



IEA Bioenergy
Technology Collaboration Programme



Country Report FRANCE

IEA Task 33 Business meeting

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Chourouk NAIT SAIDI
ATEE

Lyon, France

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OUTLINE

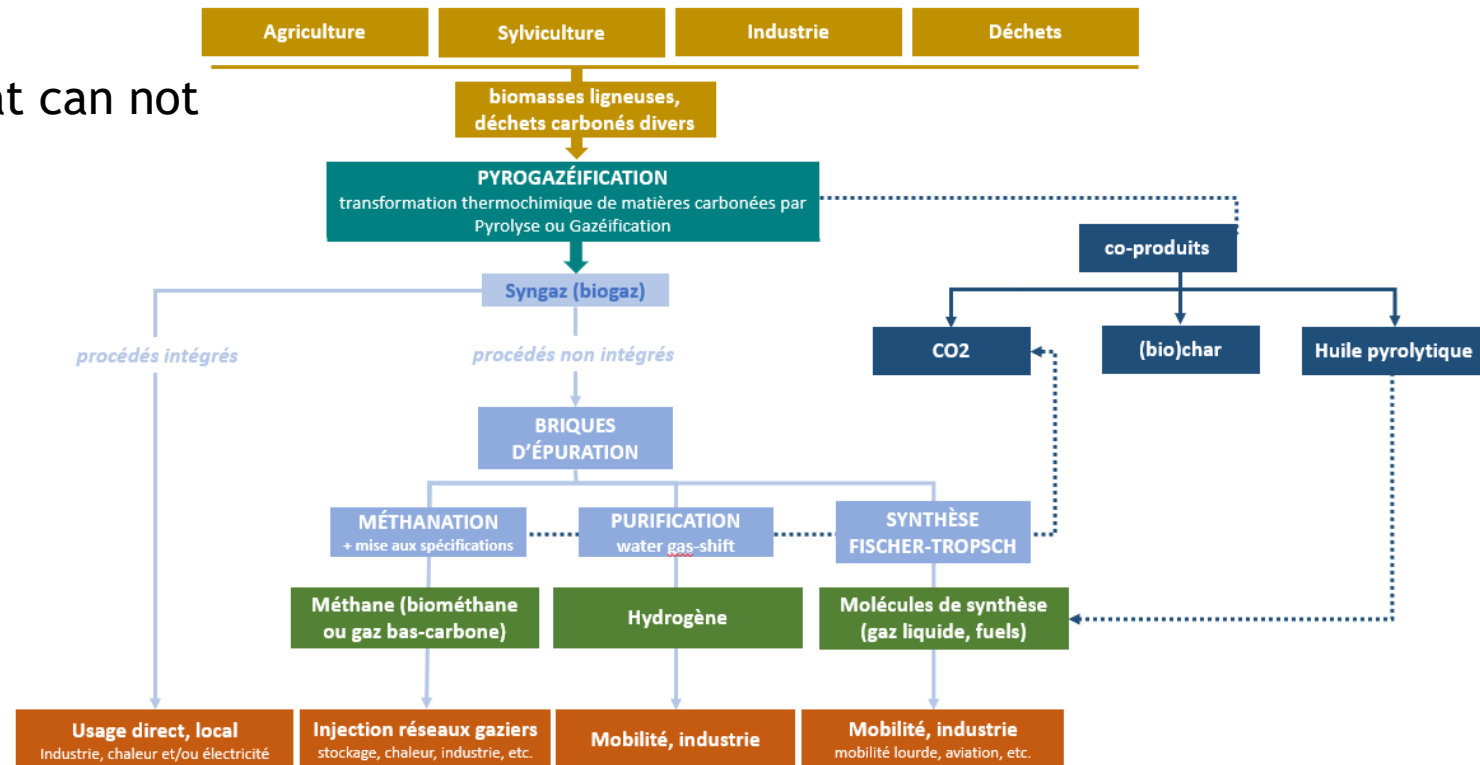
- What are the “pyrogasification” technologies definition in France?
- Funding mechanisms in France
- Update on Commercial projects
- Research on gasification
- Overview of gasification facilities

What are the “pyrogasification” technologies definition in France?

