# Natural Gas' role in the Hydrogen Transition

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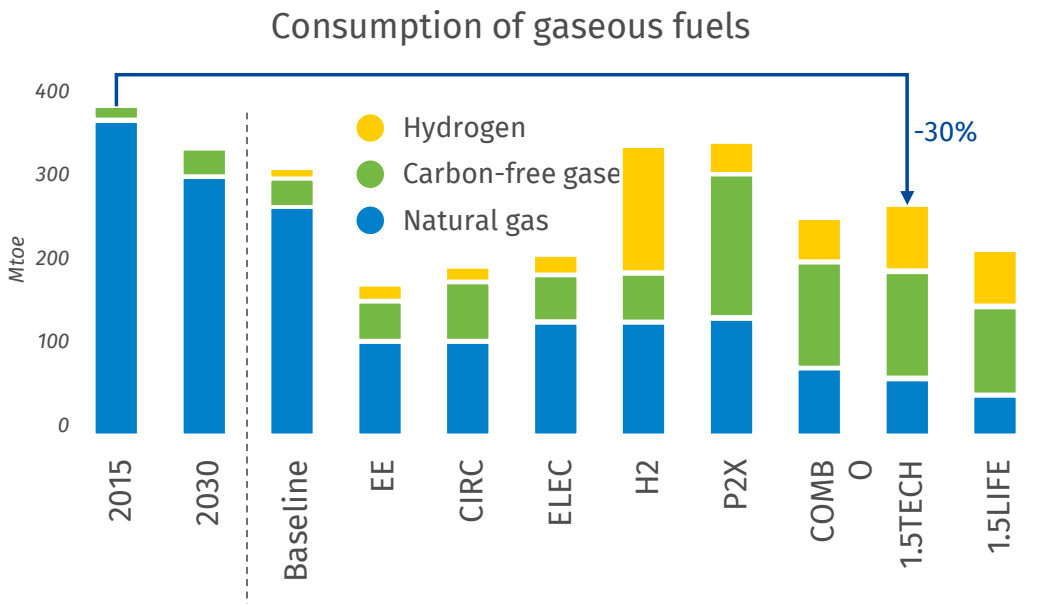
# European Commission Vision for Gas to 2050




*Source: European Commission Long-Term Strategy*

European Commission Long-Term Strategy confirms role of gaseous fuels in the energy transition

There is a major reduction in natural gas consumption in Europe between 2030 and 2050 predicted

## Eurogas view of the future

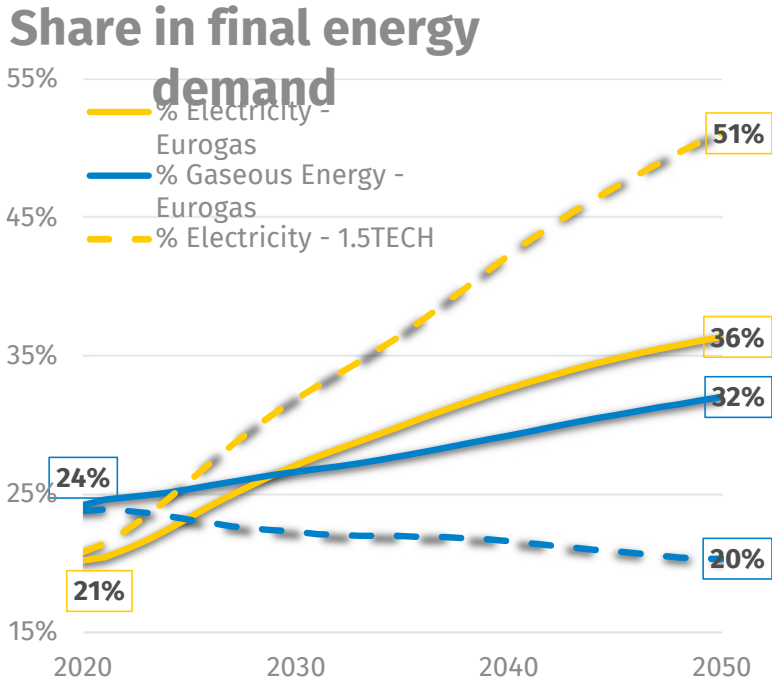
Eurogas has a pathway study to a carbon neutral future, comparing it to the European Commission's 1.5TECH

