



The role of gas in the energy transition

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Thermal & Supply GBU

PUBLIC

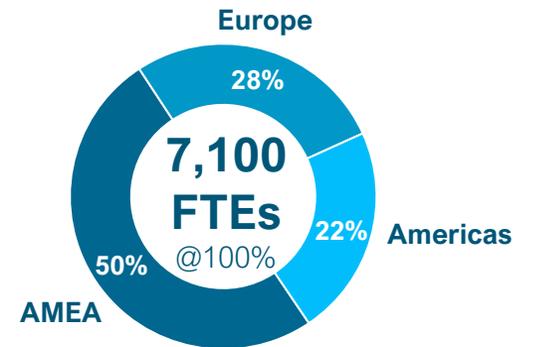
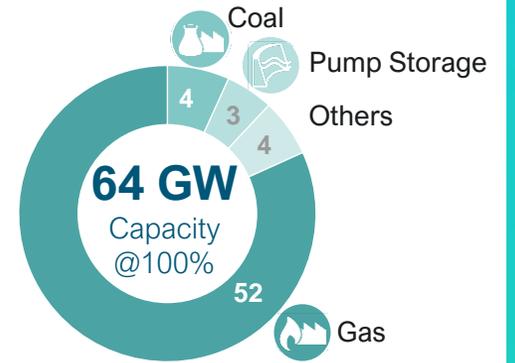
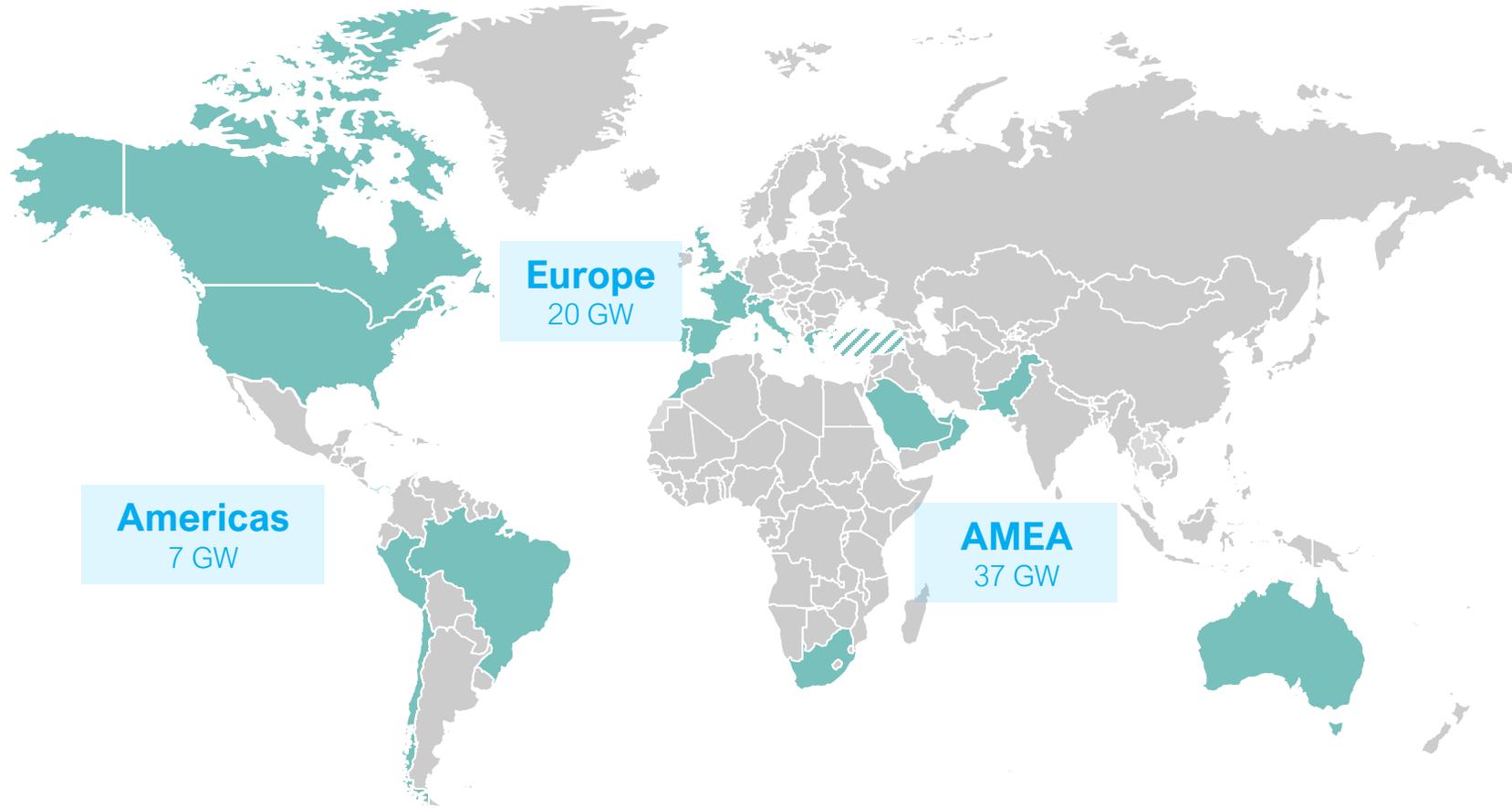
INTERNAL

