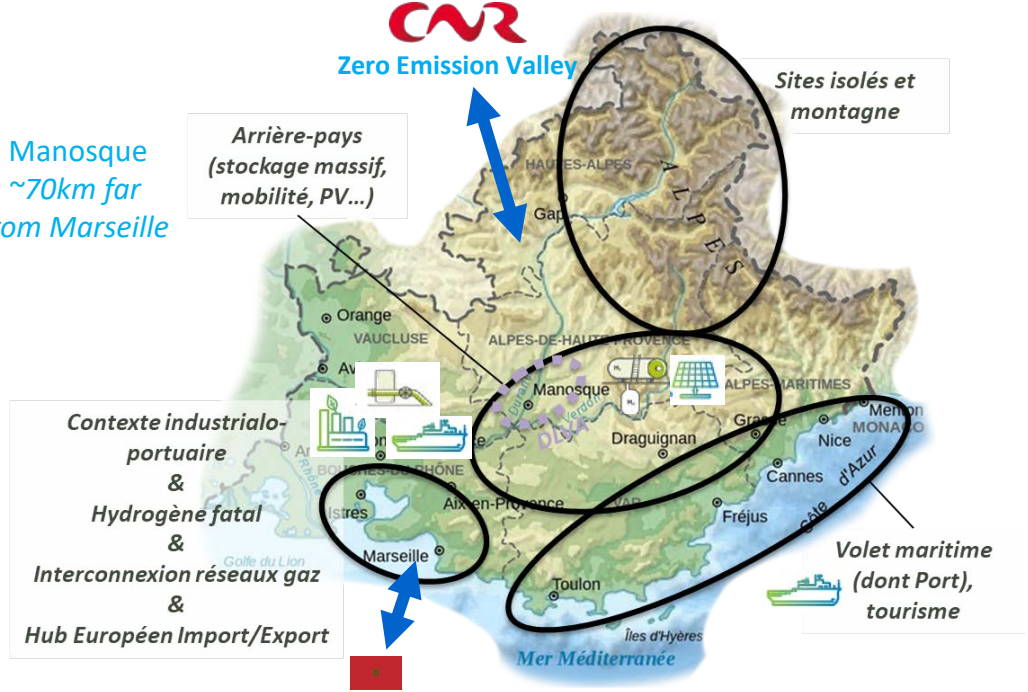
- Calendrier de réalisation



## Hydrogen for the territory, by the territory

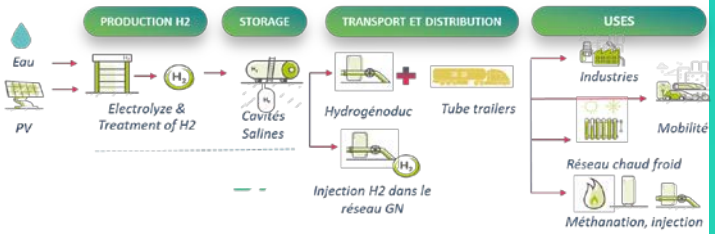
Zero Emission Valley

Manosque
~70km far
from Marseille




### A development with several phases :

| Phase | Dates | Electrolysis MW | Tons $H_2$ / year |
|---|---|---|---|
| 1 | 2020 - 2022 | 1,5 | 200 |
| 2 | 2022 - 2026 | 250 | 27 500 |
| 3 | 2026 - 2028 | 400 | 44 000 |




**H2 massification – Unique project combining solar PV, électrolysis, storage in existing salt caverns and hydrogenoduc**