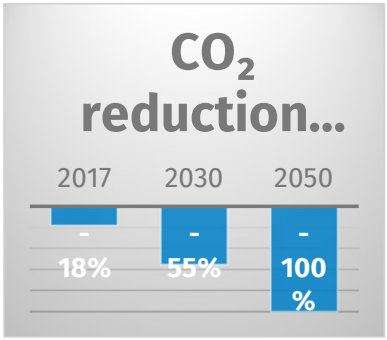
Commissioned DNV to carry out the study

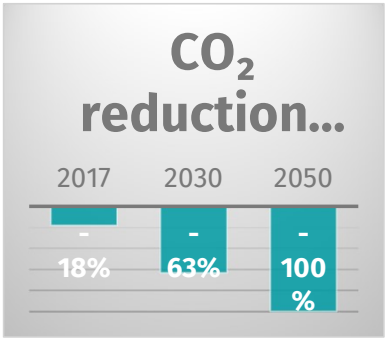
To provide estimates of any cost savings associated with a transition utilising a multi-vector approach

To outline at what point, and under which conditions, renewable and decarbonised gases will be available in Europe

# Eurogas Study compared to Commission 1.5 Tech 2018 LTS scenario



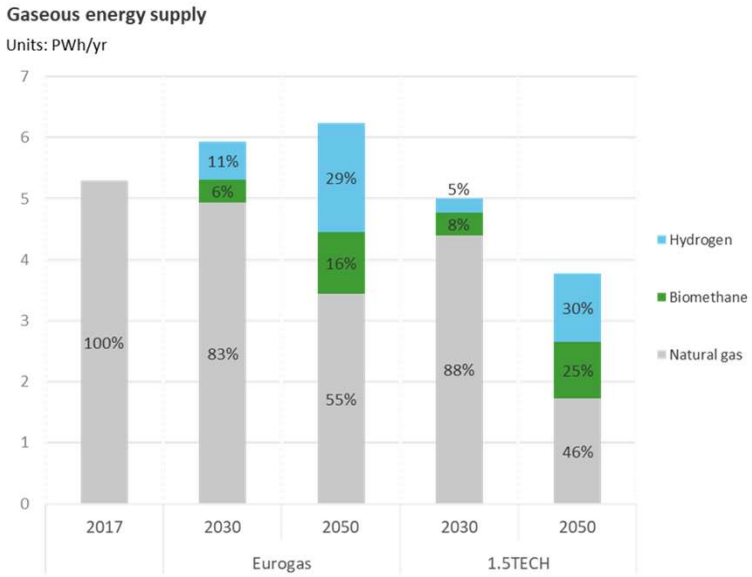

## Eurogas scenario delivers decarbonisation at lower cost

130 billion per year ➔ 4.1 trillion by 2050

More efficient use of gas and electricity infrastructure

# The gaseous energy supply chain to 2050

Gaseous energy supply in the Eurogas scenario increases by 18% over 2017 levels (natural gas supply reduces by 35%) – Hydrogen accounts for 29%