RESTRICTED

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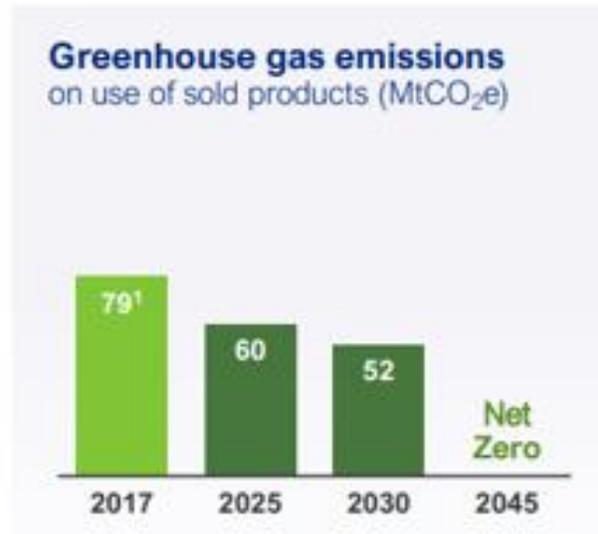
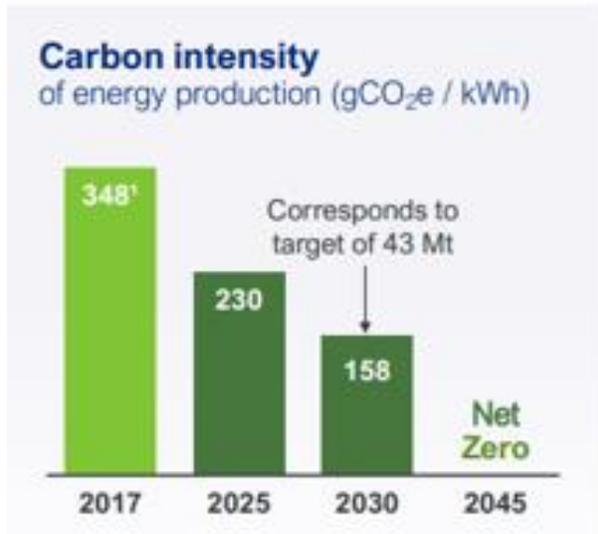
ENGIE Thermal overview 2020



€1.3 bn
COI 2020
~2/3 contracted

68 Mt CO2
for energy production
(incl. Energy Solutions)

ENGIE objective : Net zero by 2045, across all scopes, and following a “well below 2°C” trajectory



Path to Net Zero

- Coal exit
- Capex alignment: investments in projects and regions compatible with our target
- Carbon budgets assignment & carbon price integration
- Carbon objectives to top management incentive



