Decarbonised energy system and the perspective for gases

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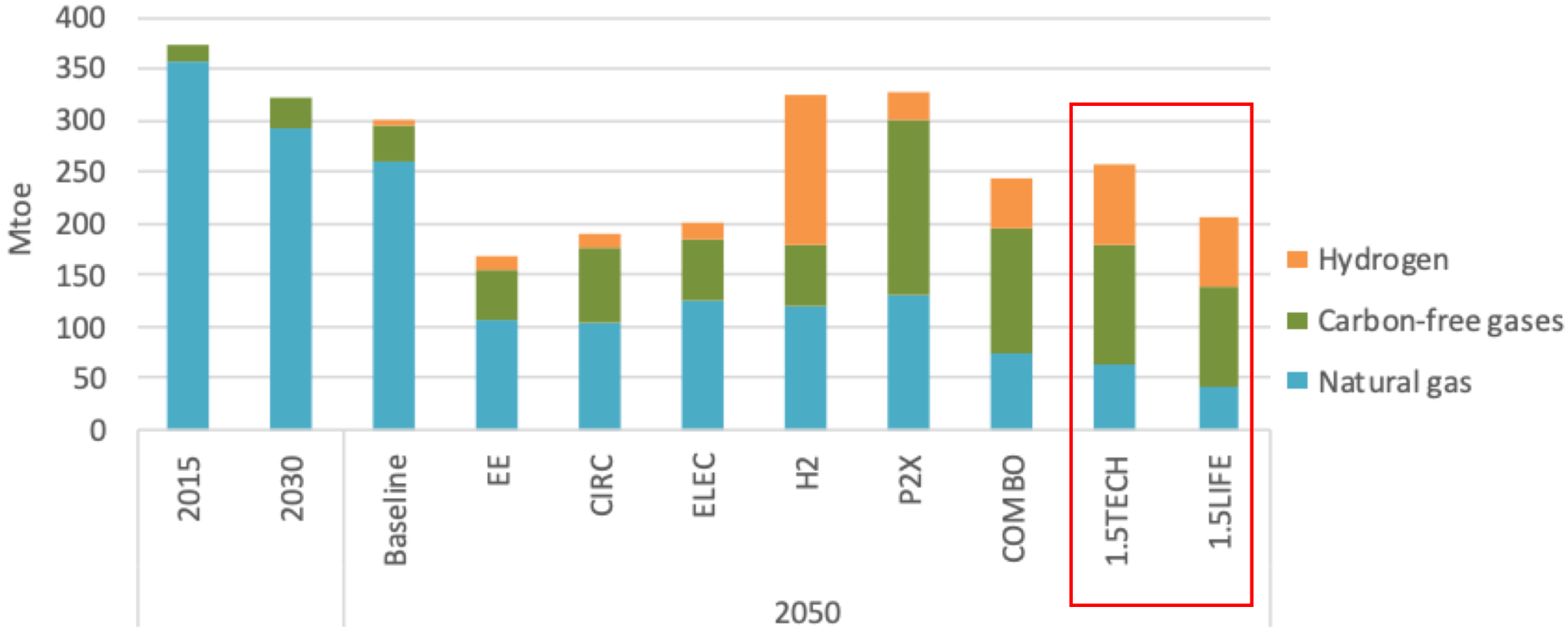
European Climate Foundation

Moving beyond natural gas

Net Zero by 2050 means natural gas plays virtually no role

Figure 33: Consumption of gaseous fuels



Note: "carbon-free" gases refer to e-gas, biogas and waste-gas.

Source: European Commission, 2050 Long-Term Strategy (2018)

Key considerations for the future role of gas

1. Climate neutrality

2. Economics & End-use

3. Infrastructure Implications

(1) Climate neutrality

- Robust definitions are the starting point. These should be based on robust lifecycle analysis which include all GHG (CO_2, CH_4, …)

- Paris Agreement goals mean gases shall be "GHG-neutral":
  - Biomethane from waste and residues
  - Green hydrogen (Electrolysis using renewables)

