



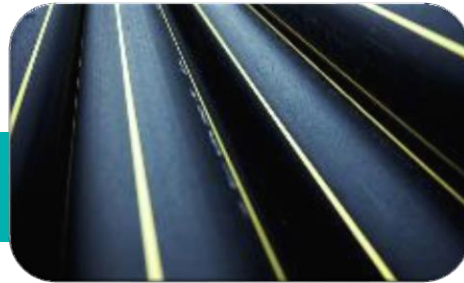
Gas grid, a key enabler to energy market decarbonisation

Jean-Marie Gauthey, Head of EU affairs

Biogas PowerON 2023



GRDF, main French and European natural gas distribution operator



200,000 km
of network



11 million
delivery points in France



A grid operator
committed to the development of
biomethane and bioNGV

Biomethane is developing rapidly in Europe with a huge remaining potential





European Biogas Association on biomethane potential studies:

- The available studies (IEA, CERRE, Univ. Ghent, Gas for Climate...) do not assess all feedstock types: agriculture residues, sequential crops, manure, food waste, industrial wastewater, sewage sludge...

EBA sums the averages per feedstock type reaching > 1,600 TWh

- Recent study of **Engie** 1,700 TWh (without energy crops) at EU+10 countries

Accessible biomethane volume in Europe = 1,200 – 1,600 TWh

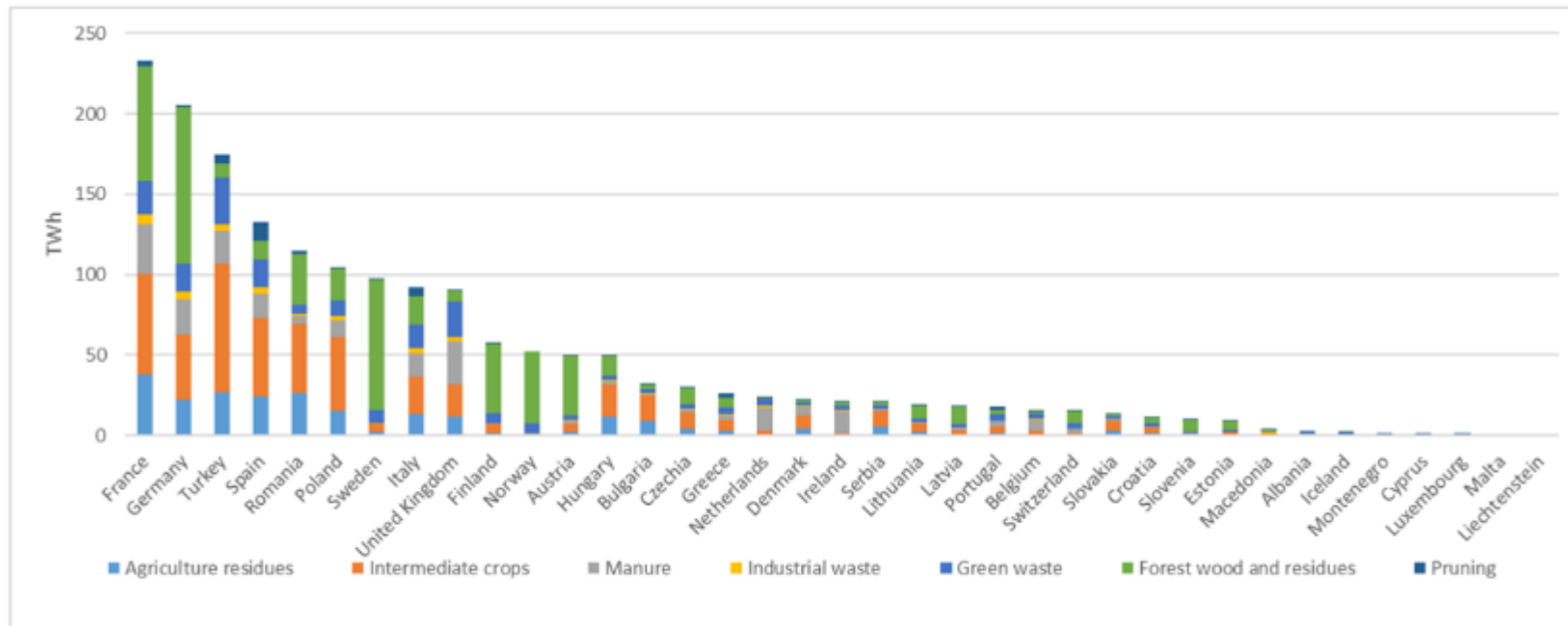


Figure 1: Biomethane potential 1G+2G per country in 2050 [TWh]



1,203 biomethane plants in the EU producing about 40 TWh/year (end of 2022)

Share of biomethane injected in the gas grid in Denmark  (% of gas consumption)