The gasification sector is attracting interest because it responds to two issues

- A new alternative energy production
- Waste management: an outlet for waste that can not be recycled

1. **PYROLYSIS** (400°C - 800°C) is a thermal treatment of dry carbonaceous materials, in the absence of oxygen, producing a gaseous ("syngas"), liquid (oil) and solid (bio)char phase.
2. **GASIFICATION** (900°C - 1400°C) is the process of transforming a solid carbonaceous material into syngas by adding a small amount of oxygen or steam.
3. **PYRO-GASIFICATION** is a process of pyrolysis followed by gasification.



Funding mechanisms in France

Biomethane financial support systems

Call for projects pyrogasification
syngaz (biomethane) grid
injection 2023

- Support first commercial plants with pyrolysis and gasification technologies for the production of syngaz
- Feed-in tariff support for grid injection
- Feedstocks: biomass, waste woody biomass, non recycled plastics waste (RDF)
- Guarantee of origin => the state own it

Biomethane tender 2023/2024

- New decree → extends the obligation to purchase by biomethane tender to all biomethane production technologies
- Feed-in tariff support for grid injection
- Used for Anaerobic digestion plant >25GWh
- Guarantee of origin => the supplier own it

BPA (Biogaz Purchase Agreements)
2023

- Private law contract with no state support
- Guarantee of origin => the supplier own it
- Can be used in ETS system
- Can be used in the maritime sector

CPB (biogaz production
certificate)
2026

- No state support
- No Guarantee of origin
- Fixed obligation from state for energy suppliers to buy biomethane
- The exceeded amount can be used in EU ETS (**European Union Emissions Trading System**)

Funding mechanisms in France

Bio hydrogen financial support systems

1. ADEME call for projects [Écosystèmes territoriaux hydrogène - EcosysH₂](#) (2023)



Call for projects “Hydrogen Territorial Ecosystems” for the production of hydrogen by pyrolysis/gasification of biomass, on an exploratory basis. Plant capacities must be less than 10,000 tons/year.

The admissibility of applications will be assessed by ADEME. Capex financial support will be given for the accepted candidate.

2. ADEME call for projects Technology bricks and hydrogen demonstrators (2023/2024)
Technology building blocks: innovative components and systems

Projects can focus on any link in the hydrogen technology chain, from production to end use, for applications in industry, transport and mobility, energy or networks (non-exhaustive list, given by way of illustration):

- Components and systems linked to hydrogen production: electrolysis, methane pyrolysis, thermochemical processes (pyrogasification) using biomass without conflict of use, justifying the absence of local pressure on the resource

The admissibility of applications will be assessed by ADEME. Capex financial support will be given for the accepted candidate.

Funding mechanisms in France

CHP and Syngaz direct use financial support systems



- Stakeholders → Pyrolysis and gasification for direct use of syngas
- In 2023 ADEME the pyrolysis and gasification process are still ineligible for the Heat funds for industry, agriculture and service sectors called “Fonds Chaleur - BCIAT”
- Discussions underway with governments on the treatment of pyrogasification for direct use and the opening of the BCIAT in 2024 to pyrolysis and gasification technologies.

APPELS À PROJETS - EN COURS
(jusqu'au 28/09/2023 - 15:00 - Heure de Paris)

BCIAT 2023 - Biomasse chaleur pour l'industrie, l'agriculture et le tertiaire

ADEME, the french ecological transition agency, offers financial assistance for ecological transition projects via several financing levers such as Fonds Chaleur, Fonds Économie Circulaire, Fonds Air Bois and France 2030.