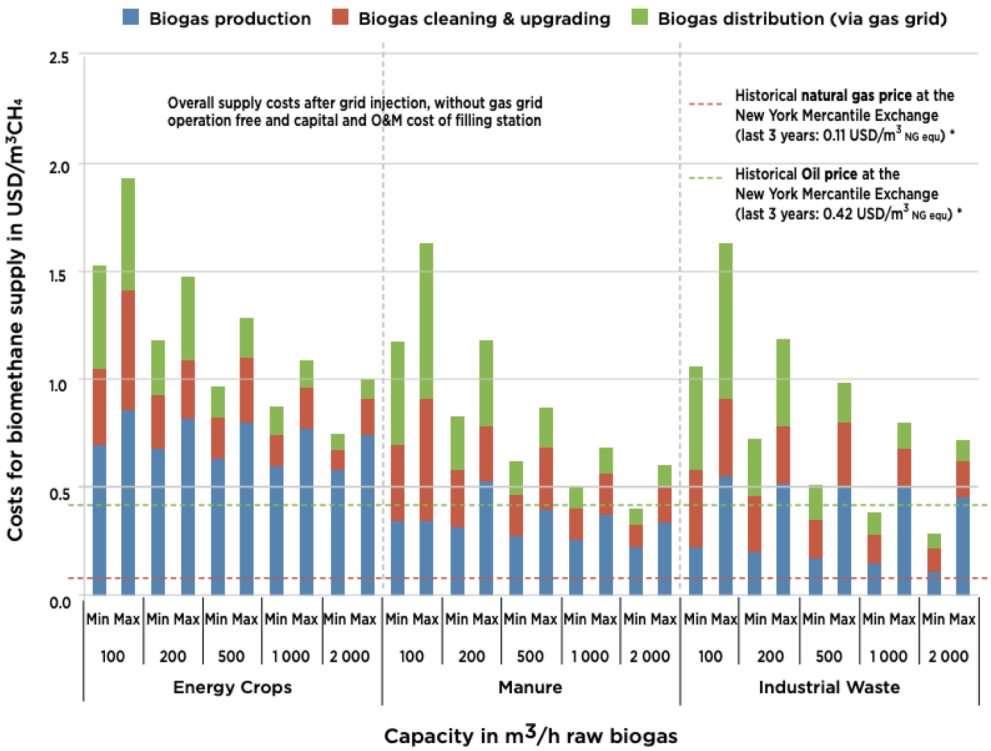
    + E-gas from green hydrogen => depends on CO_2 source.

- Important to consider potentials: limits to biomethane means that only green hydrogen can be available at scale

(2) Economics and end-use

Biomethane and synthetic gases will not be cost-competitive with natural gas

Figure 14: Total production costs for biomethane used as vehicle fuel by feedstock and size



Sources: Urban et al. (2009); Urban (2010); Adler et al. (2014)

Source: IRENA , Biogas for road vehicles: Technology brief (2017); Agora Energiewende, The Future Cost of Electricity-Based Synthetic Fuels (2018)

Cost of synthetic methane and liquid fuels in cent$_{2017}$ per kilowatt hour final product (without network charges and distribution cost) Figure 5

Note: Prices of natural gas and premium petrol are based on average values from scenarios by the World Bank and the IEA. Other cost reductions for PtG / PtL may result from advancements in PV, from battery storage that increases full load hours, and from especially large electrolysis facilities. Cost increases may result from higher cost of capital due to higher country risks.