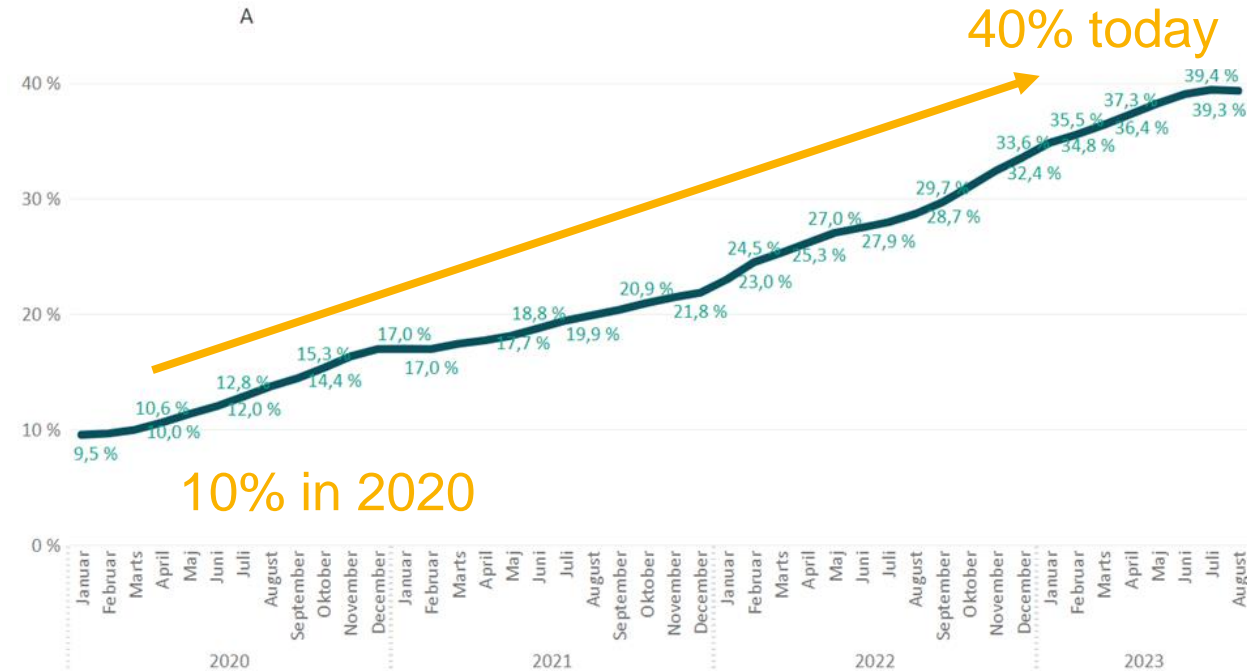
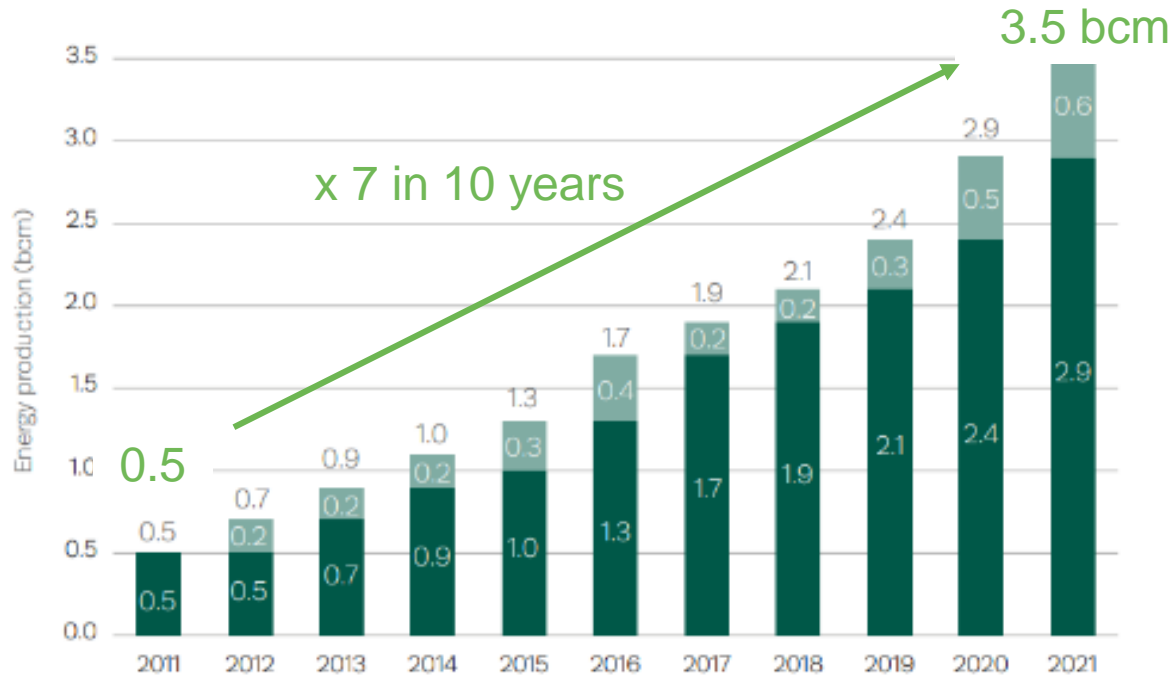


Figure 2.5 - Biomethane production in Europe (bcm)

- Existing production
- New production

Source: [EBA](#), annual report 2022

Source: [Energinet](#)