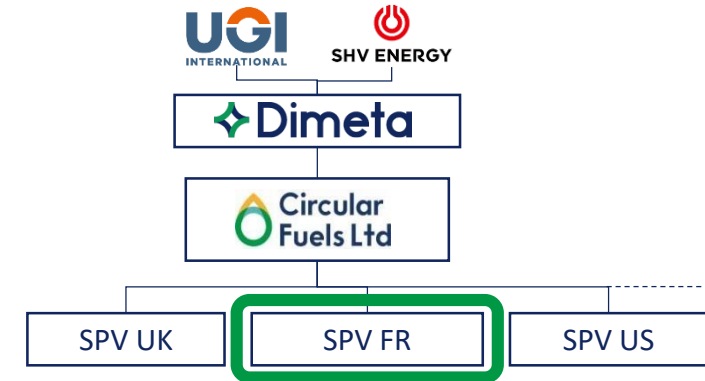
Upcoming projects

Production of liquid gaz or DME (Dimethyl ether)

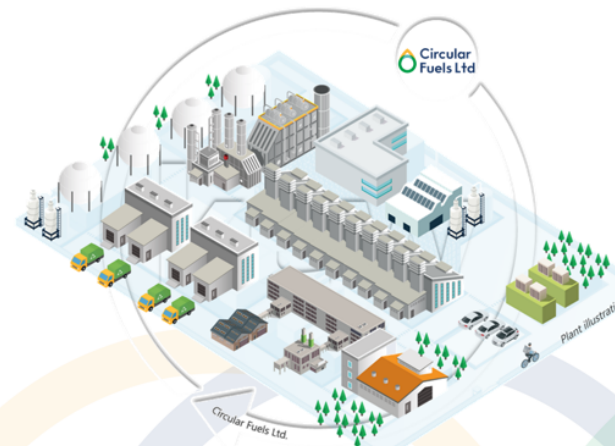
Commercial-scale gasification plant (20.000ton/year RDF) in operation

Standardization strategy with **no scale-up/down** of current configuration

Commercial development based on the **industrial skids pre-manufacturing** of gasification plant



LARGE SCALE PROJECTS FEATURES



50.000 ton / year DME

Nr.11 KEW's ACT modules

85-90MW fuel input
eq. 250.000 tons/year RDF

Area 100.000sqm

6-9 MWe of auxiliary consumption

Feedstock flexibility:

- MSW RDF
- C&I RDF
- Digestate
- Sludge
- Low grade biomass

Upcoming projects

BioTJet project for production of SAF

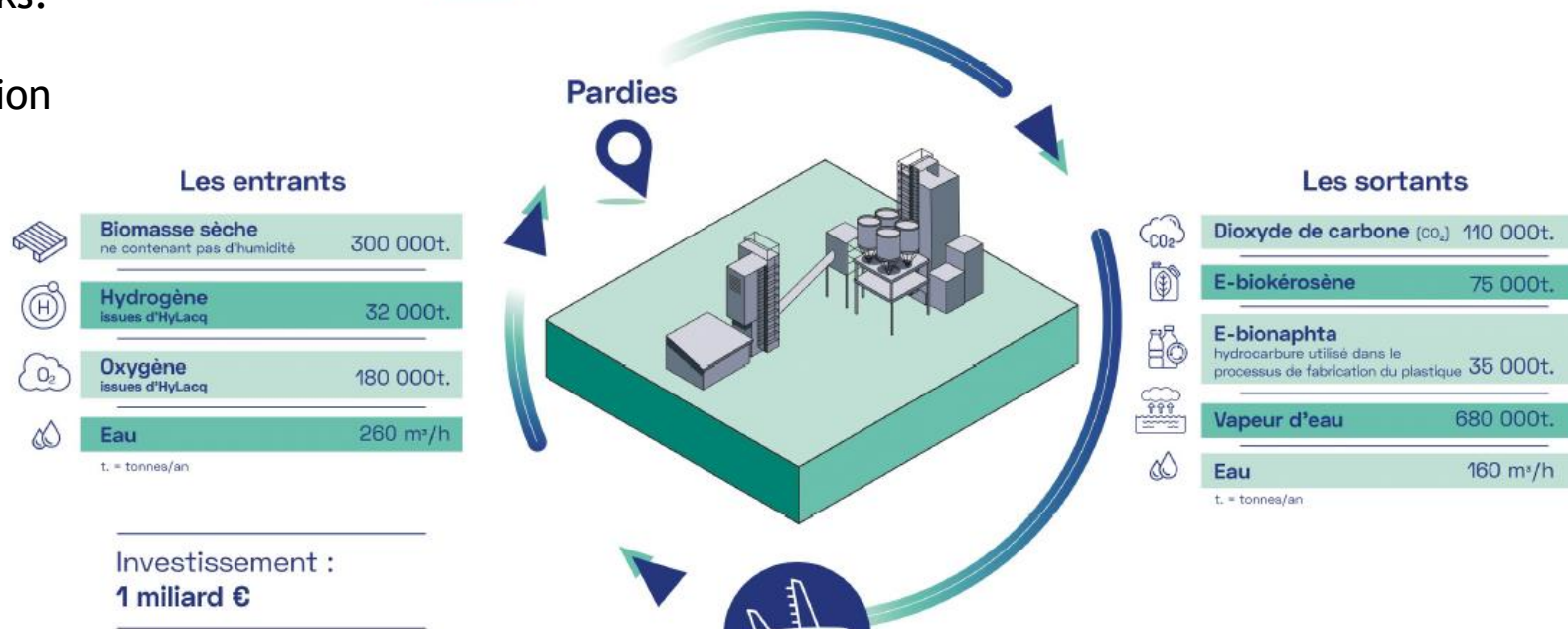
- Support from ADEME : 4,9 M€ subsidies + 3 M€ repayable advance
- Forestry residue and alternative feedstocks. Local sourcing.
- Scheme with electrolytic hydrogen injection