Transformation of ENGIE's generation portfolio

Coal phase-out plan in action in Chile

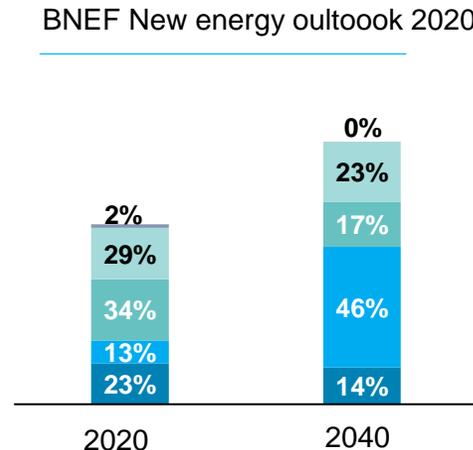
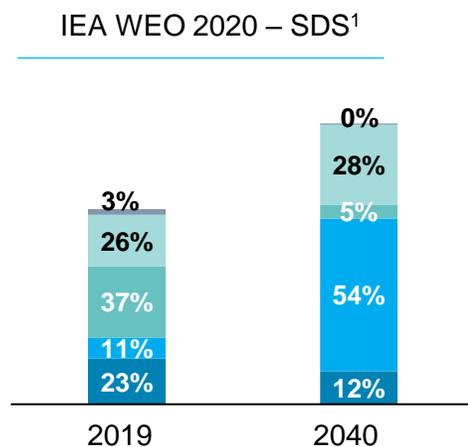


¹ This design also includes the coal asset commissioned in 2019

Gas power generation will still play a significant role in 2040 to provide flexibility & balance the intermittency of renewables...

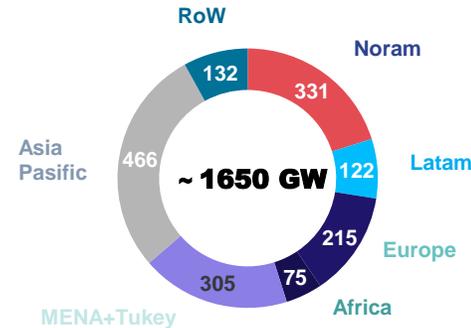
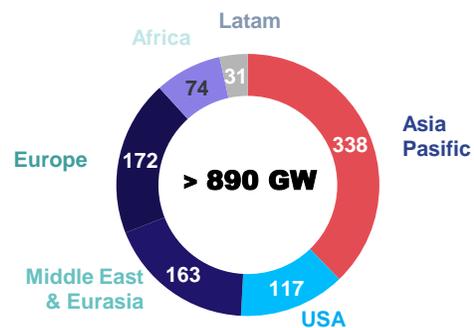
Data World

Power generation by technology (in Twh)



- Others
- Oil
- Hydro & Nuclear
- Coal
- Renewables
- Gas

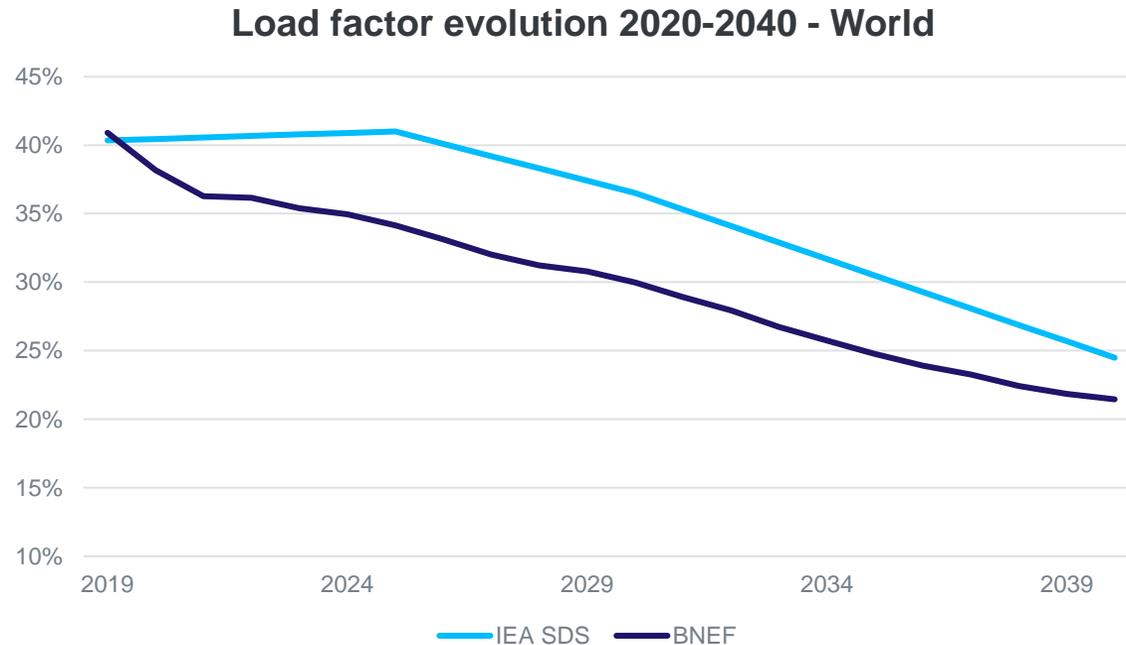
Global thermal gas capacity additions by 2040² (in GW)