Enough renewable gas potential to cover 100% of the current needs



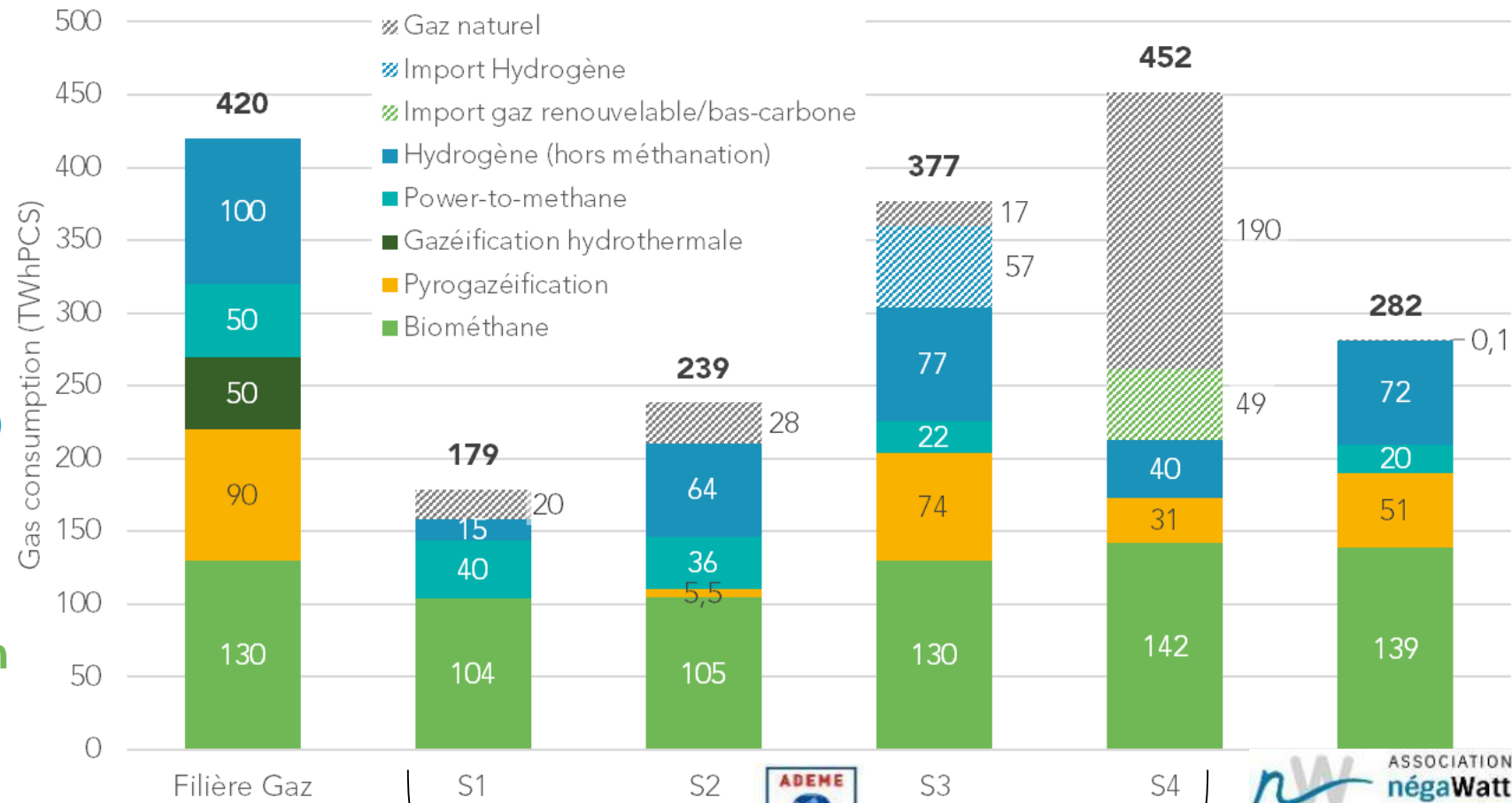
3 scenarios

- French gas industry
- ADEME public agency on energy
- négaWatt (NGO)

Key results

- > **Hydrogen through methanation** (20-50 TWh) or pure (70-100 TWh)
- > **New technologies are required: pyro-gasification** (50-90 TWh) **hydrothermal gasification**
- > consensus on **anaerobic digestion** potential: 130 TWh

Scenarios of the gas mix in France by 2050 [TWh PCS]



*Hydrothermal gasification has not been taken into account by ADEME or négaWatt, due to lack of hindsight in the sector

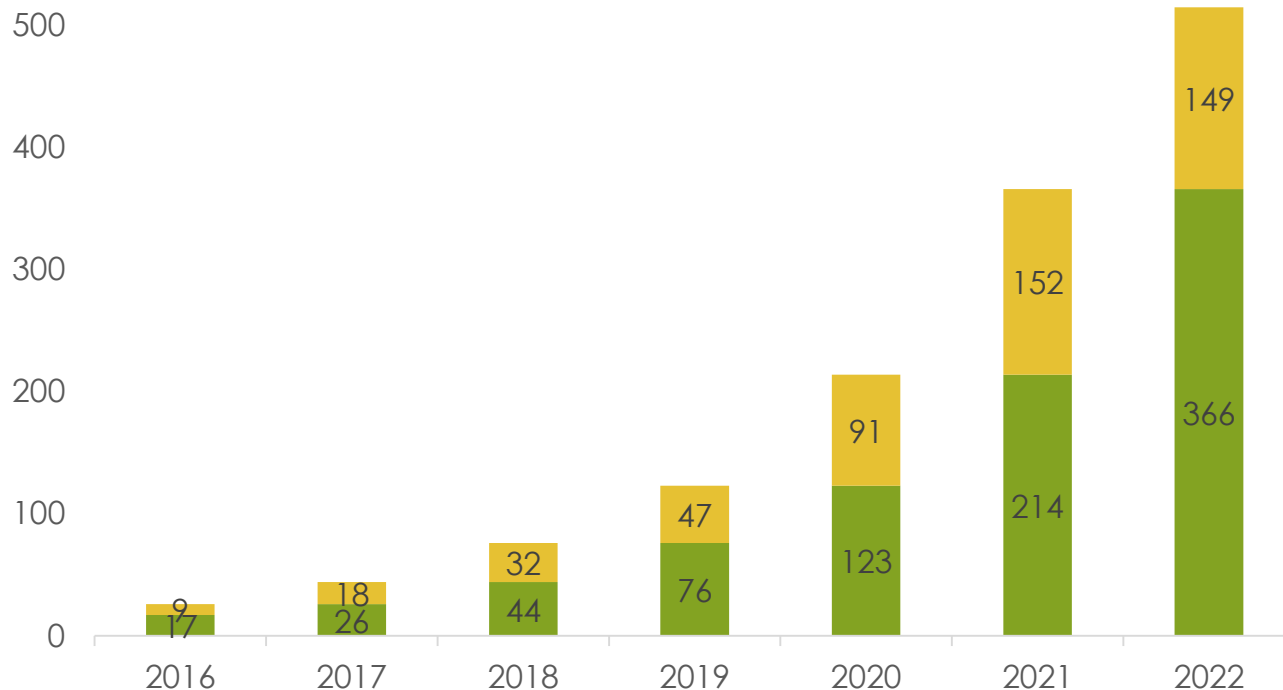
A booming biomethane sector: equivalent to 2 nuclear reactors in 6 years



608

biomethane sites inject in the gas grid
(end August 2023)
Total capacity > 10.8 TWh/year

+3 new biomethane plant per week



**Capacity register:
1,174 projects
= 25 TWh**

**2030 target
at 10% of
gas
demand
under
review at
15-20%**

Source: [open data](#)

Gas grids are key for renewable gases in Europe



Existing gas infrastructure is a key EU assets



- ✓ **Gas infrastructure** is mature, well interconnected with huge underground storage capacity
- ✓ **Gas markets** are established with a diversity of products and liquidity
- ✓ **No major investments** expected for renewable gas injection:

The French gas system requires **between 6 and 9.7 B€ of investments until 2050** according to the Energy regulator, while the electricity distributor alone announced at least 5 B€/year

Gas infrastructure adaptation: the “Right to Inject”