BioTJet

Usine de production de e-biokérosène

Objectif de production : **75 000 t./an de e-biokérosène** soit **20 %** de la consommation obligatoire en 2030 en France.



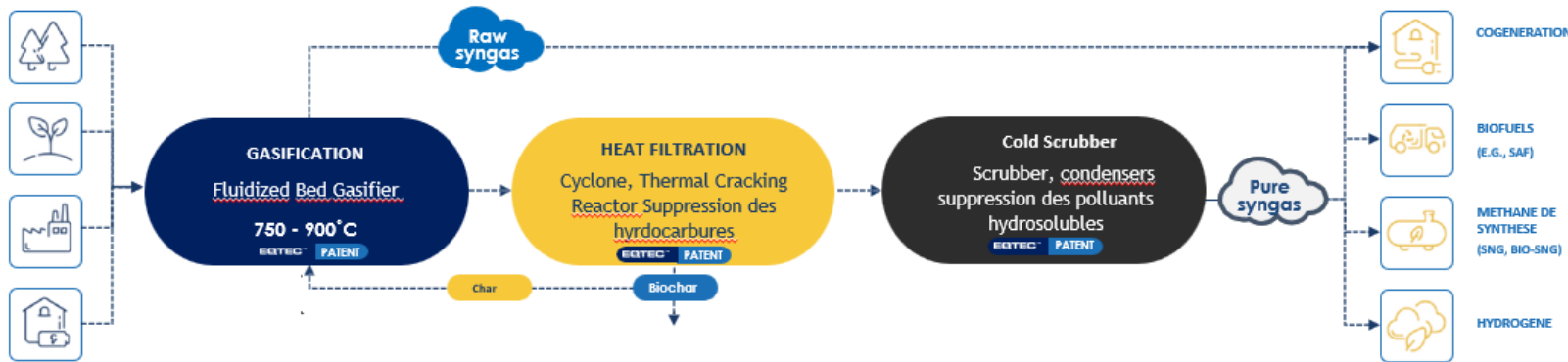
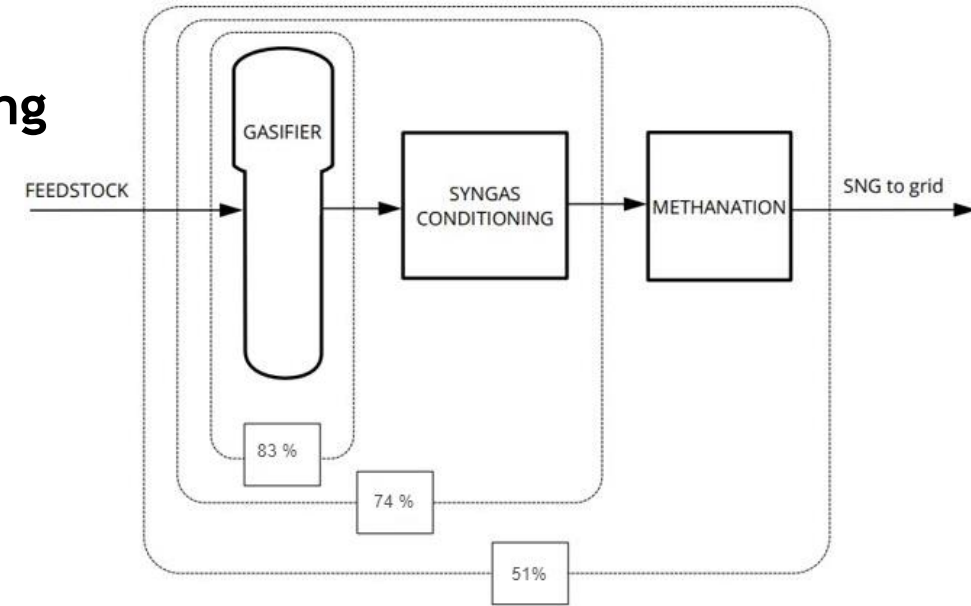
We are here!