¹IEA WEO 2020 – Sustainable Development Scenario (SDS), compatible with the 2015 Paris climate agreements

²Including 2020 (21 years)

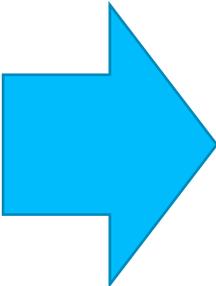
...while evolving from base load to mid-merit or peak load → need for O&M optimization



- Thermal generation will remain necessary in a carbon neutral world, but **its use will evolve to complement** ever increased shares of renewables
- Power should still be a significant part of gas usages: Gas to Power should represent more than **30% of total gas demand** in the World by 2040, from 40% today (IEA WEO 2020)

Gas power generation will need to decarbonize to reach the EU ultimate goal of carbon neutrality by 2050 (-55% in 2030)

EU Taxonomy



- 5yr declining carbon budget for CCGT *
- LCA GHG emissions averaged over 5Y period *

* Taxonomy – Complementary Climate DA – Gas (Gas Naturally, September 2021)

...even though the fate of gas in the EU taxonomy remains to be decided (like that of nuclear)

May 17, 2021
5:29 PM CEST
Last Updated 5 months ago

Sustainable Business

EU reassessing role of natural gas in green finance rules, Commission says

By Kate Abnett

3 minute read



BRUSSELS, May 17 (Reuters) - The European Union's landmark rules to classify green investments may need to accommodate natural gas, the European Commission said on Monday, as Brussels weighs a politically fraught decision on

nuclear | Apr 22, 2021
Innovative 'Steel Bricks' Design Expected to Reduce

News & Technology for the Global Energy Industry

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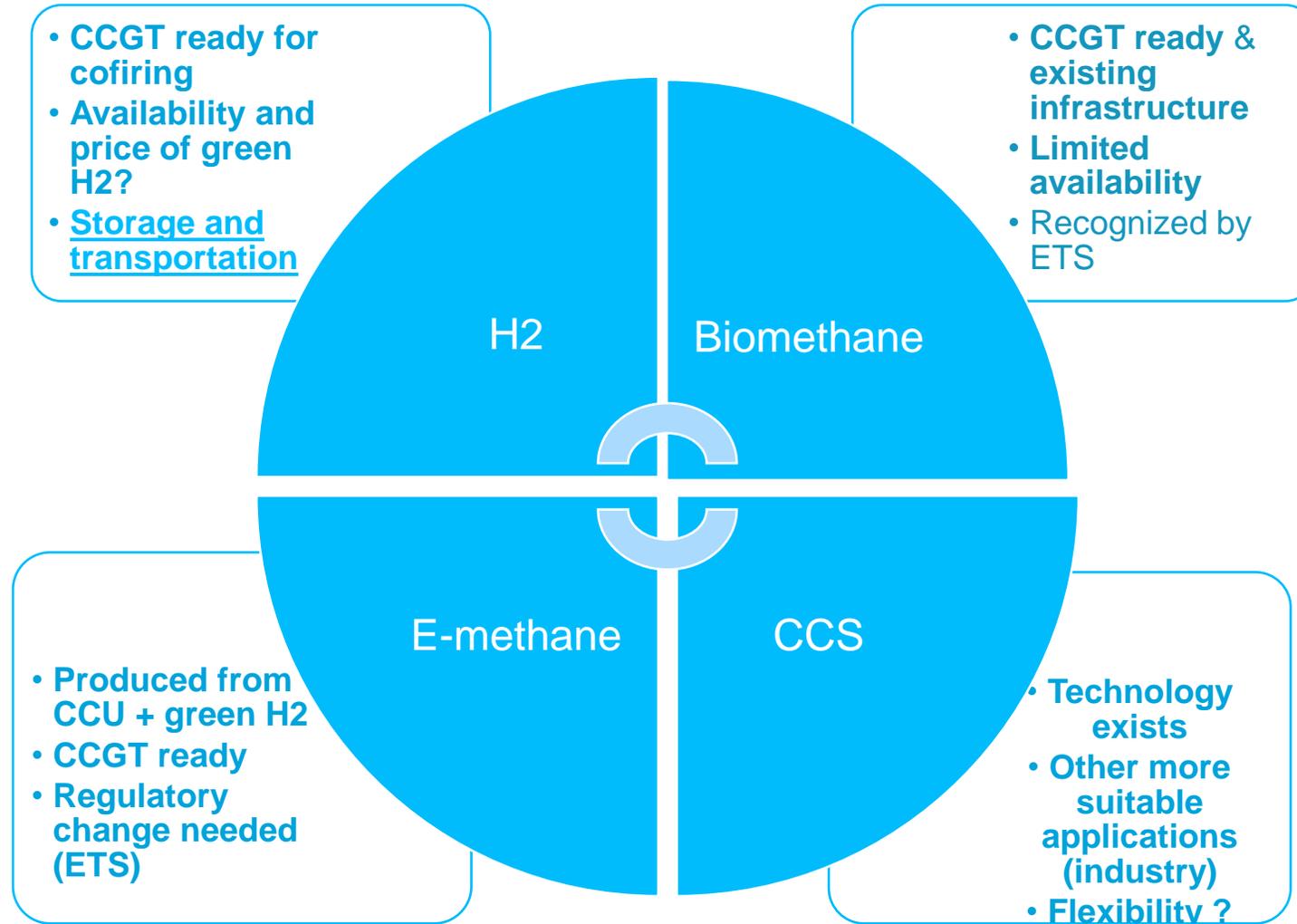
Legal & Regulatory