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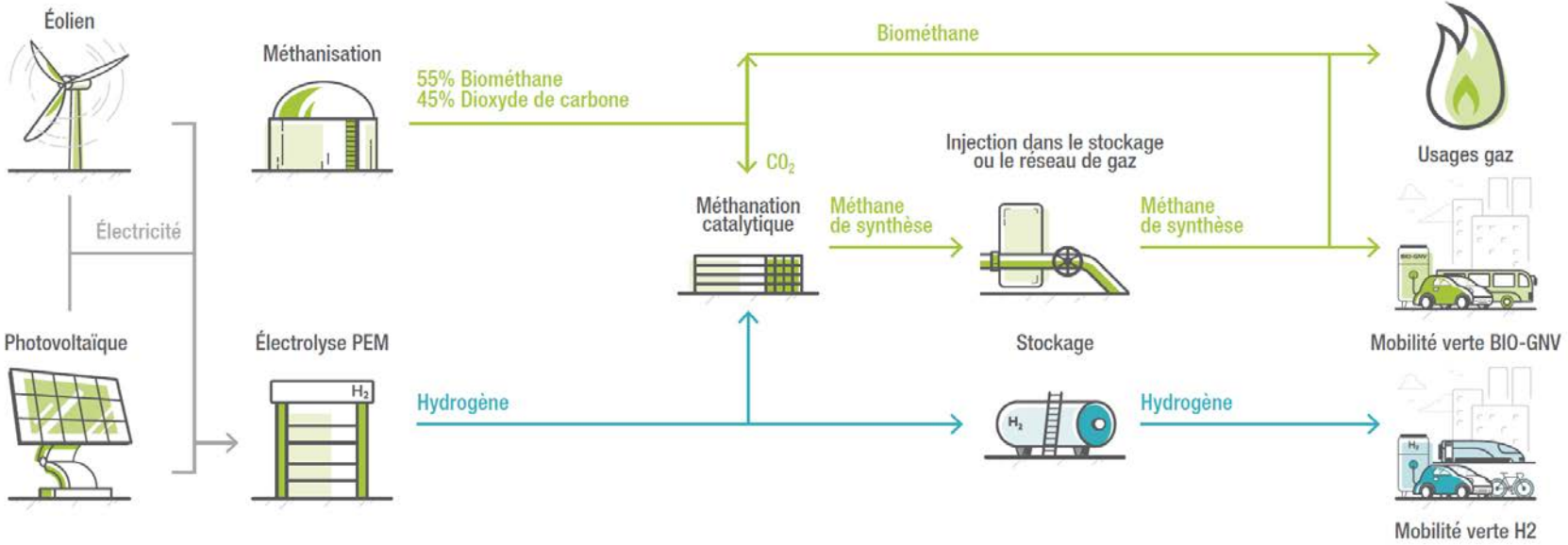
# **MÉTHYCENTRE** – RÉGION CENTRE-VAL DE LOIRE – PRÈS DU SITE STORENGY DE CÉRÉ-LA-RONDE