2028

Upcoming projects

Gardanne Production of biomethane from SNG upgrading

- The "P5" coal unit of the Centrale Thermique de Provence ("Centrale de Gardanne"), owned by GAZELENERGIE GENERATION SAS, has been permanently shut down as of March 31, 2022.
- Biogaz Gardanne ("BGG") project, involve two gasification lines for the production of second-generation biomethane, recovering around 2x50,000 tons of wood waste annually from local deposits. i.e. around 235 GWh of annual production, enough to fuel 985 CNG buses injected into the GRTgaz network.



Production	
Wood waste Feedstock (MW)	55
Biomethane production (MW)	30



Upcoming projects

Salamandre Production of methane SNG

Salamandre project: ENGIE's first commercial project of SNG from gasification to be installed in Le Havre

Project led by:

storengy (100% ENGIE subsidiary)

Partners:



Localization :



Le Havre



Salamandre:

Produce, on an industrial scale, a low-carbon synthetic gas that can be injected into the network or used as fuel (synthetic LNG), from solid fuels



170 GWh of SNG / up to 11 ktpa of synthetic LNG - For heavy / maritime transport and intensive industries
+ ~40 GWh of renewable heat - For industries and urban networks



70 000 t/year of non-recyclable waste recovered - Supplied regionally, otherwise exported, incinerated or landfilled