Reprieve for Nuclear, Gas in EU's Sustainable Finance Taxonomy Rules

The European Union's (EU's) much-watched Taxonomy Climate Delegated Act—the world's first "green list"—unveiled by the European Commission (EC) on April 21 qualifies several power-producing sectors in its technical screening criteria for sustainable investment decisions. However, it delays controversial decisions on gas and nuclear.

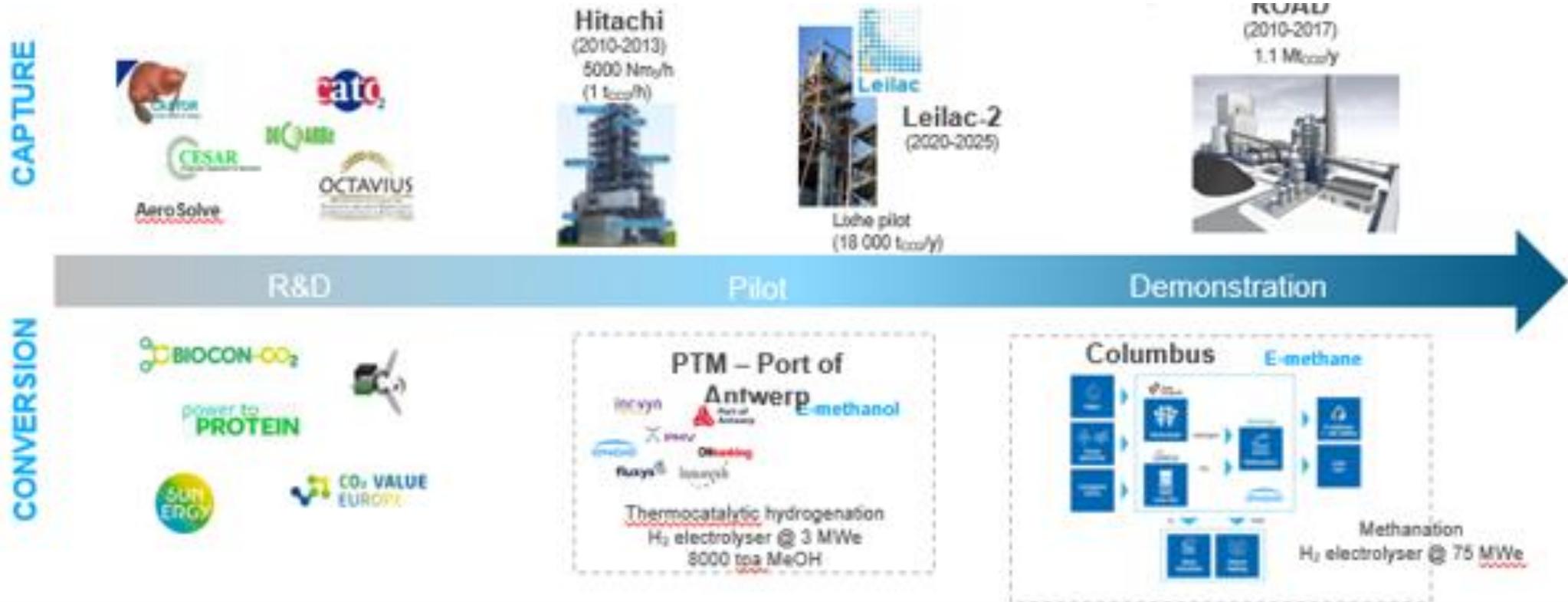
The EC adopted the Delegated Act as part of an ambitious package to help improve the flow of money toward sustainable activities across the EU and help the region meet its climate neutral goals by 2050. The decision came one day before the EU reached a provisional agreement to reduce its GHGs by 55% in 2030.

