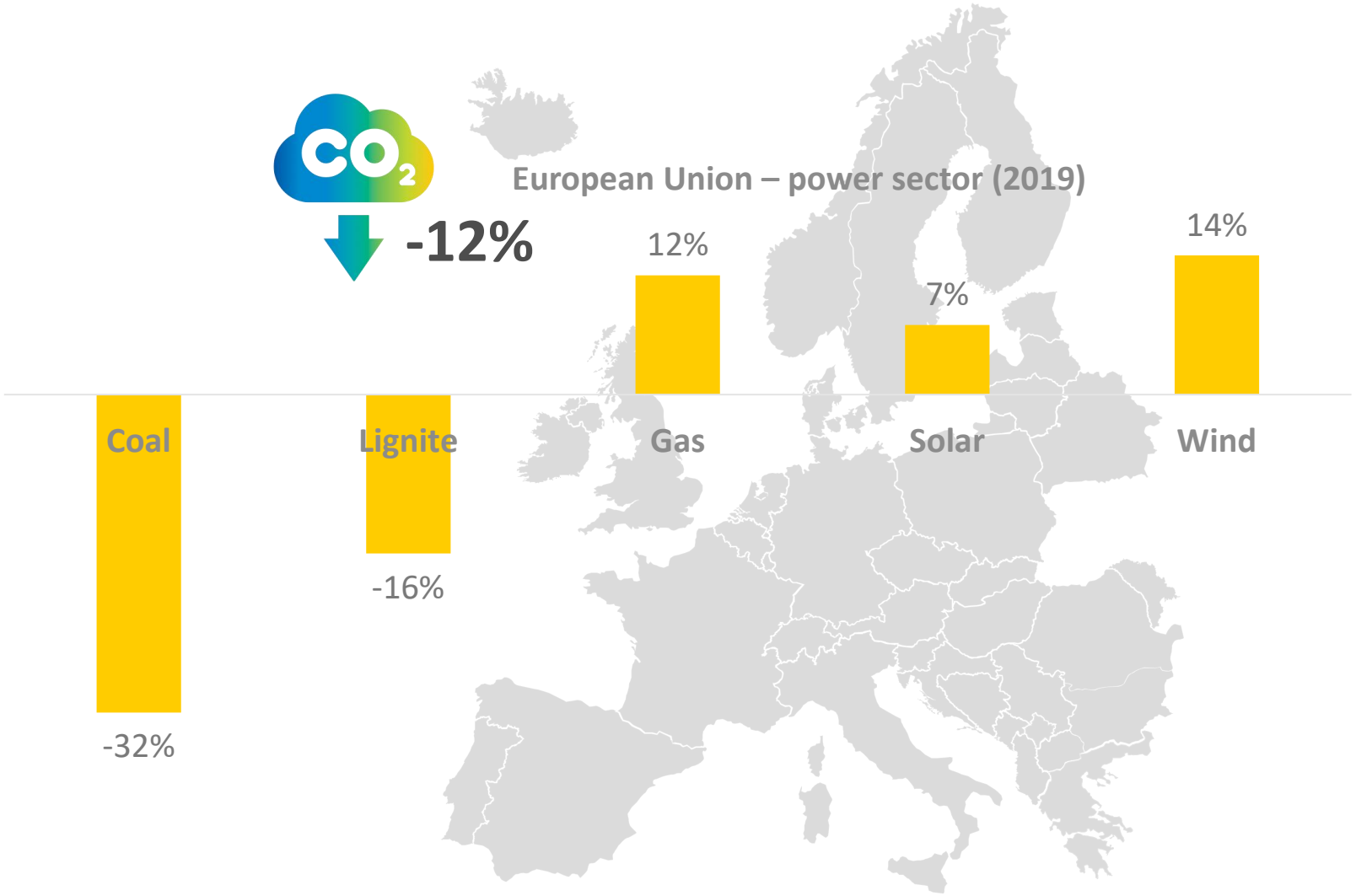
The role of natural gas and biogas in the EU to 2050

James Watson, Secretary General

The situation now: Gas and res-e displace coal and drive down greenhouse gas emissions in power