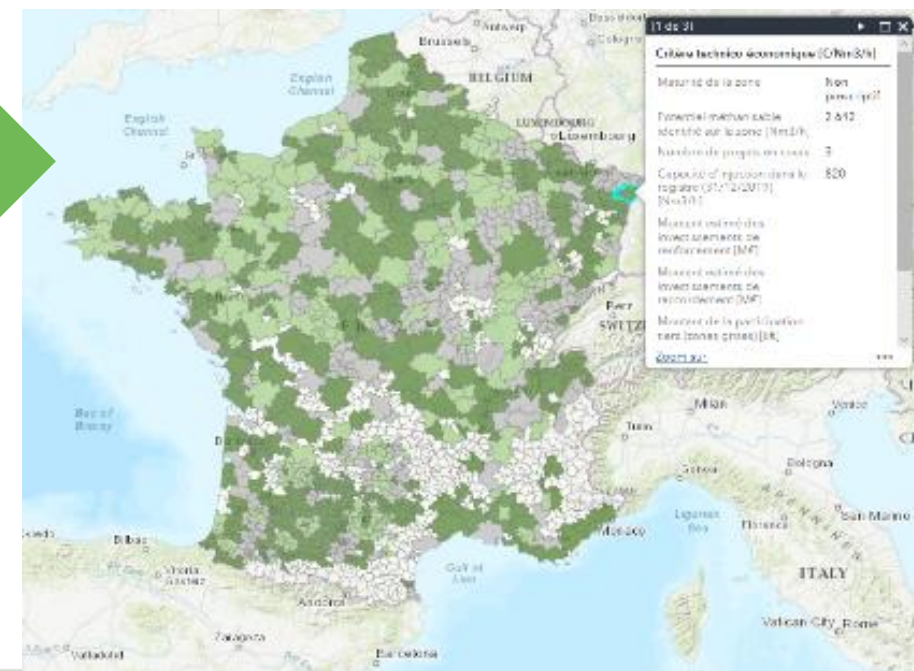


A principle established by Law in 2018 to organise necessary infrastructure adaptation for biomethane injection.

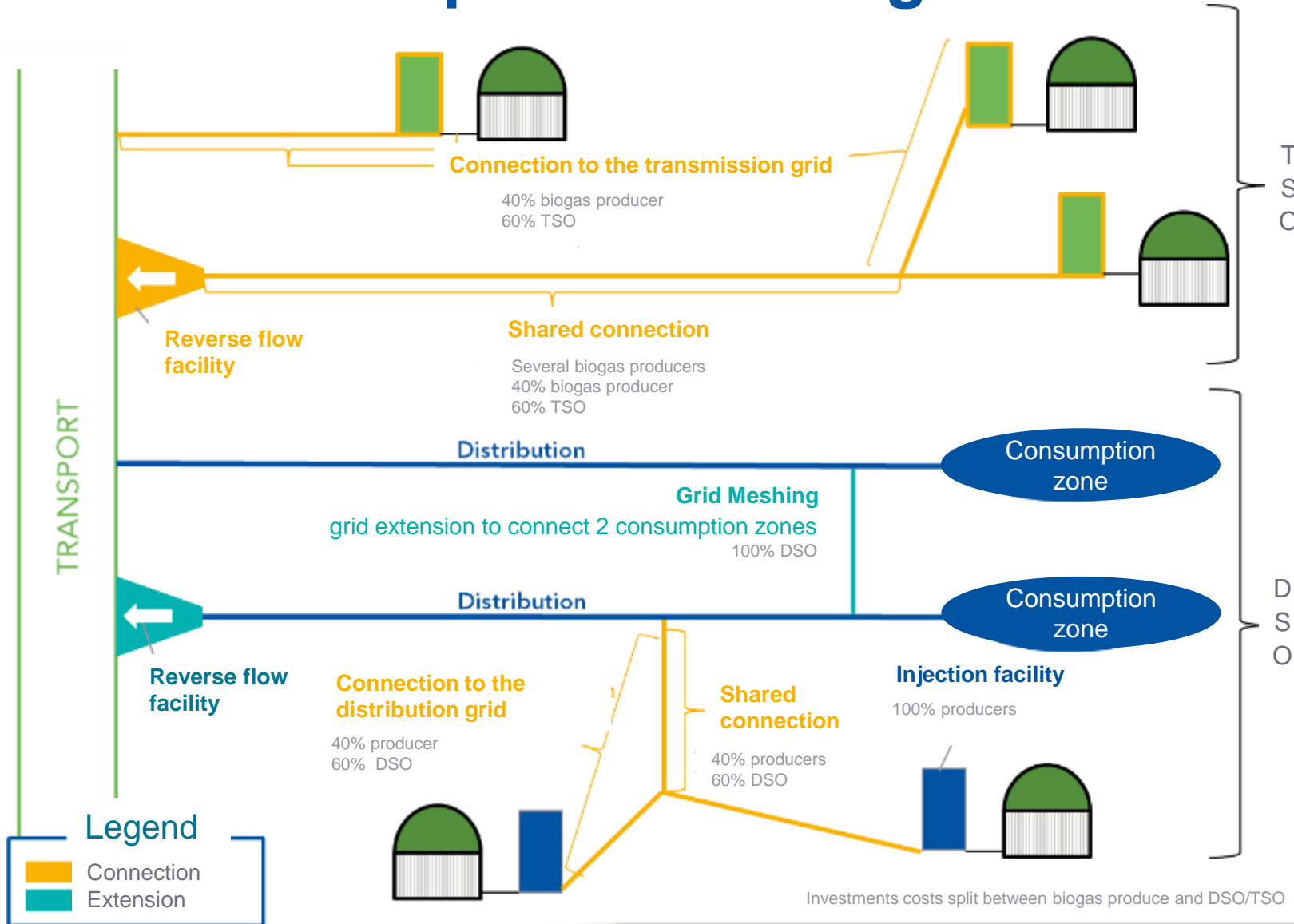
Some key principles:

- **Guarantee the connection** of a biomethane producer even outside a gas-served zone
- A **financing framework for the grid reinforcements**, specifying investment criteria
- Treatment of **shared connections** for several producers
- Establish prescriptive **infrastructure development plan**, i.e. areas eligible for grid reinforcement measures.