# Hydrogen is going to be important

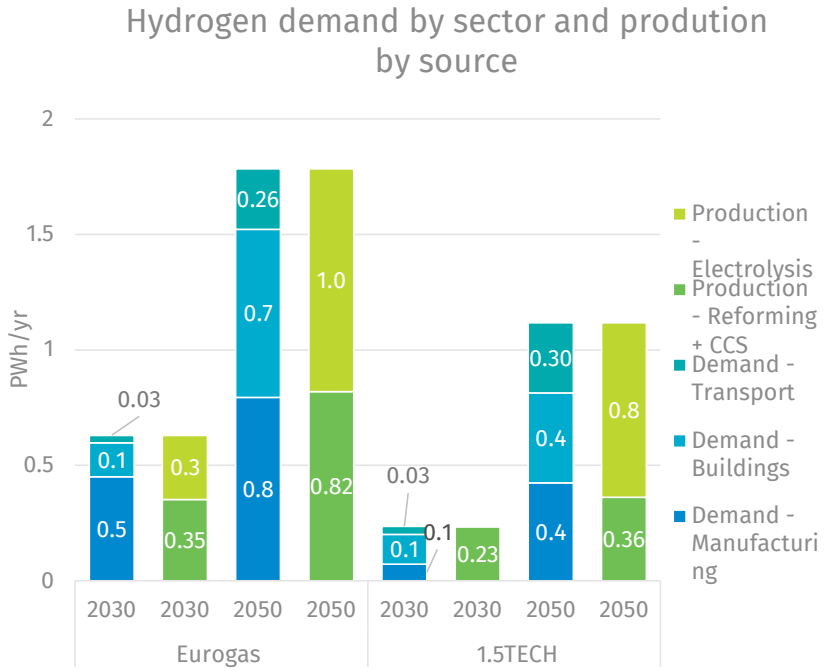
Eurogas scenario sees manufacturing lead hydrogen uptake until 2030

Hydrogen *(together with biomethane)* displaces natural gas in heating after 2030 towards 2050 – in the beginning blending will be especially important for this sector

The transition is gradual and requires appropriate framework conditions are set in 2020s

Both scenarios show an important role for hydrogen from reformed natural gas as an early driver to provide scale by 2030

The share of hydrogen from electrolysis overtakes hydrogen from reformed natural gas by 2050

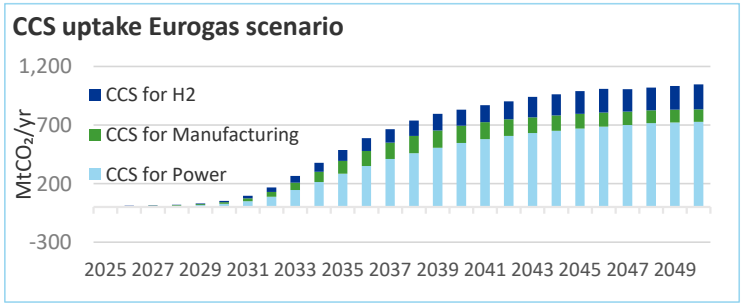


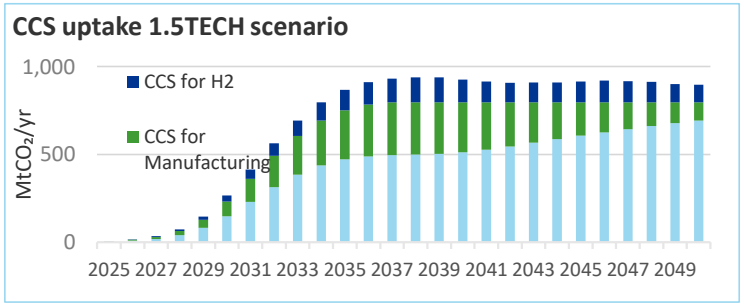
# Whatever scenario we choose, CCS is not an option. It is a necessity.

Both scenarios rely on CCS, especially to decarbonize the power and manufacturing sector

Although the Eurogas scenario has a higher share of natural gas, it decarbonizes the energy system with 15% lower cumulative CCS deployment towards 2050 than 1.5TECH

Under conservative assumptions and restrictive policies, both scenario's use 11-13% of available storage capacity, and have between 114-130 years of storage left in 2050



