



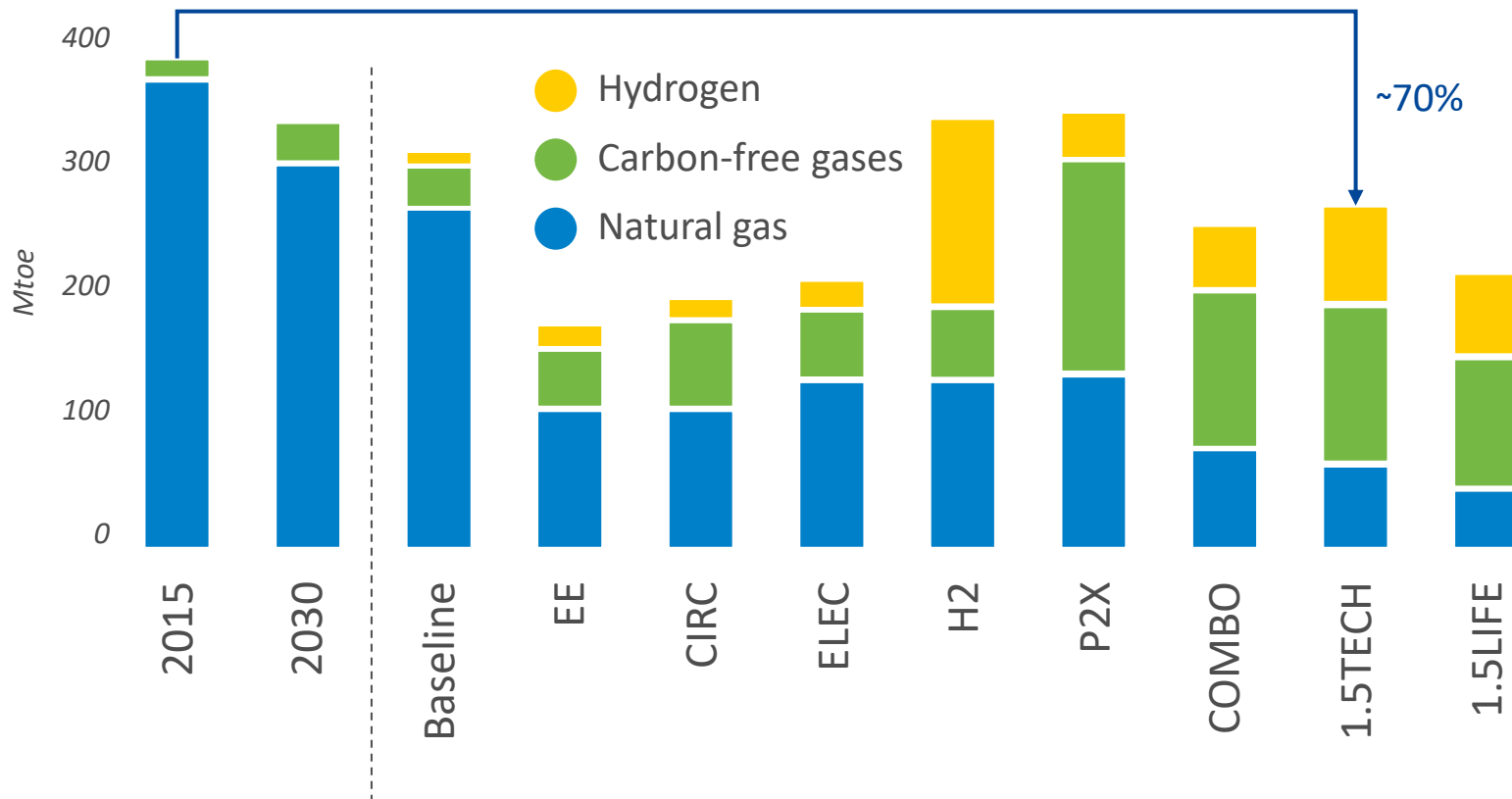
The Role of Hydrogen in Europe to 2050

James Watson, Secretary General

European Commission Vision for Gas to 2050