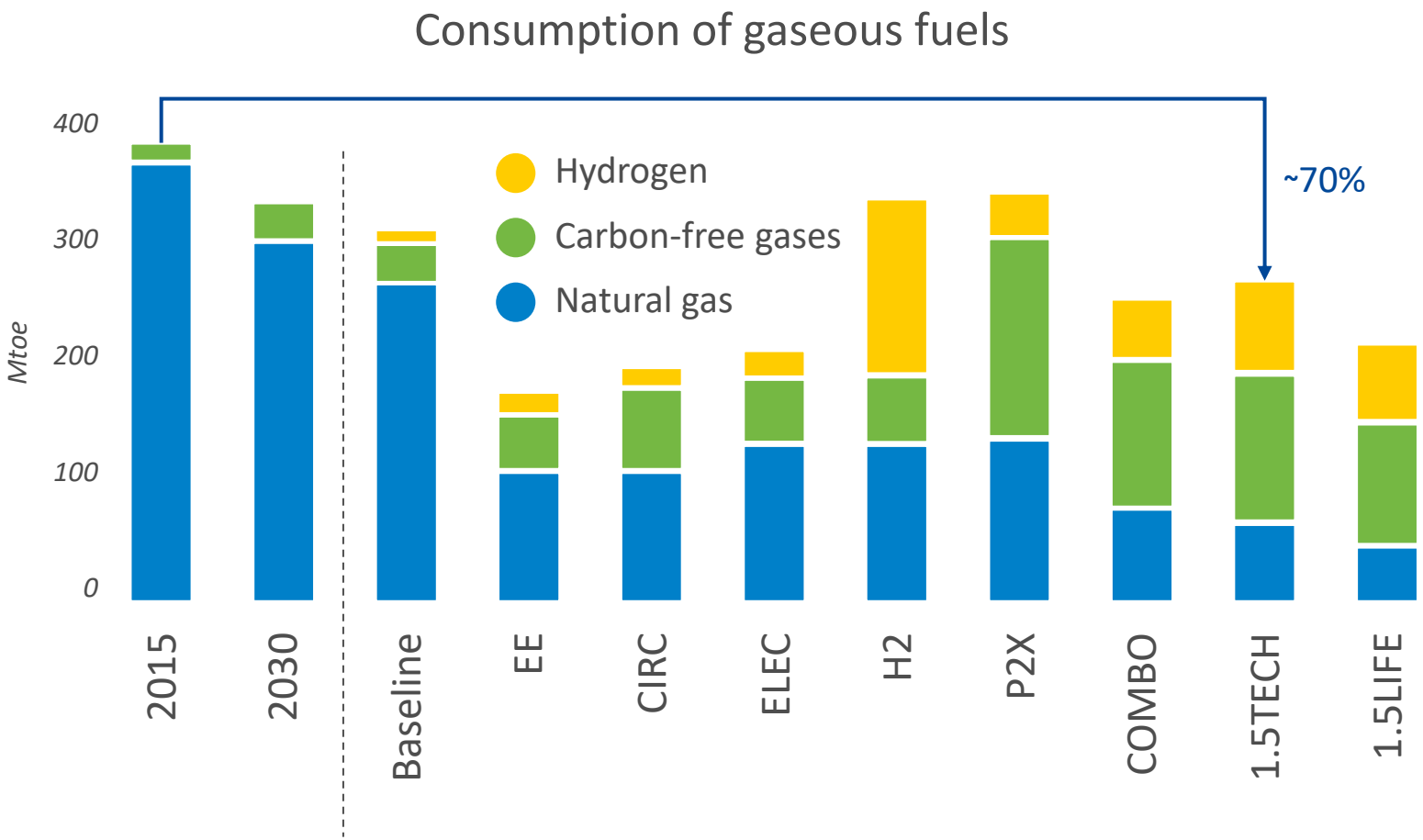
Low gas prices drive fuel switching, along with carbon pricing.

Gas is an ideal alternative to coal, lignite and oil while cutting emissions.

Gas enables and supports deployment of intermittent renewables

Source: Agora Energiewende: The EU Power Sector in 2019 (Feb 2020)