What are the current options on the table?



From CCS to CCU

Building technical and operational experience



ENGIE Laborelec has supported different CCUS projects development from the design, engineering to the subsidies files submission
 → Technology suppliers selection, pre-FEED and FEED studies, Process integration, Heat management and valorisation, water management, environmental impact (emissions, aerosols, CO₂ quality), techno-economic assessment

H2 co-firing project

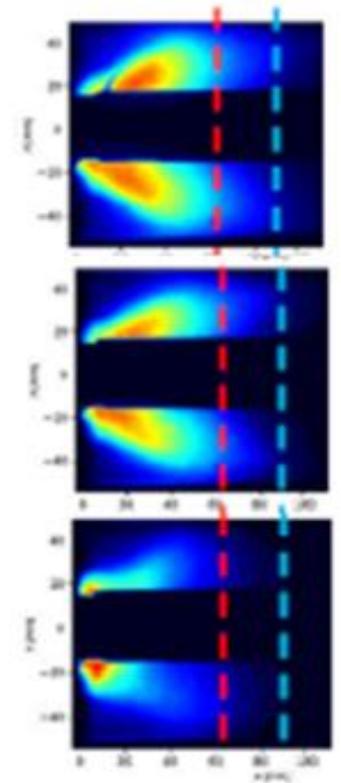
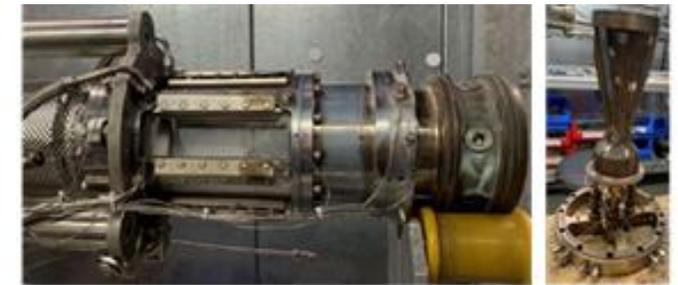
From Lab to pilot

Partners :

Ineos Phenol / ENGIE BU GEN

Purpose:

- Test co-combustion up to 20% of H₂ in own 25MW Siemens SGT 600 without making any modifications to the gas turbines
- Evaluate impact on gas turbine behaviour and emissions

