

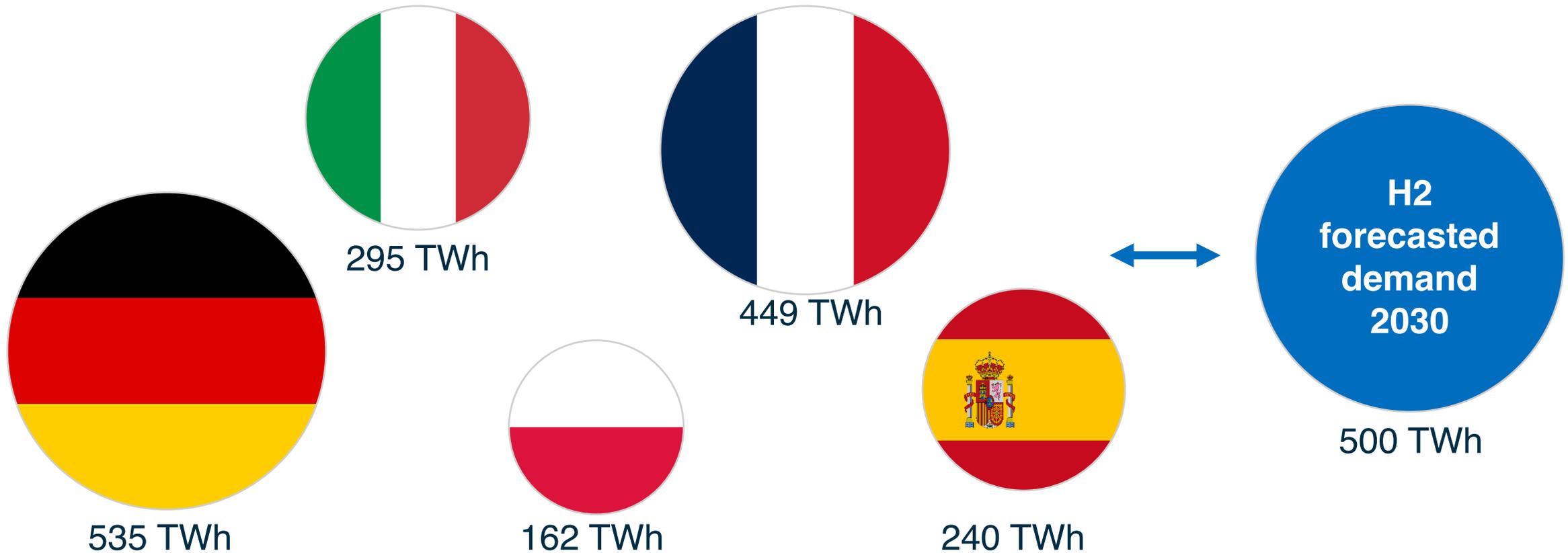
Hydrogen's place in an energy efficient EU

Scale of the challenge

**Meeting hydrogen targets is a challenge
that will require significant resources**

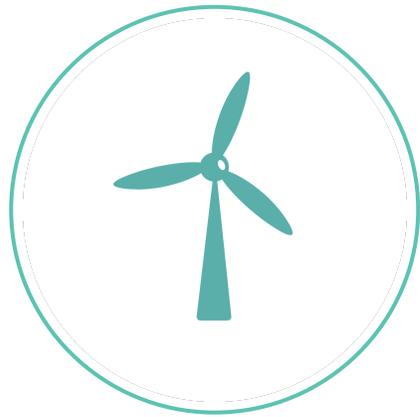
Producing 10 Mt of Hydrogen will consume around 500 TWh of electricity in 2030

Member State demand in 2020



If the targets were to be met today, nearly every single windmill and solar panel in the EU would be needed