Consumption of gaseous fuels



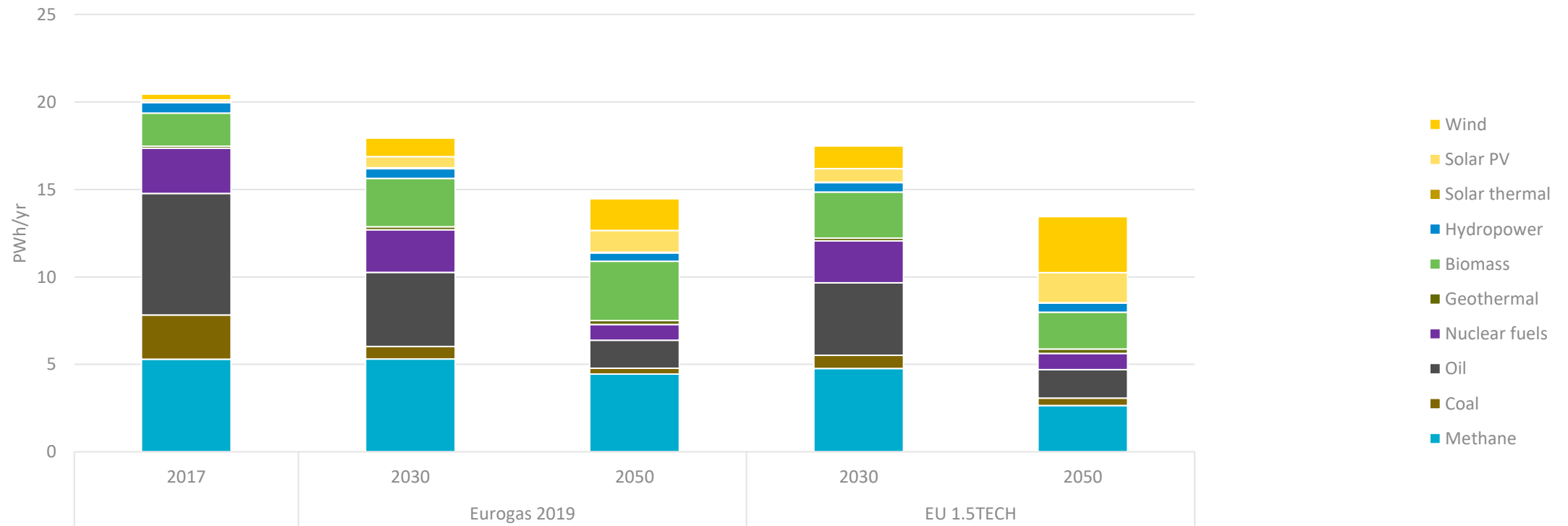
European Commission Long-Term Strategy confirms role of gas in the energy transition