European Commission Vision for Gas to 2050



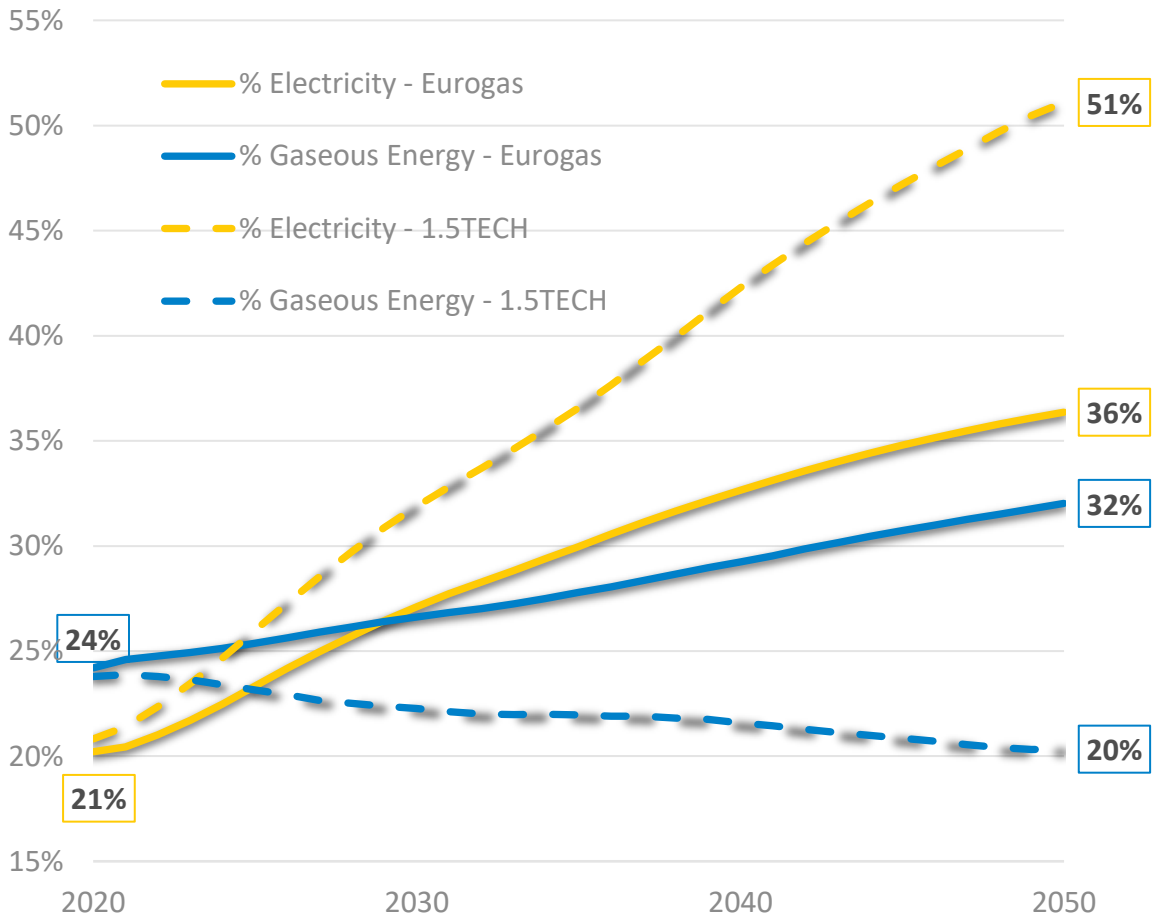
European Commission Long-Term Strategy confirms role of gaseous fuels in the energy transition

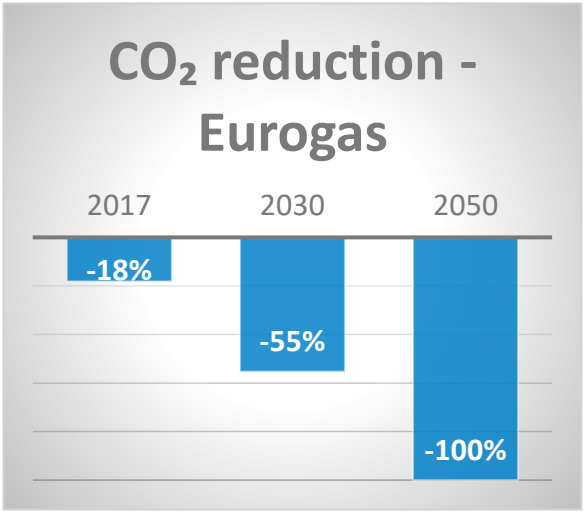
There is a major development in hydrogen in Europe between 2030 and 2050

