Hydrogen production using renewable energy

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Natural gas is a potent greenhouse gas (GHG) with a global warming potential 28 times higher than CO2 over a 100-year timescale13. The leakage rate in the production and transportation system of natural gas is a relevant factor affecting the carbon intensity of blue hydrogen14,15,16. In contrast, hydrogen produced through water electrolysis has a carbon intensity linked to the source of electricity and, to a lesser extent, the manufacturing of the system17. Currently, water electrolysis accounts for only 2% of global hydrogen production5. However, its widespread adoption alongside renewable technologies like solar and wind power could facilitate large-scale production of low-carbon hydrogen.

We estimate the potential demand for hydrogen at both country and sector levels for years 2020 and 2050.

Detailed country- and sector-specific results can be found in the Supplementary Dataset. While the hydrogen demand in 2020 is currently met by fossil resources, our 2020 scenario represents a counterfactual situation where all fuel or feedstock inputs to the chemical, cement, refineries and light industry, steel production, and transport sectors are instead provided by electrolytic hydrogen (see Methods subsection "Hydrogen demand").