CCS a necessity in the 1,5 Scenarios

A Eurogas Vision for Energy in 2050



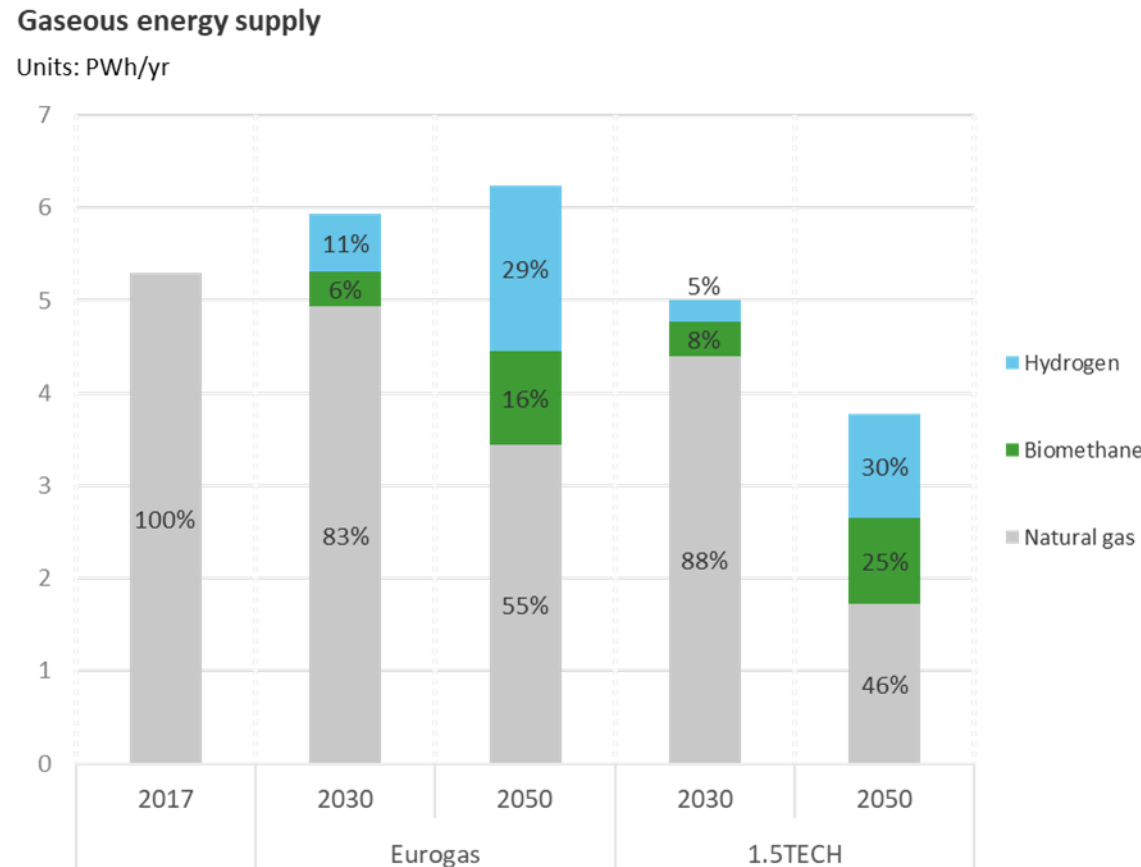
Primary energy supply by source



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%



Eurogas Study: Natural Gas an important feedstock for hydrogen

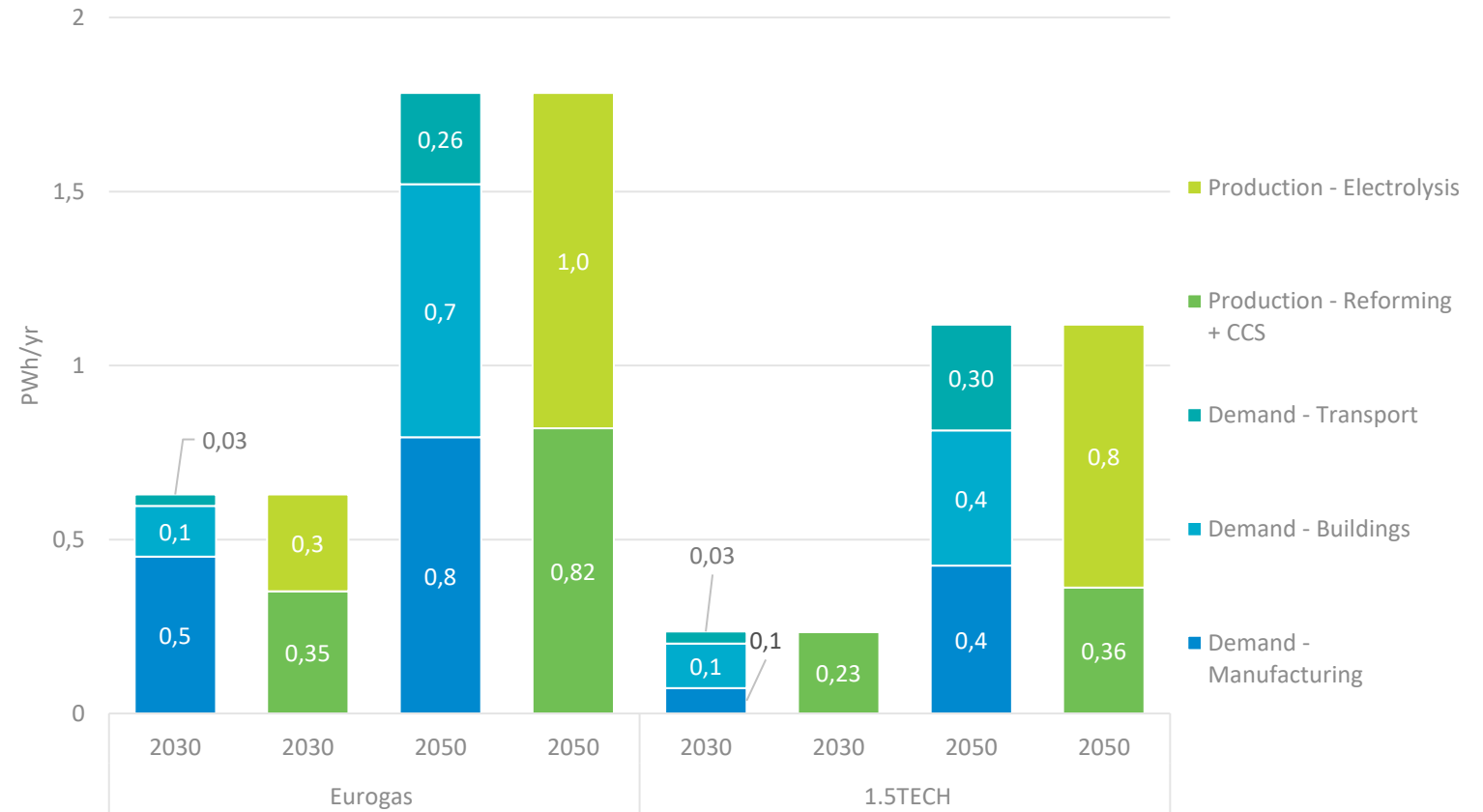