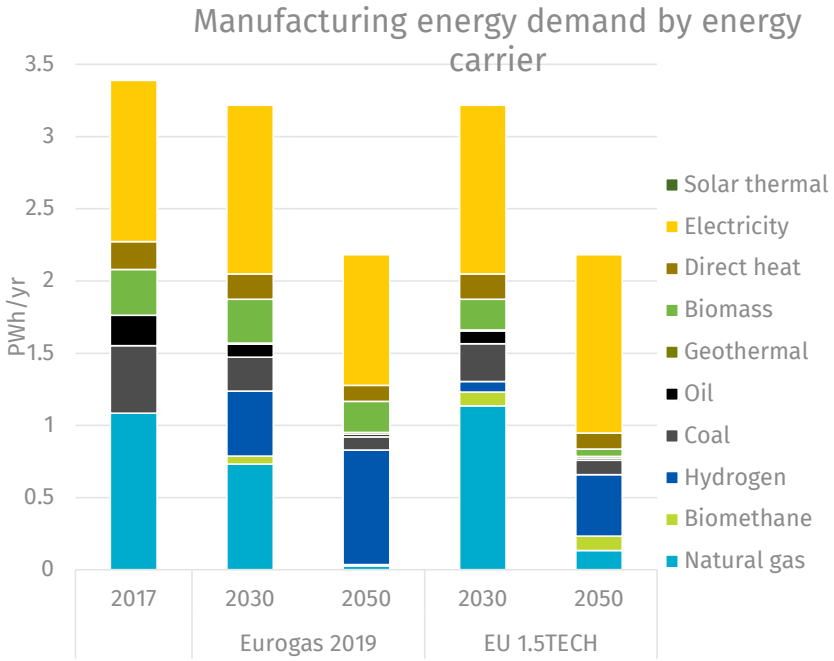



# Manufacturing leads the uptake of hydrogen until 2030 according to Eurogas

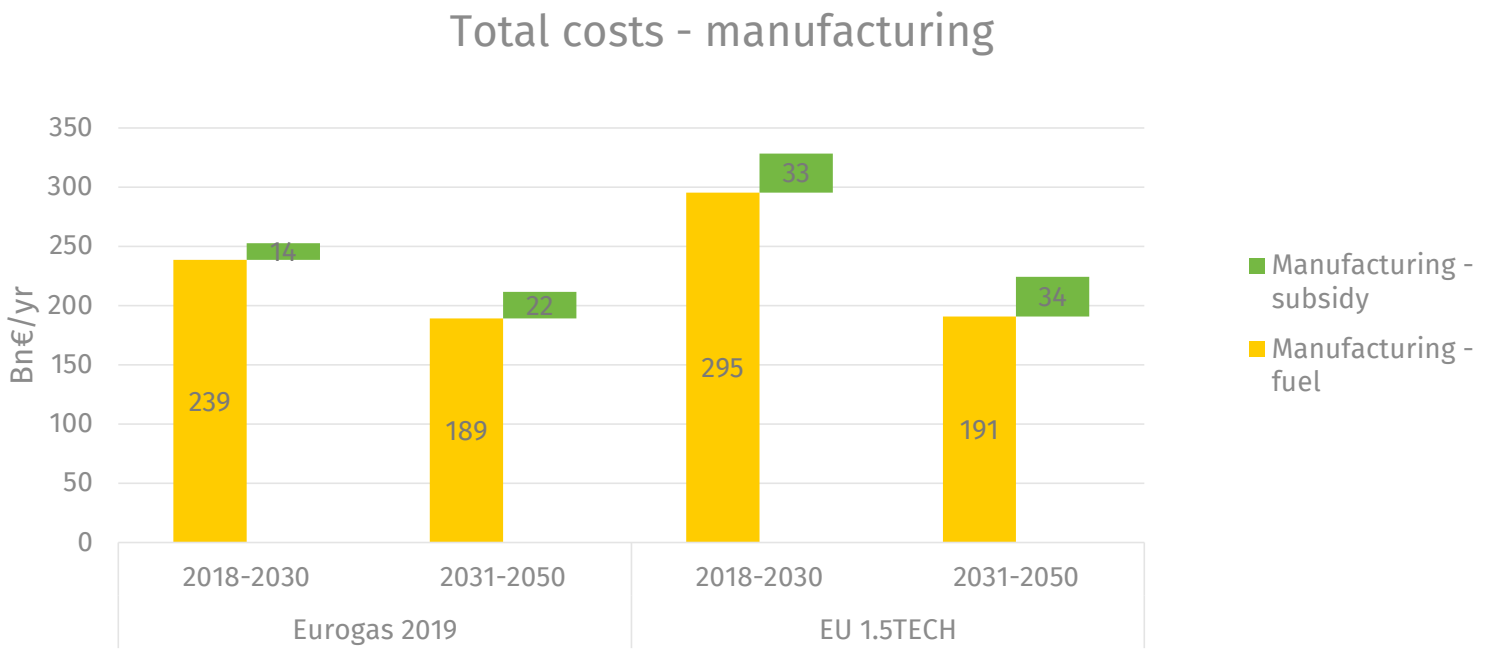
Manufacturing sector is the main driver for initial large-scale hydrogen demand