MÉTHYCENTRE



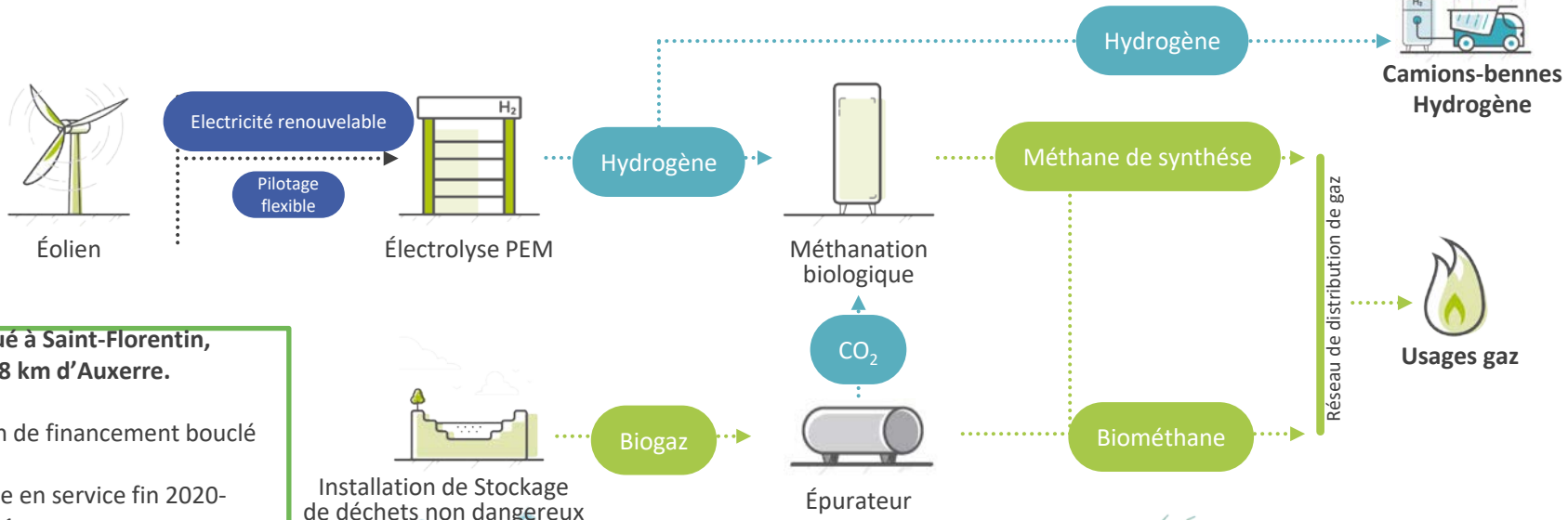

- Plan de financement bouclé
- Mise en service fin 2020-2021

# HYCAUNAIS – PRÈS D'AUXERRE
# RÉGION BOURGOGNE FRANCHE-COMTÉ

**Piloté par Storengy,** Hycaunais propose 3 gaz renouvelables (hydrogène, biométhane et méthane de synthèse) pour des usages mobilité verte et injection réseau. Ce projet valorise le $CO_2$ fatal présent sur le site d'enfouissement de Saint-Florentin en utilisant un processus de méthanation.

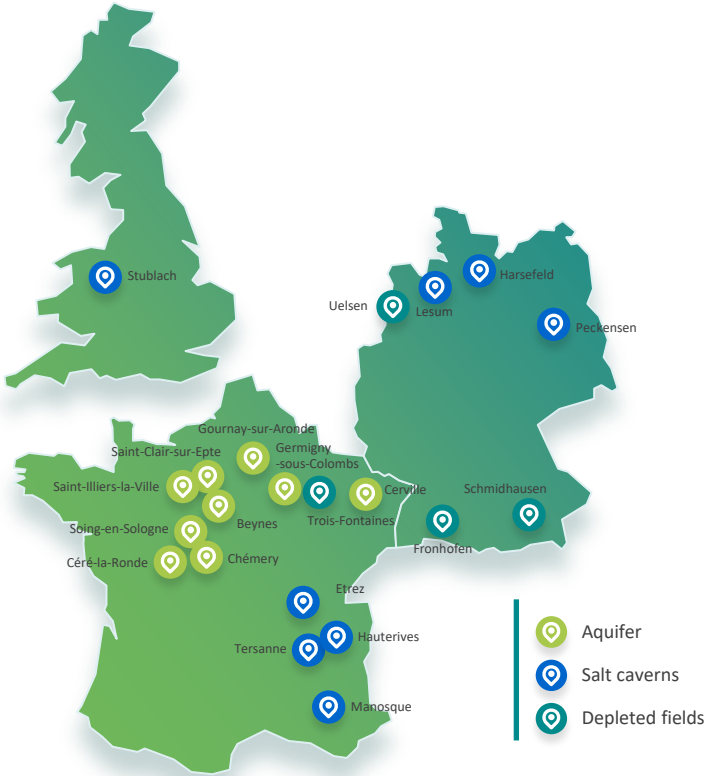
**Ce projet couple électrolyse, méthanation et méthanisation :**

- L'hydrogène nécessaire à ce procédé est produit à partir d'électricité éolienne. Une partie de l'hydrogène pourrait alimenter des stations de mobilité verte.
- Le méthane de synthèse produit sera injecté dans le réseau et les gaz renouvelables produits alimenteront des stations de mobilité verte




- **Situé à Saint-Florentin, à 28 km d'Auxerre.**
- Plan de financement bouclé
- Mise en service fin 2020-2021

# 21 STORAGE SITES, 3 TECHNOLOGIES




**1rst**
underground storage operator in Europe

**4th**
underground storage operator in Europe

$T_f = 2$
Global frequency rate in 2019

**+1 000**
Employees