Eurogas scenario sees manufacturing lead hydrogen uptake until 2030

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

Hydrogen demand by sector and production by source



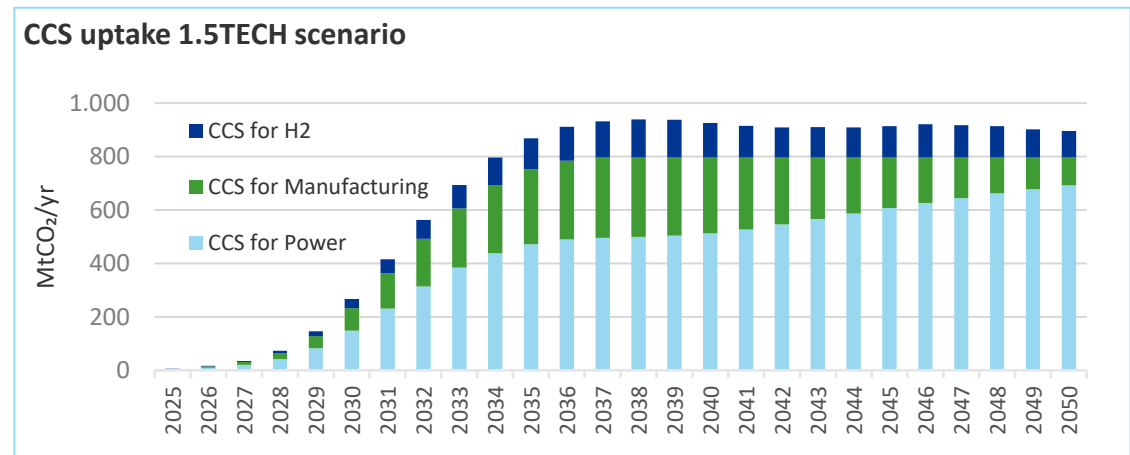
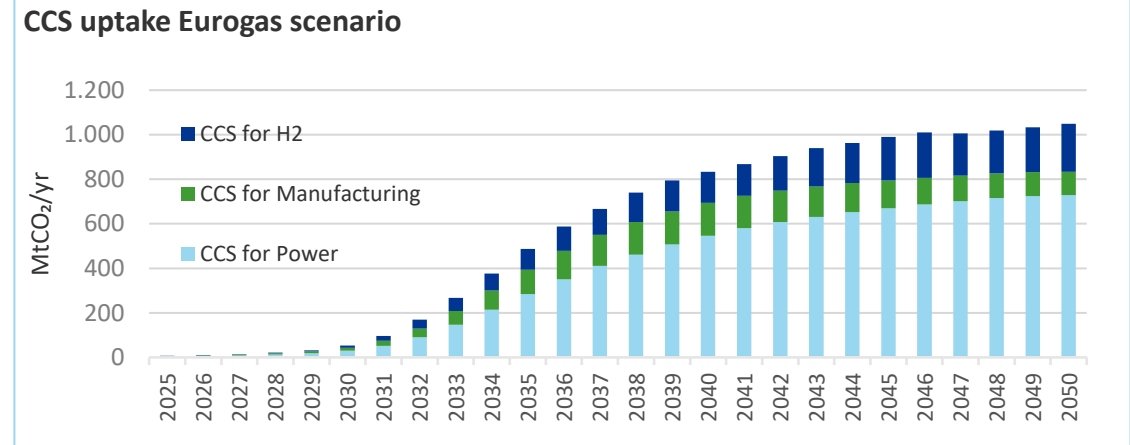
Whatever scenario we choose. CCS is not an option. It is a necessity.