These volumes lead manufacturing to trigger the necessary infrastructure investments

Using hydrogen in manufacturing requires less subsidies and has lower energy costs than the strong electrification seen in 1.5TECH



# More affordable to decarbonise manufacturing sector with hydrogen than electricity – save EU competitiveness



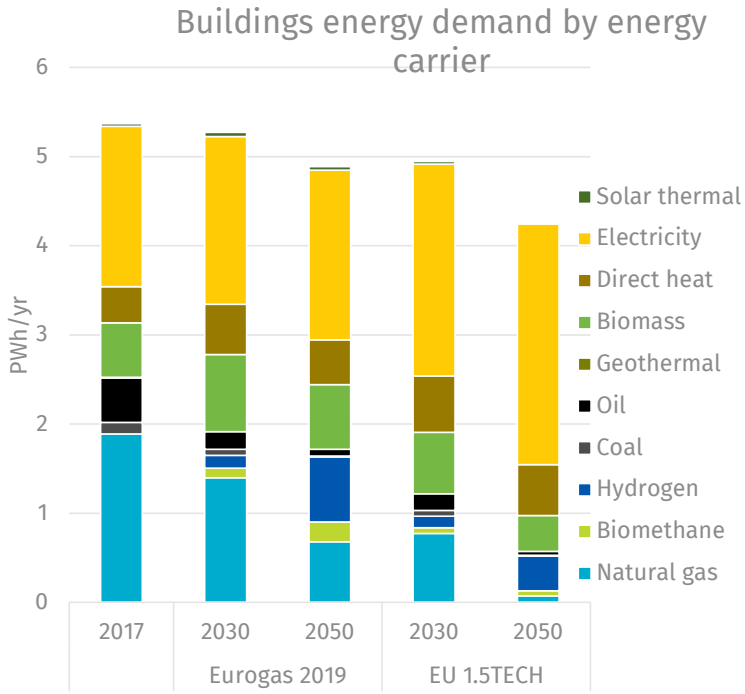
# Gas is still needed in the building sector

Gaseous energy, delivers a more cost-effective pathway

*True*: Electrification of heating can reduce energy demand compared to gaseous solutions

*Also true*: **over €10 trillion in subsidies needed to transform Europe's buildings stock** and replace appliances in 1,5 TECH

Social acceptance is a barrier that should not be underestimated – gaseous solutions are easy to implement and affordable for households across Europe



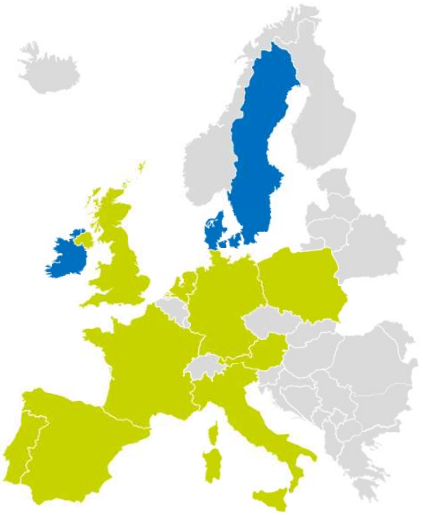
# Several countries already leading the way in promoting renewable and decarbonised gas