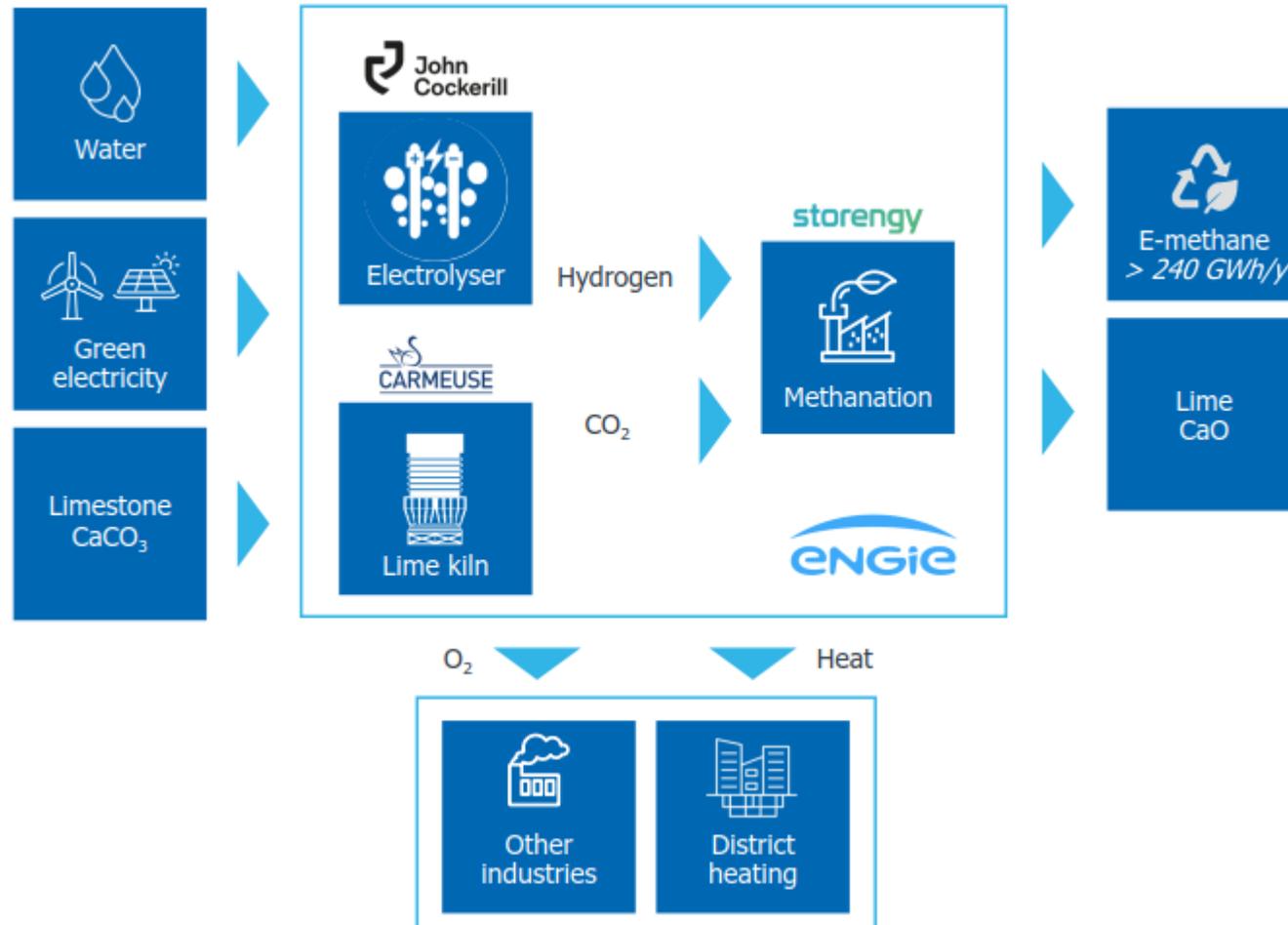


Result:

- May 2021 : Test up to 25% co-combustion of gas with (grey) H₂

E-methane -Columbus project

Carmeuse, ENGIE and John Cockerill join forces to reduce CO2 emissions in Wallonia



Drivers and Key questions around decarbonization

Decarbonization Drivers

- Technology: speed to maturity & cost competitiveness
- Country preferred decarbonization pathway
- **(EU) Regulation & subsidies**
- **CO₂ prices increase**
- Green fuel availability
- Customer demand