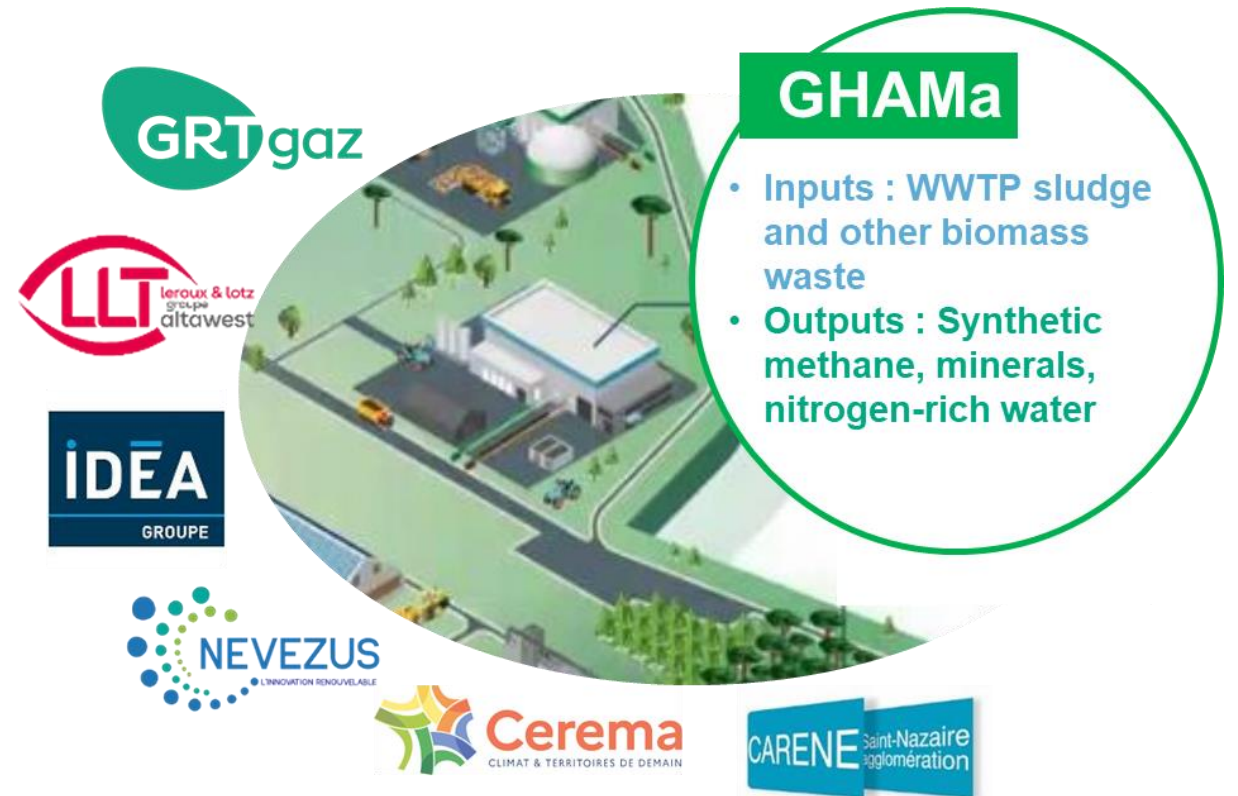


From TRL 8 to 9
Replicability of the solution

Upcoming projects

GHAMa Production of methane from hydrothermal gasification

- GHAMa, the 1st industrial demonstration project in France currently under development
- HTG Technology developed by Leroux et Lotz Technologies
- Commissioning scheduled for late 2024/early 2025



Research on gasification

University of Lorraine's LERMAB ERBE laboratory

- Development of detailed engineering for O₂/H₂O gasification as part of the European POLYGEN project with CEA Grenoble's LITEN laboratory in 2016.
- Commissioning of an O₂/H₂O gasification unit at the University of Lorraine's LERMAB ERBE laboratory in July 2022.
- Trials for several projects, including Barthe Energie (wood waste for CHP applications).
- Signature of a framework agreement with Wood PLC for the development of gasification projects for biomethane for grid injection.
- Signature of a framework agreement for the potential development of 6 gasification projects for biomethane injection in Italy.



Research on gasification

- **IMT Mines Albi RAPSODEE laboratory** (Albi Research in Process Engineering for Divided Solids, Energy and the Environment)

The activities are structured into two research groups in the fields of energy (renewable energies: solar and biomass), the environment and particulate engineering with particular emphasis on sustainable processes.

THE VALTHERA PLATFORM is a technological platform specializing in the development of high energy efficiency thermal processes for the recovery of residues and by-products of biomass transformation(drying, combustion, gasification, etc.)



Credit: Valthera Platform

- **Atomic energy and Alternative Energies Commission (CEA) - LITEN**

Having initially developed skills in the recovery of cellulosic biomass by gasification, then turned to alternative waste treatment processes with a high calorific value: household waste, food residues and sewage sludge. CEA Liten's expertise in gasification processes (thermochemical route) covers all stages of resource treatment.

- **IFP Energies Nouvelles(IFPEN)** operates in four main areas: Sustainable mobility, Renewable energies, Responsible fuels, Climate, environment and circular economy.

IFPEN research teams work on one or more of three complementary objectives : Developing economical transport with low environmental impact, Producing e/bio fuels, chemical intermediates and energy from renewable sources, Producing fuels and chemical intermediates with low environmental impact from fossil resources.



Credit: CEA Liten Platform

- **INSA VALOR - PROVADEMSE platform**

INSAVALOR is the Research & Development, Valuation and Continuing Education subsidiary of INSA (national institute of applied sciences) Lyon.

The platform PROVADEMSE is the technological innovations platform of INSAVALOR to develop and experiment technical and innovative solutions regarding the remediation of soils and sediments, as well as the waste repurposing into materials and energy. Certified by the competitiveness cluster AXELERA in 2008, PROVADEMSE has been highly supported since its creation by the Ministry of Industry, DRRT, the Region Rhône-Alpes-Auvergne, the Metropole of Lyon and the FEDER funds.