323 zones validated by the Energy Regulator representing 1.1 B€ of investments to allow the injection of 1,175 plants or 35 TWh/year.



Biomethane plant connection: a comprehensive regulation in France



I/V criteria

The financing of grid reinforcement are included in the tariff of the operators if respecting the I/V (investment on volume) criteria defined by the National Regulation Agency.

Adaptations of network: focus on reverse flows

> 40 projects of reverse flow units approved by the French National Regulation Authority



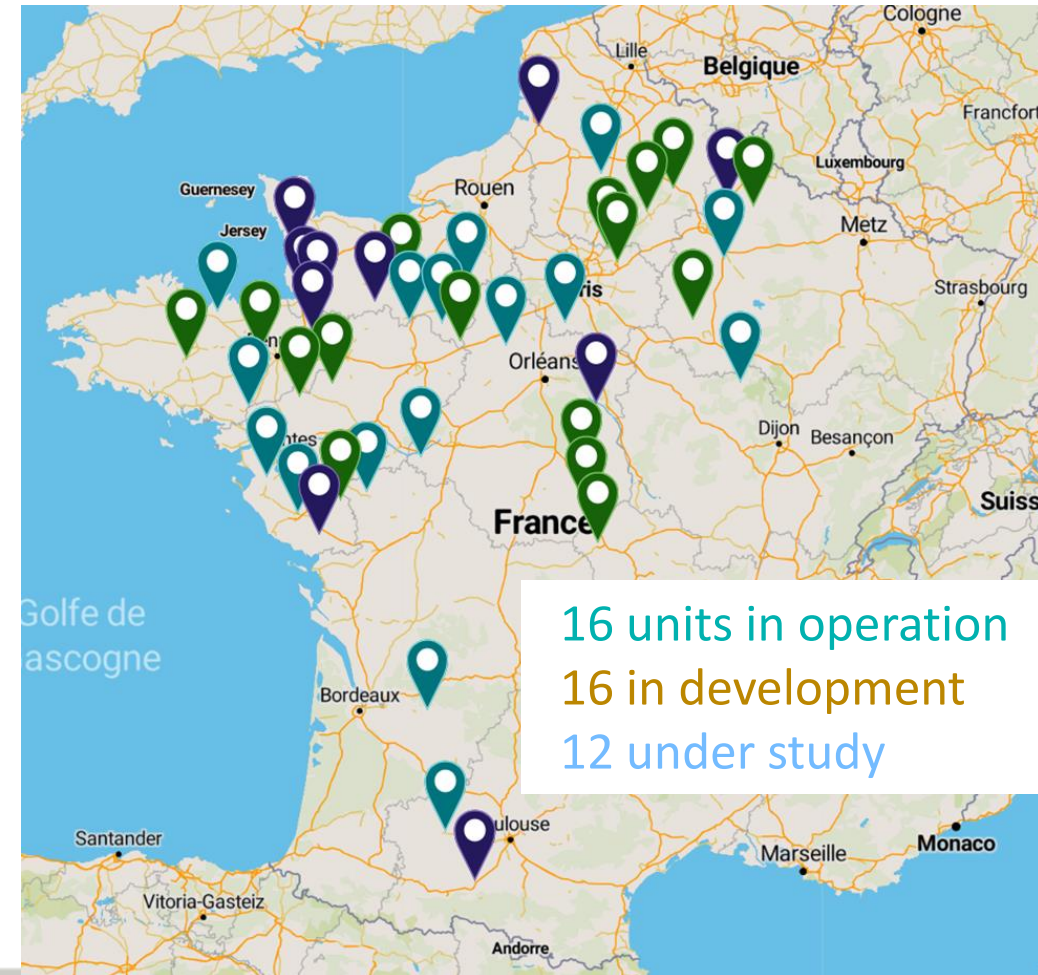
Reverse flows are new objects in the gas system



They are **high-pressure facilities**, operated by TSOs



Investments on **feasibility studies and development** are approved by the French NRA



Gas grids support biomethane to easily meet the market

The EU model for renewable gas is based on the functioning of the current gas market

- > **Suppliers** must be able to propose **renewable gas offers** to all their gas consumers
- > **Consumers** must be able to **certify their consumption of renewable gas** to cover their obligation (e.g. ETS quotas for industry or power generation, tax reduction for mobility...) and efforts of decarbonisation
- > **Infrastructure** operators **optimise their assets** through the supervision of the independent national energy regulation agency (regulated assets base and tariffs)

Simplicity for the consumers is essential:

- > **All connections and appliances remains:** biomethane or natural gas are the same molecules
- > **Consumers just sign “green offers”:** injection of renewable gas in the grids allows its **traceability** (a single mass-balance facility) and **tradability** (book and claim system)

Gas grids are long term partners of the gas market decarbonisation

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Biogas PowerON 2023



Annex



GRDF's vision of the future of the gas industry

Manufactured gas
Local production and distribution

Lighting Cooking



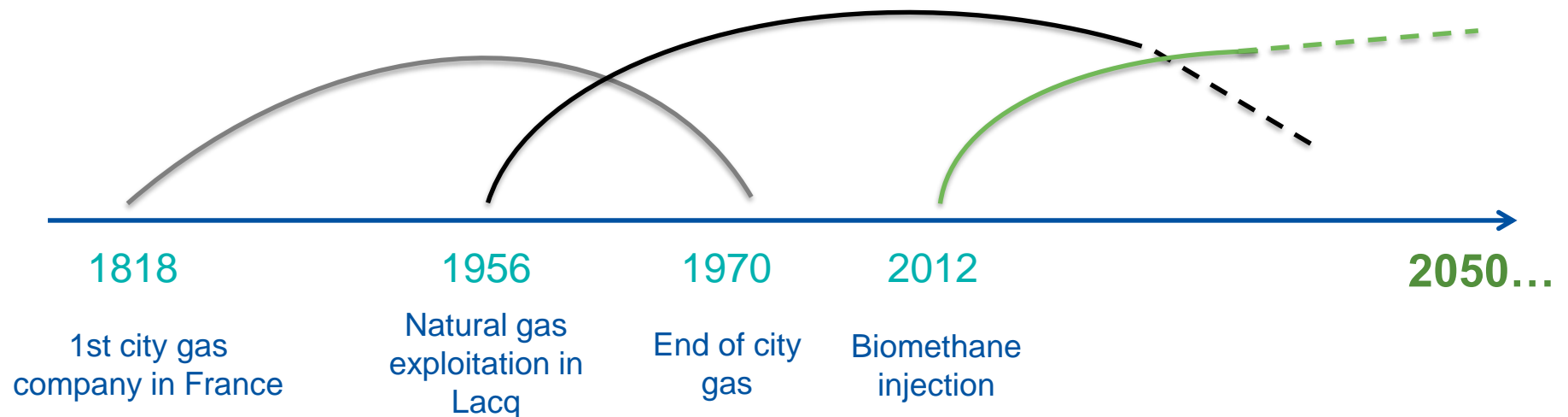
Natural gas
Centralised infrastructures

... Heating, Hot water...