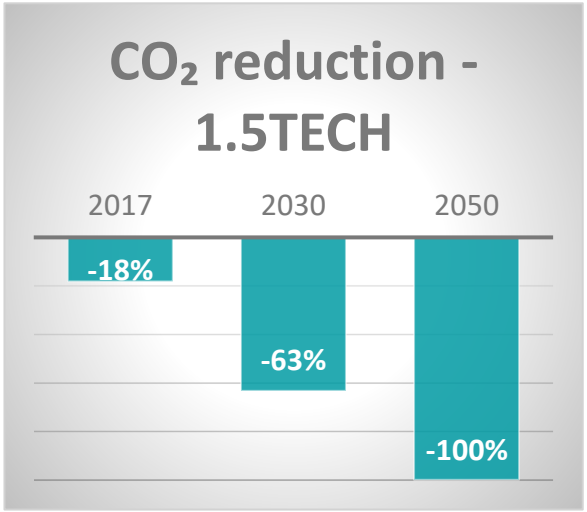
Source: European Commission Long-Term Strategy

Eurogas Study compared to Commission 1.5 Tech 2018 LTS scenario

Share in final energy demand







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 can and will fully decarbonize…

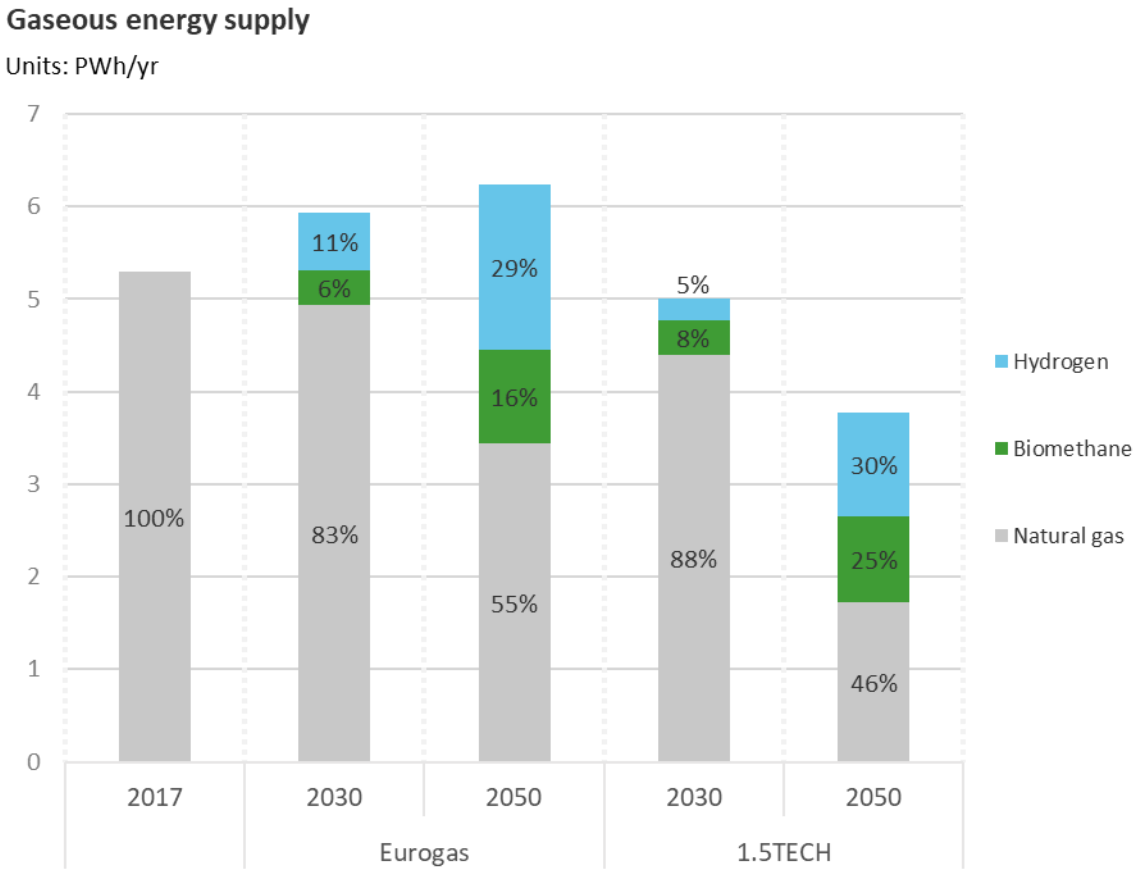
By 2050…

…gaseous energy supply in the Eurogas scenario increases by 18% over 2017 levels

…natural gas supply reduces by 35%

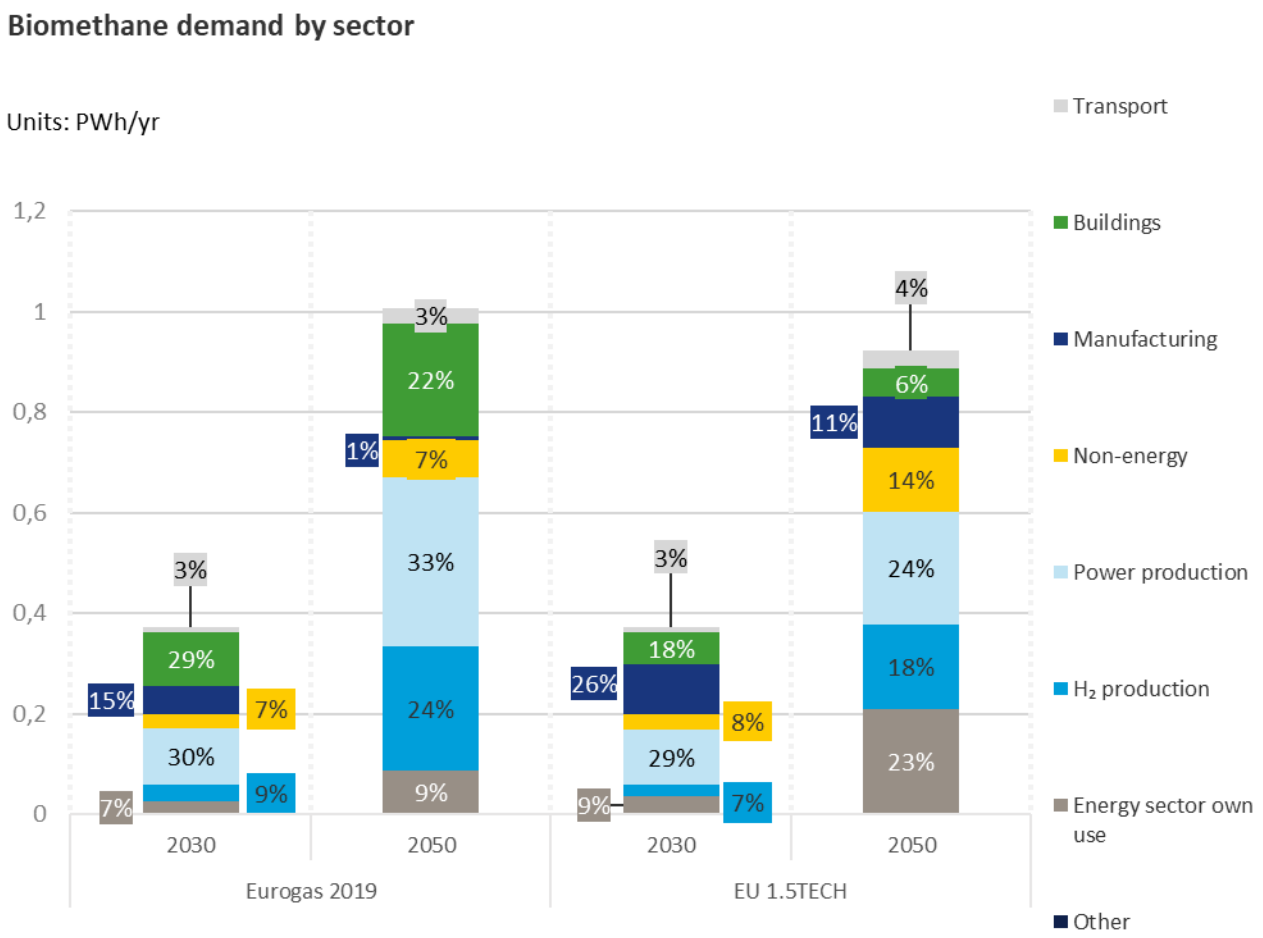
…gaseous energy is 89% decarbonized including CCS

…gaseous energy is fully decarbonised if net negative emissions from biomethane in power generation are accounted



Biomethane is a no-regret option that enables substantial negative emissions

- Biomethane is used in all sectors in the EU as it is delivered through gas networks
- Biomethane demand in Eurogas and 1.5TECH are similar for 2030 and diverge slightly in 2050 (~900/1000 TWh)
- Largest sector in terms of biomethane demand is power generation in both Eurogas (33%) and 1.5TECH (24%) in 2050
- Enables net negative CO2-emissions in power and manufacturing