Gasification facilities in France

Overview Commercial projects and R&D plants



Credit: GazoTech



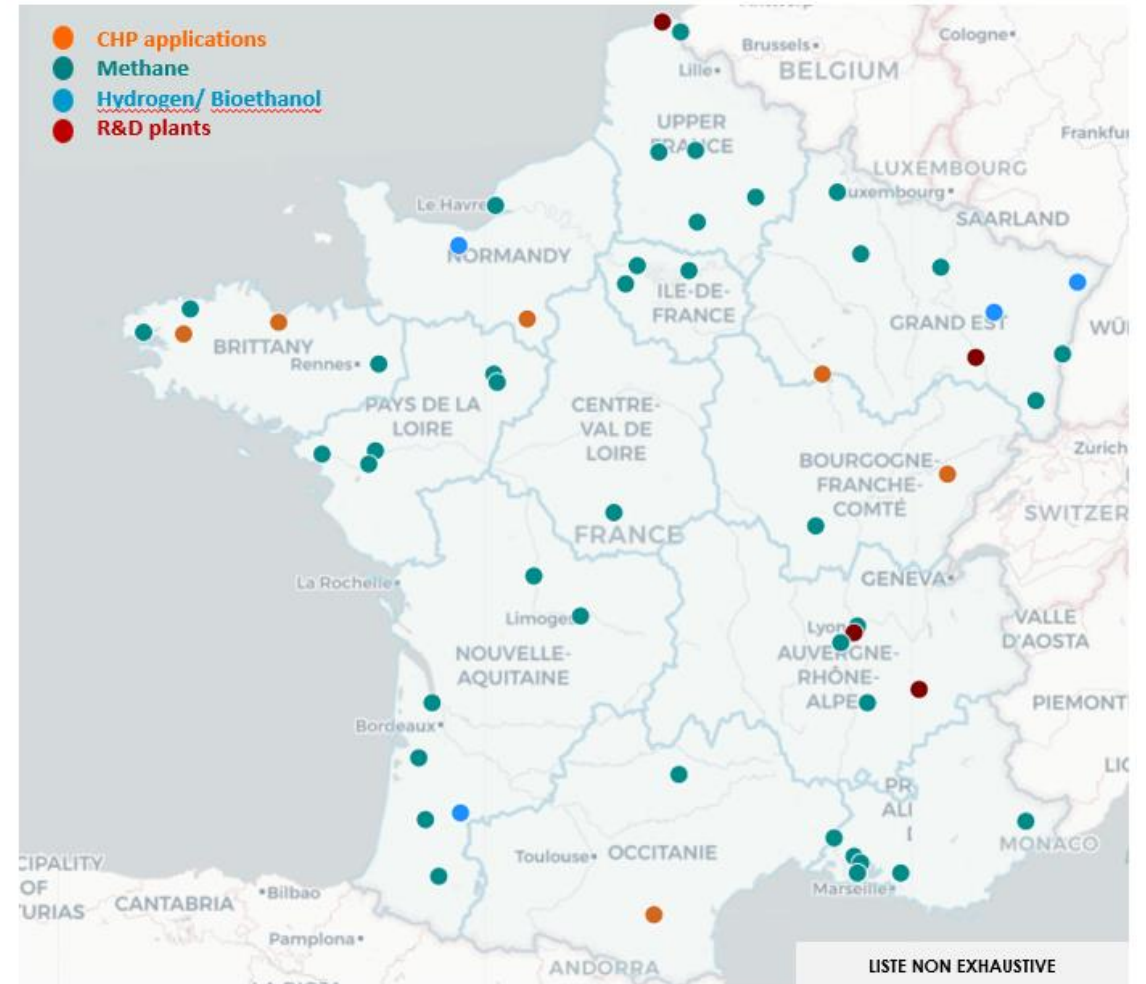
Credit: Plateforme Lermab (Eqtec)



Credit: Plateforme GAYA (Engie)



Credit : Plateforme BioTfuel



Thank you

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