Renewable gas
Decentralised and interconnected infrastructures

... Mobility, Power to gas, Fuel Cells...



Biomethane: the only renewable energy compliant with its national targets

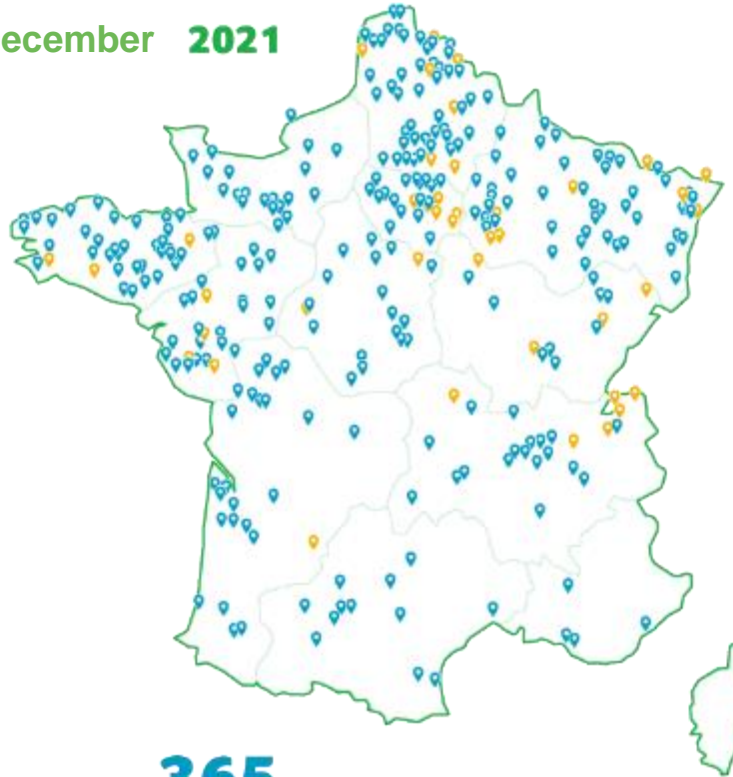
December 2017



44

Biomethane injection sites

December 2021



365

Biomethane injection sites

December 2022

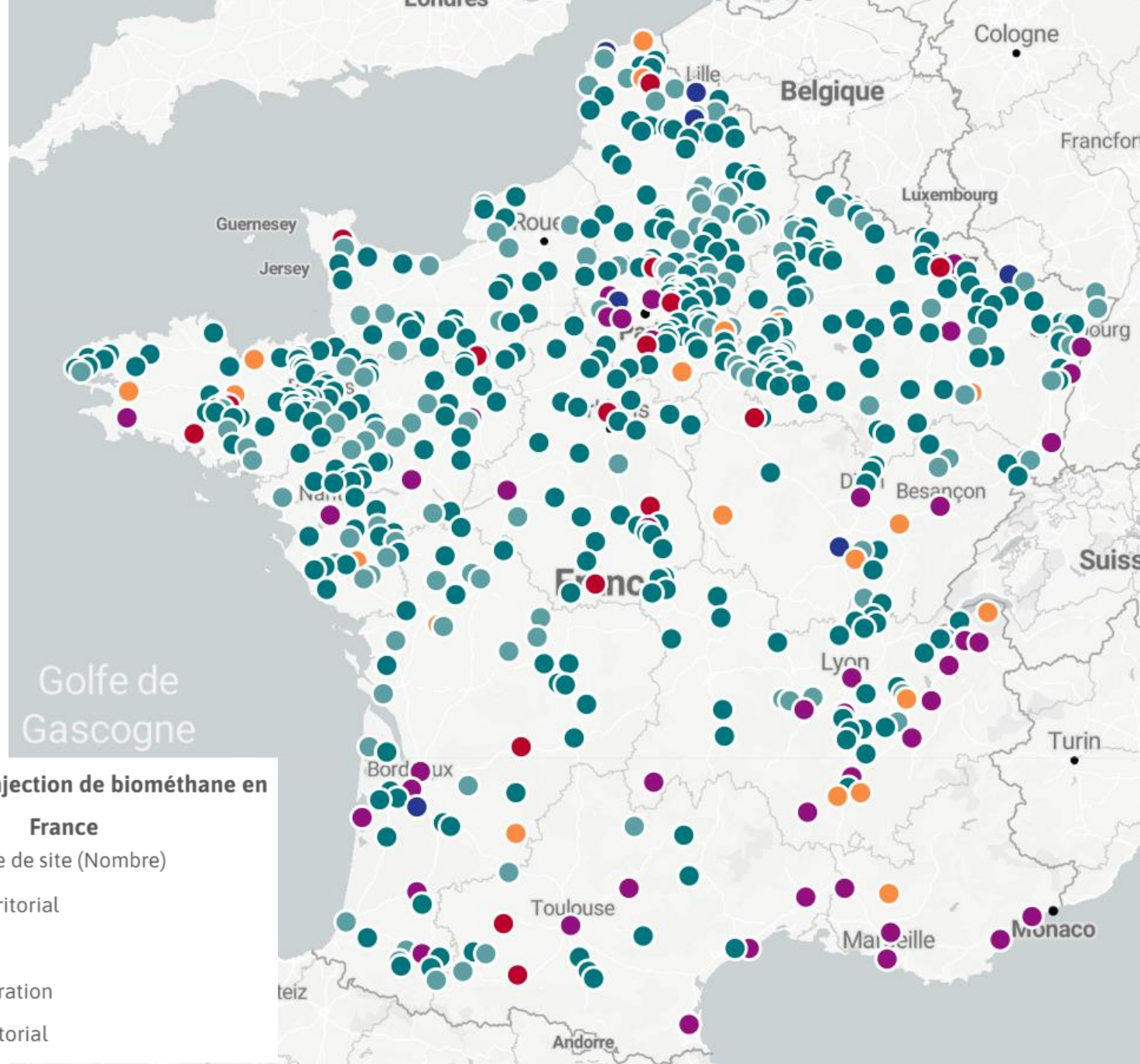


515

Biomethane injection sites

Number of biomethane plants multiplied by 14 in 6 years (2017-2023)