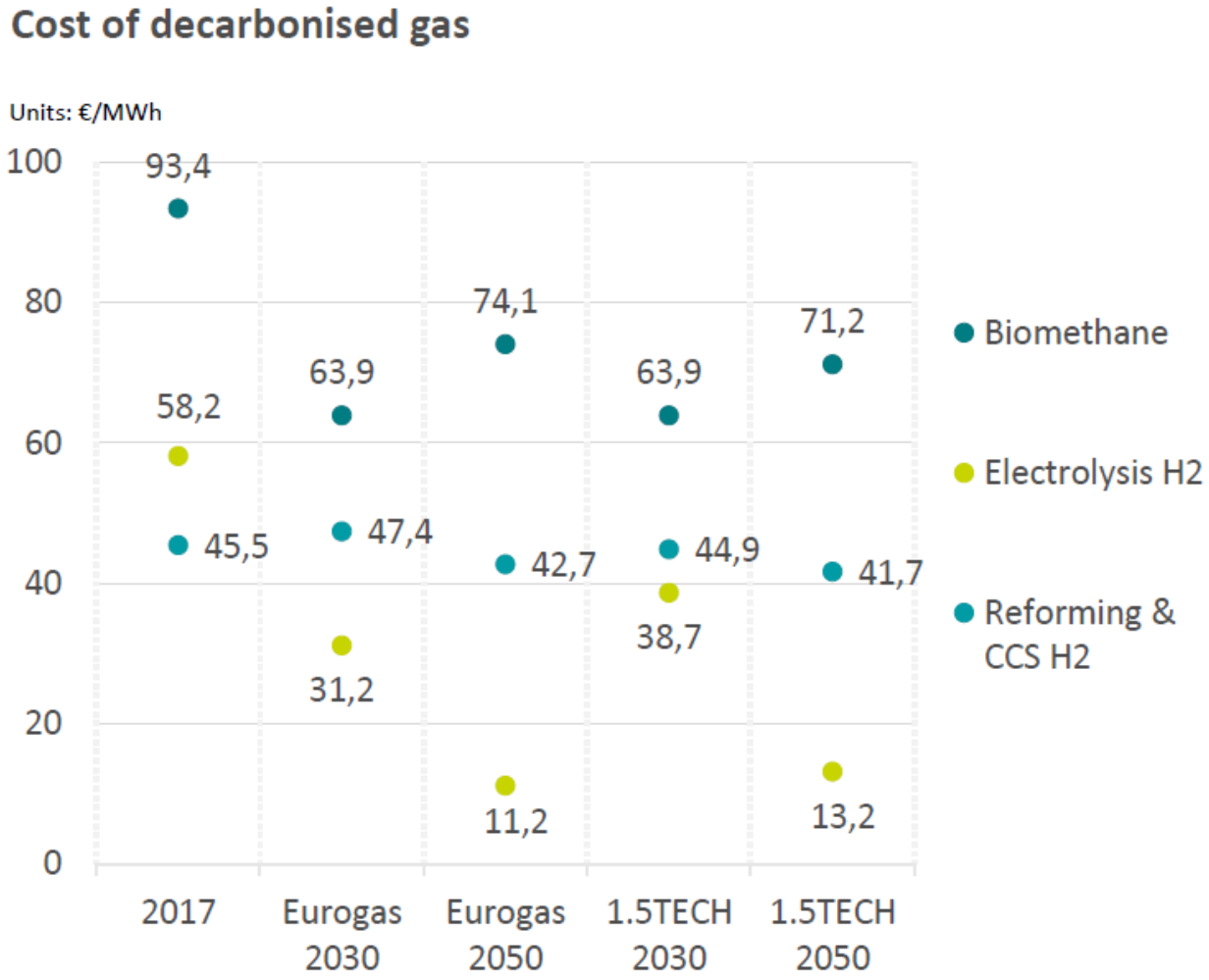
Technology cost development for Biomethane and Hydrogen