## Industry led initiatives

**Denmark**: 12% of gas consumption renewable in early 2020 - 100% by 2035

**Ireland**: 20% of gas consumption to be renewable in 2030, potential for 100% in 2050 (50 TWh)

**Sweden**: 15 TWh of biogas by 2030



## Government led initiatives

**France**: 10% of all gas in the grid to be renewable by 2030 and 100%+ potential by 2050 (400+ TWh) and 6.5GW electrolyser by 2030

**Austria**: 5 TWh by 2030 of renewable gas injected, equivalent to 6% of its natural gas consumption in 2018

**Germany**: 5 GW electrolyser capacity and 20% of all $H_2$ production to be renewable by 2030

**Portugal:** plans 2,5GW electrolyser by 2030

**Poland:** plans 2GW of electrolysers by 2030

**Netherlands**: plan 4 GW of electrolyser by 2030

**Spain**: plan 4 GW of electrolyser by 2030

**United Kingdom**: H2 to be used for heating by 2030 and 1 billion in CCS

**Italy**: 10 bcm biomethane in 2030 = 13% of 2017 gas demand. Plus 5 GW electrolyser by 2030

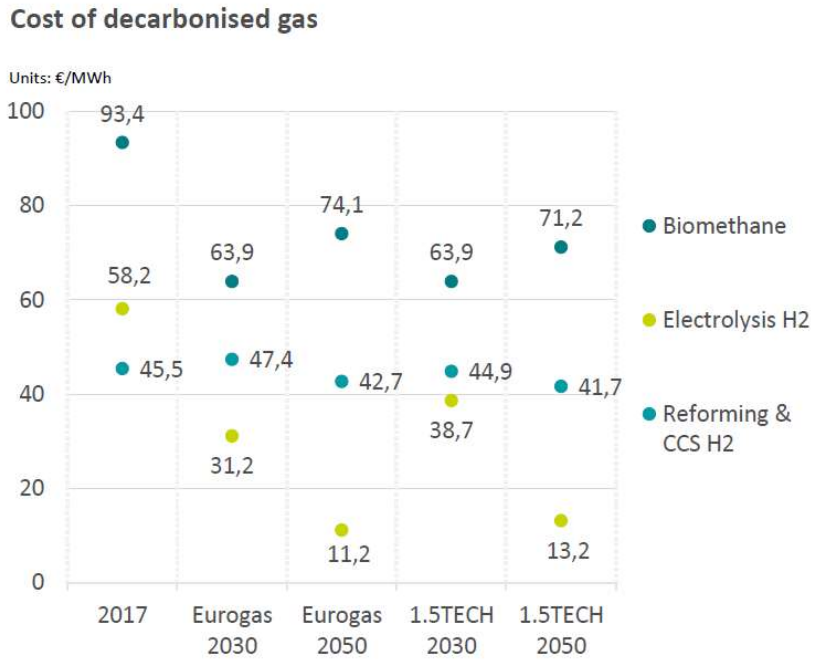
# Technology cost development for Biomethane and Hydrogen

OPEX and CAPEX benefit from regional and global cost learning

Carbon price causes natural gas to become less competitive, but also pushes cost escalation in feedstock

Cost of electrolysis for hydrogen decreases faster in Eurogas scenario than in 1.5 TECH more cost learning due to higher installed capacity

Costs of reforming with CSS are relatively stable, as CCS is a minor part of total cost, while reforming is a mature technology with limited cost learning



# The energy transition in Europe requires trillion+ Euro Investments every year

A holistic energy system approach to the transition is the most cost-effective saving over 4 trillion Euros in the period

Rolling out gaseous solutions across all sectors, **using existing infrastructure, saves €130 billion per year until 2050**

Main cost driver of the European Commission's scenario is the electrification of heating

- Over €10 trillion in subsidies needed to retrofit buildings
- Over €1 trillion needed to match electricity infrastructure to meet peak demand