The only renewable energy compliant with national targets



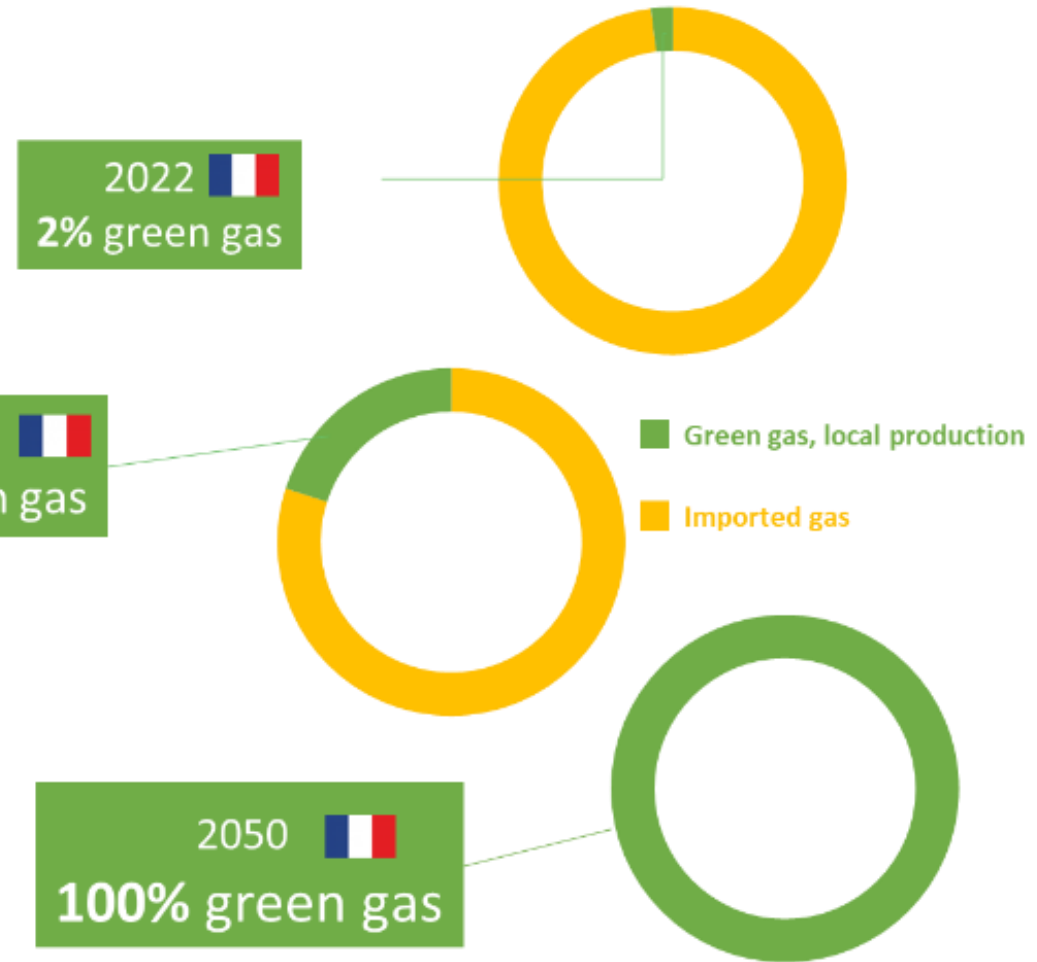
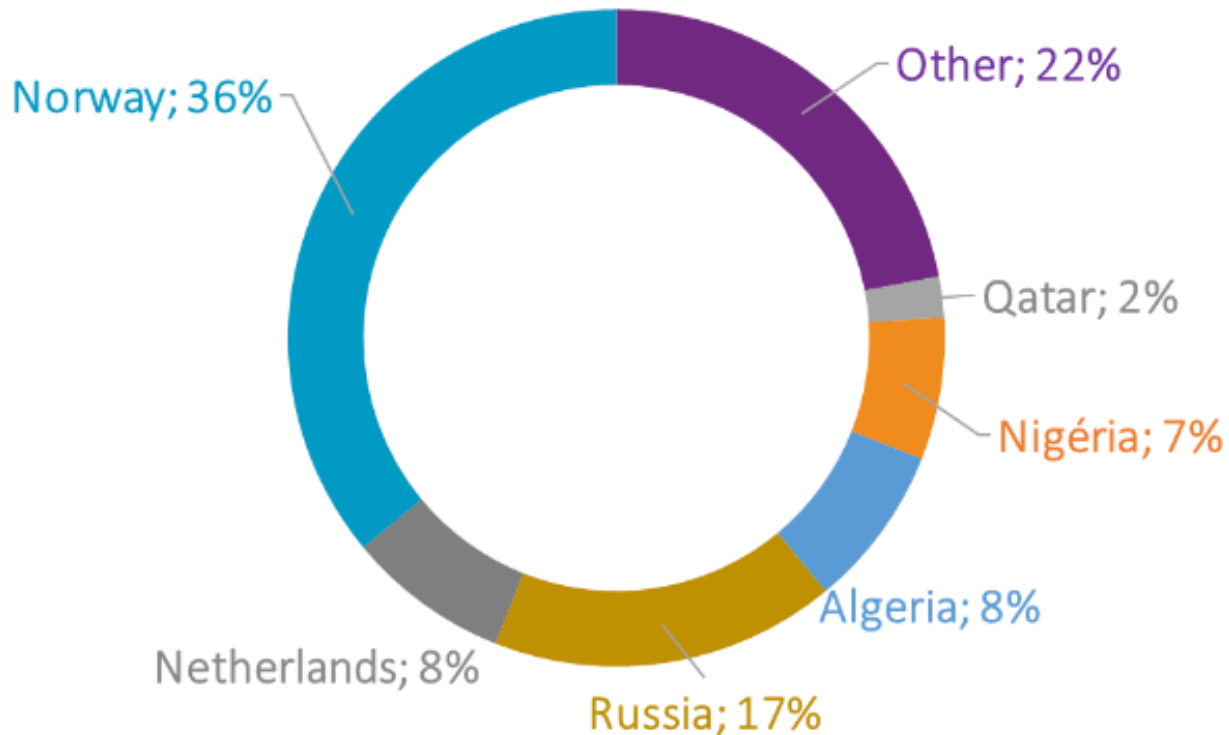
Points d'injection de biométhane en France