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



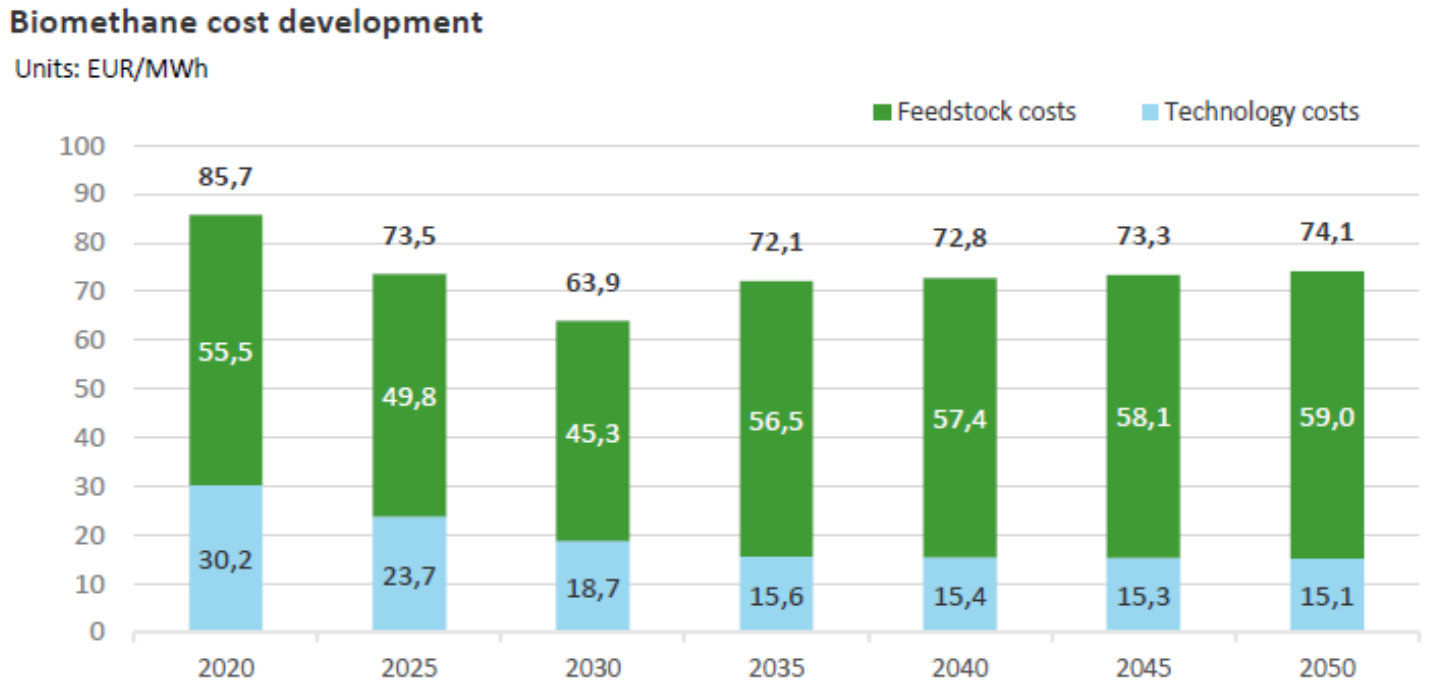
The cost of renewable and decarbonised gas declines towards 2050

The cost of renewable and decarbonised gas declines towards 2050 compared to 2017

However, biomethane costs increase after 2030, as we approach 2050 when production pushes towards the limits of available sustainable feedstock

2nd gen. feedstock prices increase by 30% over 2030-2050

However, biomethane prices rise by only 16% over the same period as learning effects cut technology costs in half