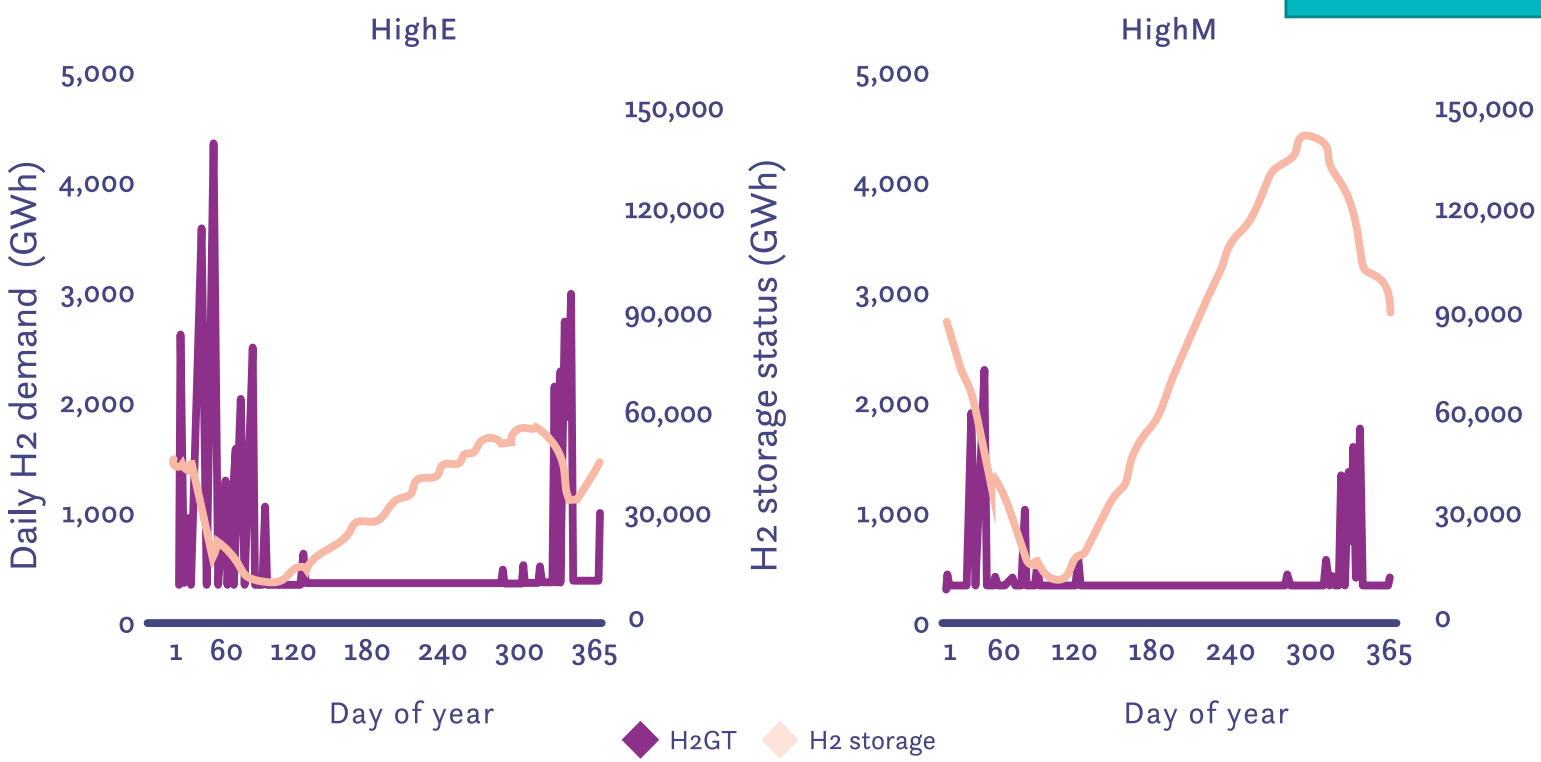
* Offshore wind power
** PV and PV / wind systems
*** Geothermal / hydropower (total potential limited to 50 terawatt hours)

Note: 10 cents per kilowatt hour is equivalent to around 90 cents per liter of liquid fuel.

(2) Economics and end-use

Targeted role for green hydrogen in high value end-uses like industry, heavy transport. In energy systems specifically for seasonal storage in colder weather countries