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 scenarios use 11-13% of available storage capacity, and have between 114-130 years of storage left in 2050



Technology cost development for Biomethane and Hydrogen



OPEX and CAPEX benefit from regional and global cost learning

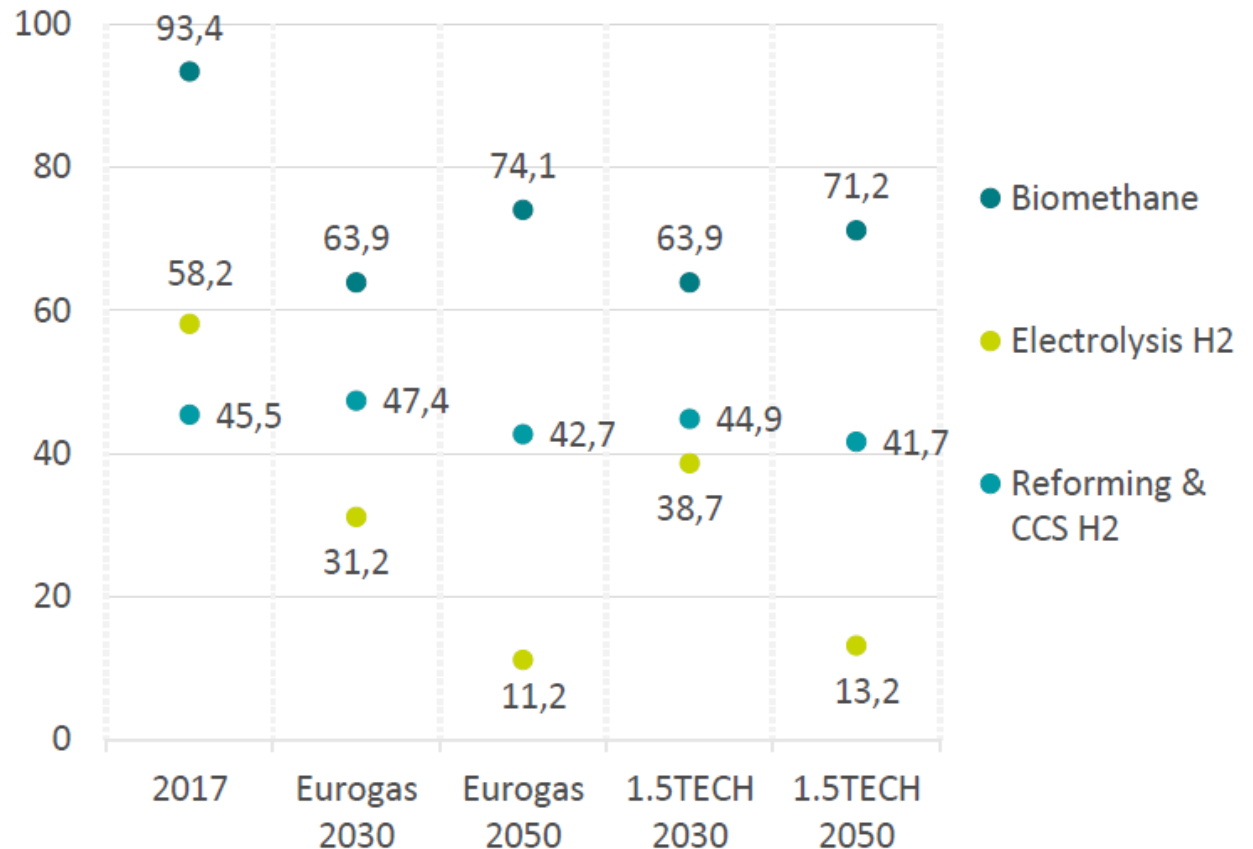
Carbon price causes natural gas to become less competitive, but also pushes cost escalation in feedstock

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

Cost of decarbonised gas

Units: €/MWh



Eurogas study shows gas delivers carbon neutrality at considerably lower cost to high levels of electrification



A holistic energy system approach to the transition is more cost-effective

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

Main cost driver of the 1.5TECH 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