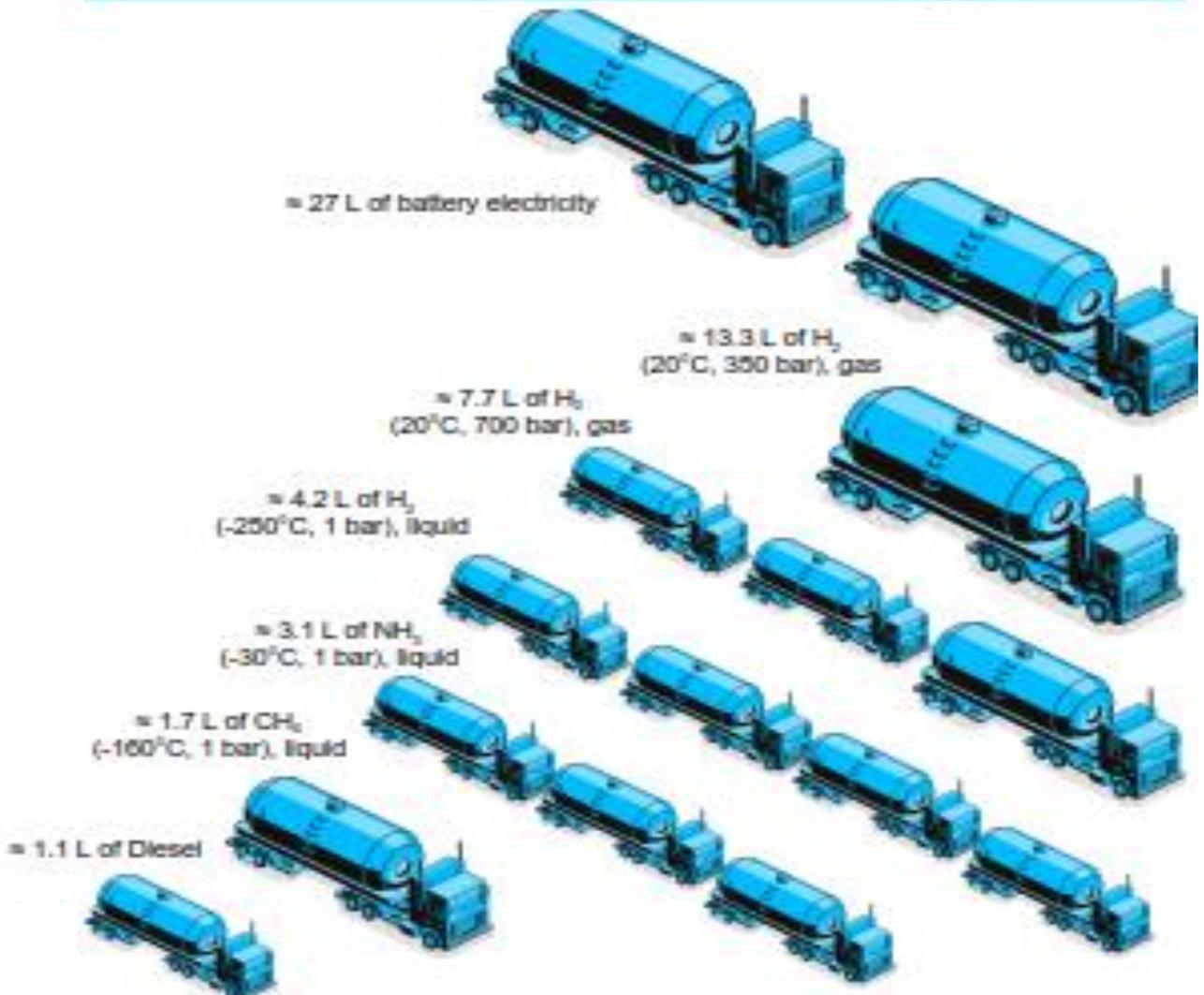
- What should be focus: existing fleet or new projects ?
- How to ensure level playing field for utilities? Ex. new projects to include options for decarbonizing (e.g. H₂ or CCS ready)?
- Which green fuels to target first? H₂, NH₃, e-Fuel? How to produce, transport and store large volumes at reasonable cost?
- How to combine CCS with flexible operation? How to transport and store CO₂?
- How to create stable investment framework? Capacity remuneration scheme?
- How to implement high and sustained CO₂ price to improve economics and create climate of acceptance (cfr. Gas price)?

H2 co-firing

Very low energy density to storage and transport are difficult

→ Need for synthetic hydrocarbons

How to transport or store 10kWh of energy?



C | Free Full-Text | Why the Carbon-Neutral Energy Transition Will Imply the Use of Lots of Carbon (mdpi.com)