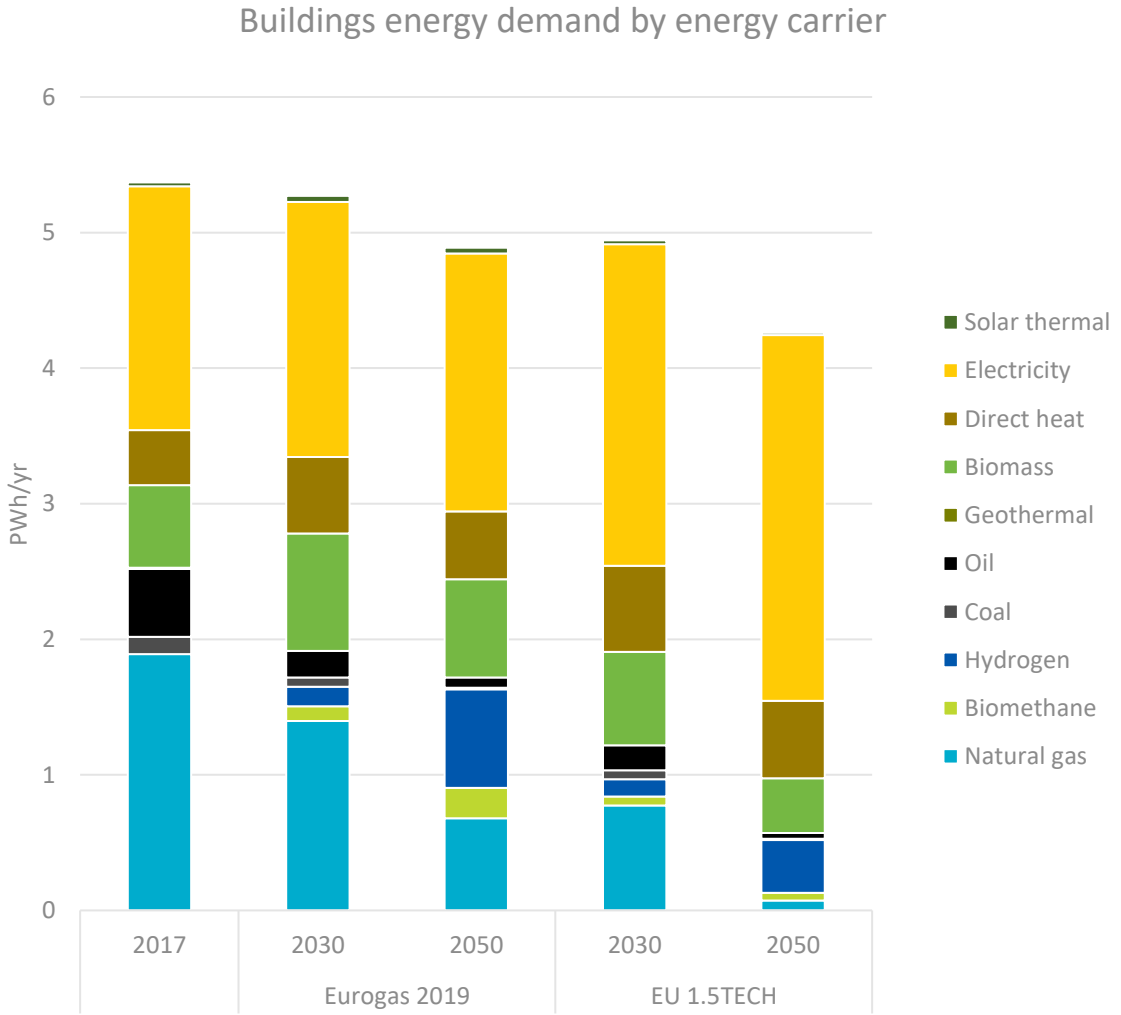
Gas is still needed in the building sector

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



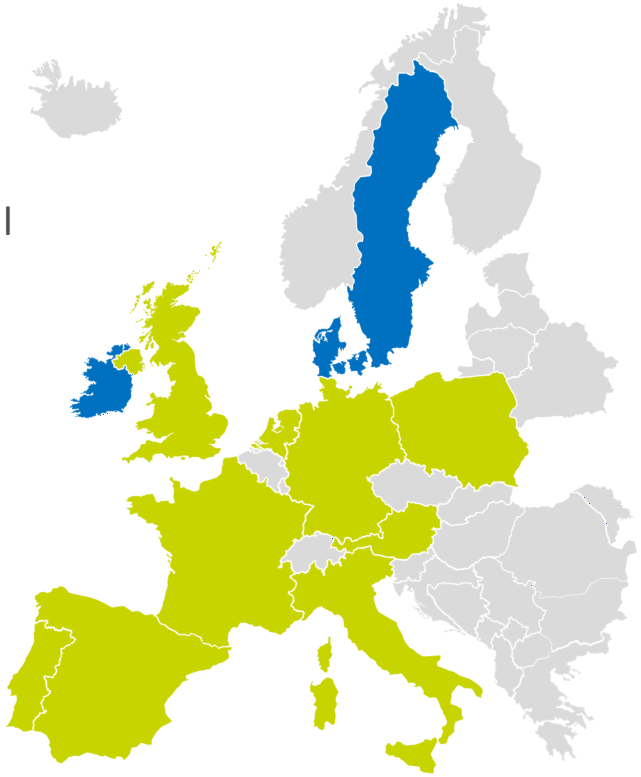
Many countries already leading the way in promoting renewable and decarbonised gas

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