Archetype Germany

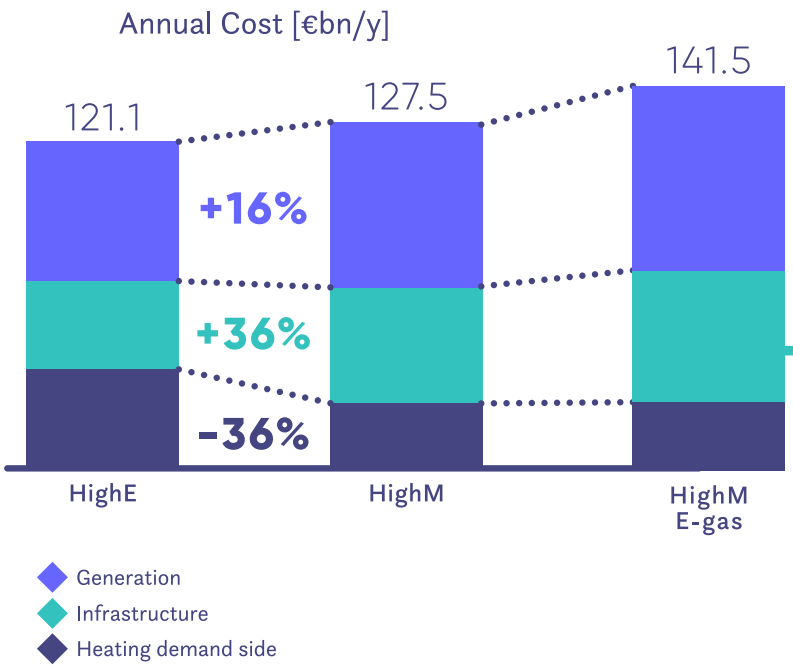


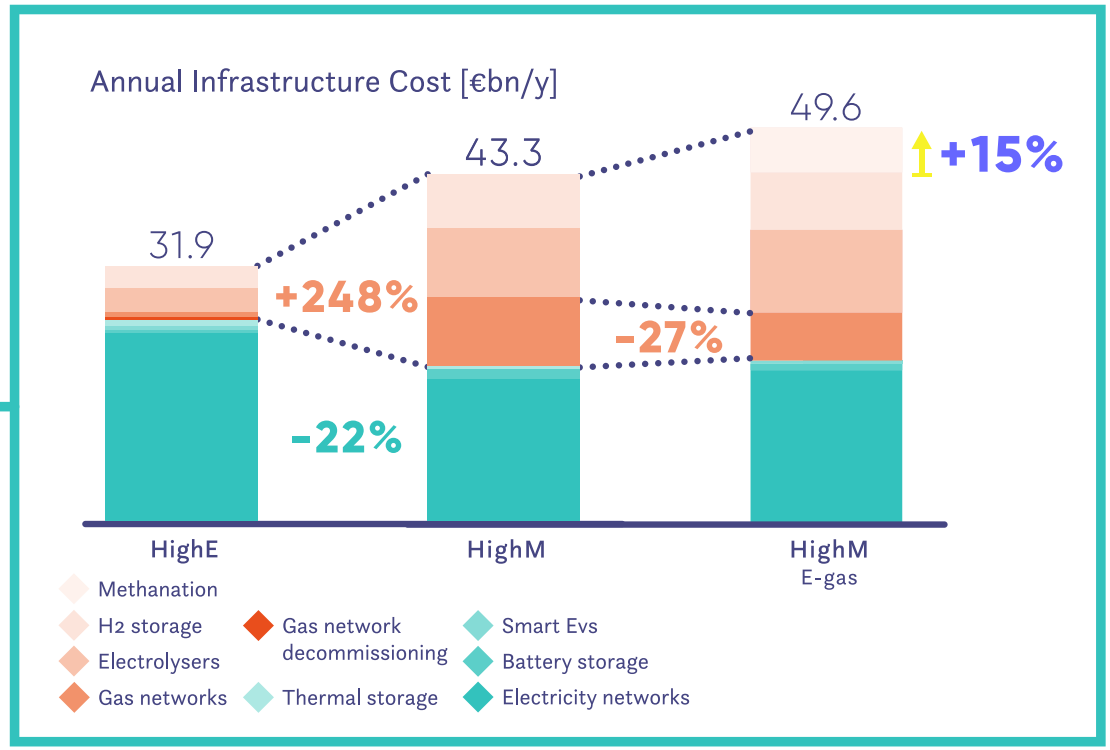
Needed EU electrolyzer capacities: from 8 GW electrolyzers in operation today to 350 GW in 2050 (HighE)

Source: ECF, Towards Fossil-Free Energy in 2050 (2019)

(3) Infrastructure implications

Green hydrogen supersizes the energy system. Avoided network costs with e-gas are outweighed by additional infrastructure & generation needs





Source: ECF, Towards Fossil-Free Energy in 2050 (2019)

Summary

- **NZ50 is perfectly feasible, in different constellations**. Sector coupling to play a **targeted role** mostly where it concerns power-to-gas (electroysers), power-to-gas-to-power (H2GTs) and power-to-heat (in heat networks).

- Different analyses converge around important points about what is the bulk solution in each end-use sector.
  => series of **no-regret choices** around **energy efficiency, electrification** for policy makers to make

- **Definitions** as the basis for good policy making for future of gas sector in the energy transition

Thank you

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