Type de site (Nombre)

- Industriel territorial
- ISDND
- Station d'épuration
- Agricole territorial

A diversification of the supply and a 100% green gas ambition in 2050

Origin of the gas used in France (2021)



Energy Regulation Agency's report on the future of gas grids in a carbon neutral economy 2050

In April 2023, the *Commission de Régulation de l'Énergie* published a report about the future of gas infrastructure with 3 scenarios of demand/supply between 165 and 320 TWh without imports. Main conclusions:

Network adaptation cost is reasonable
with 6 – 9.7 BEUR (or 200-300 MEUR/year)

Decision on the gas system shouldn't impact the energy system without proper assessment of the consequences and transfers (for instance on peak consumption from heating)

Most of gas networks will remain necessary:
Transmission especially considering gas flows between regions and countries,

Distribution for renewable gas injection and consumption (local optimisation and coordination)

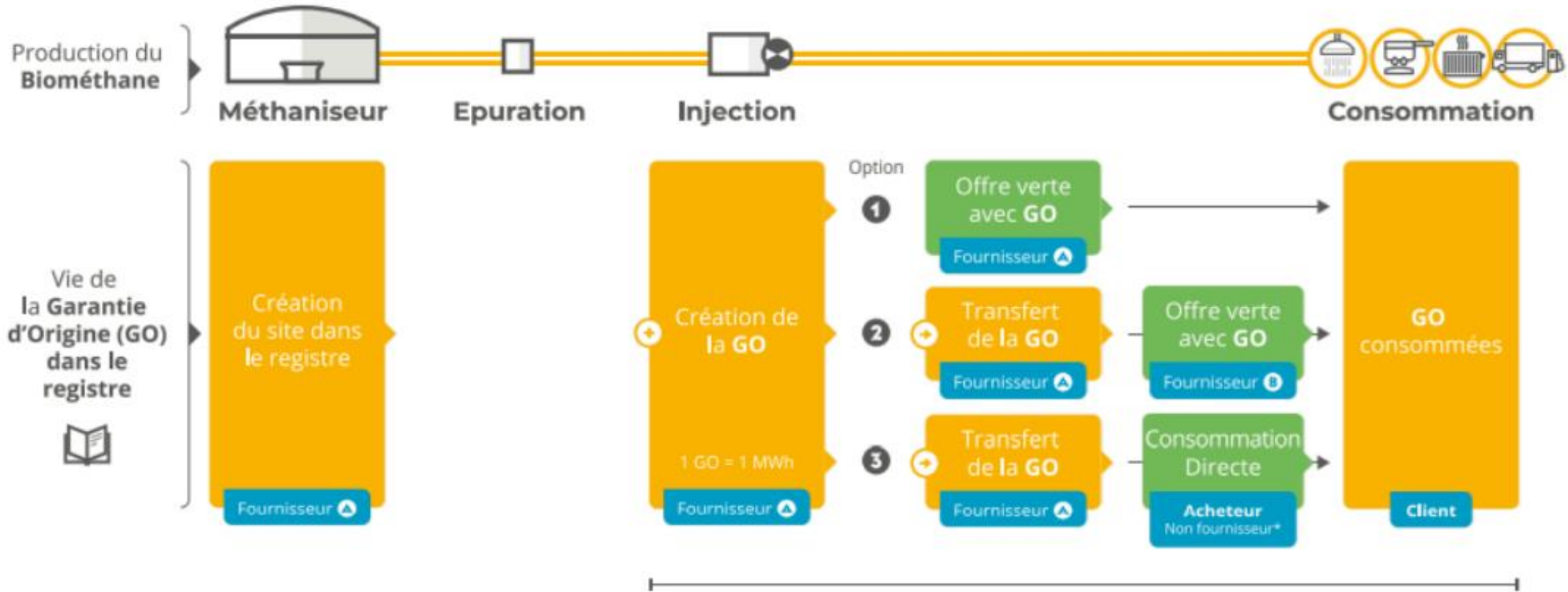
LNG terminals and underground gas storage are key for the security of supply at least on mid-term

Registry of Guarantees of Origin (GO)

Mécanisme des garanties d'origine (GO)

Source : GRDF

➤ 1 MWh = 1 GO



*ex = collectivités, industriels

Legislation on biomethane in the European Union

Renewable Energy Directive (currently under revision)

- > set the conditions of a sustainable production of biomethane (criteria...)
- > organize the trade at EU level (G.O. and certification)
- > determine some target by sector (industry, transport...)

Gas Directive and Regulation (currently under revision)

- > organise the single EU internal gas market (unbundling rules...)
- > prioritise injection of renewable gases against fossil

REPowerEU: the action plan after the Ukraine crisis

- > 35 bcm of biomethane by 2030 in the EU
- > creation of the Biomethane Industrial Partnership

Biomethane must easily meet the market

France is a single gas market zone:

- **One entry-exit system** to access transmission grid and storage capacity (25% of annual demand)
- **One virtual wholesale marketplace** for trade (PEG)
- Physical **interconnections with neighbouring countries** connect the various gas markets
- Biomethane plants can be **connected to the gas grids**, an EU “single logistical facility”.
- Suppliers/consumers can **buy and trade biomethane**:
 - They need to reserve capacities in the grids (the same as for fossil gas)
 - They use a registry of Guarantees of Origin for their green offers/consumption