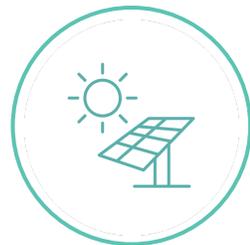
Renewables EU-27 production in 2020



397 TWh



373 TWh



140 TWh



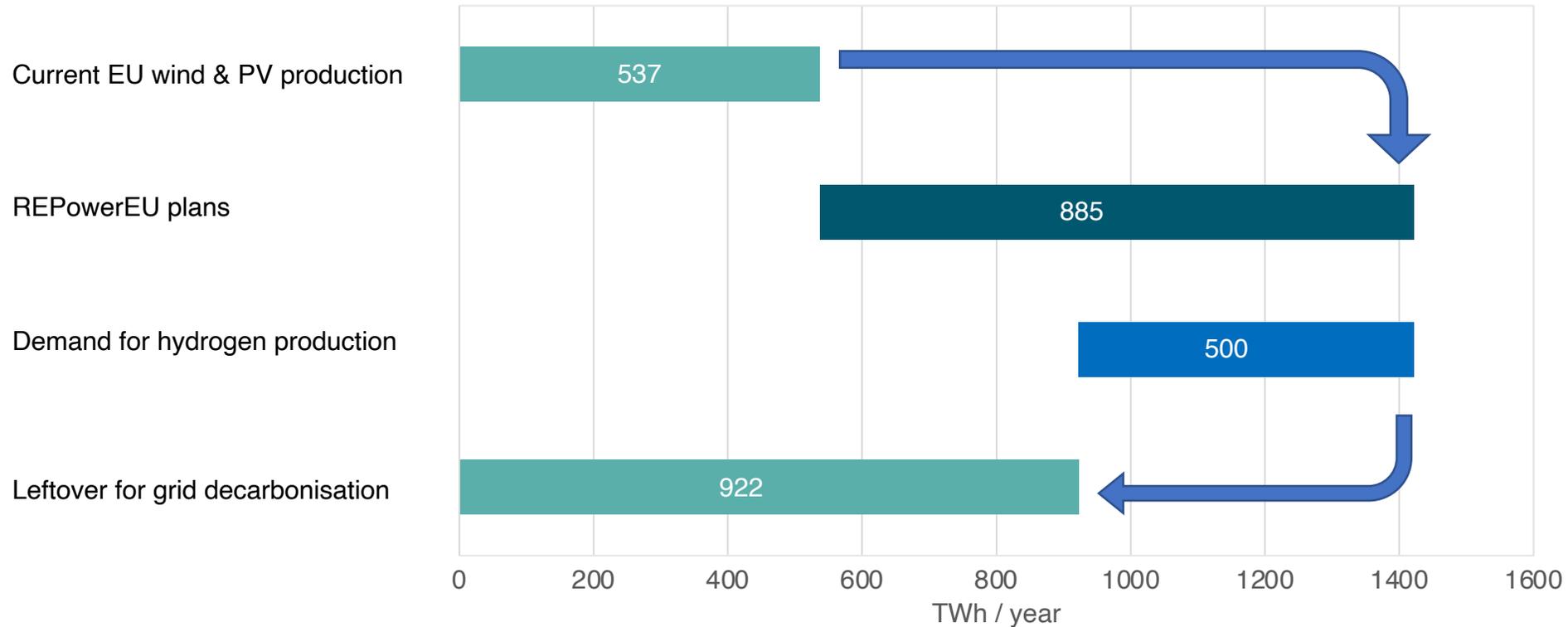
**H2
forecaste
d demand
2030**

500 TWh

Filling the gap

The demand for electricity will grow significantly and will, without additionality, have to be met with dispatchable sources

The electricity demand for hydrogen will cannibalise 63% of the additional RES planned under REPowerEU

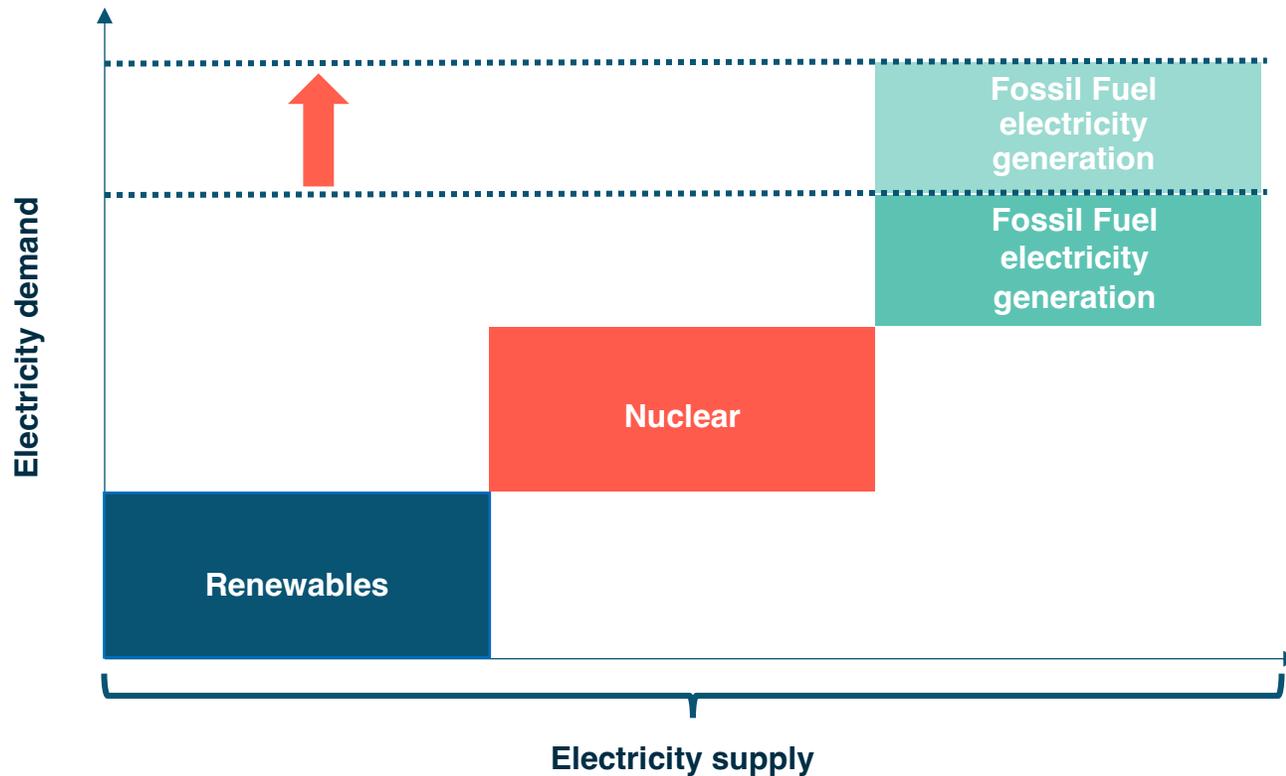


Current
EU demand:
2644 TWh/year
(2020).

Source: Current EU wind & PV based on IEA

Assumption: Repower EU plans are calculated using capacity factors: 11% for PV, and 27% for wind

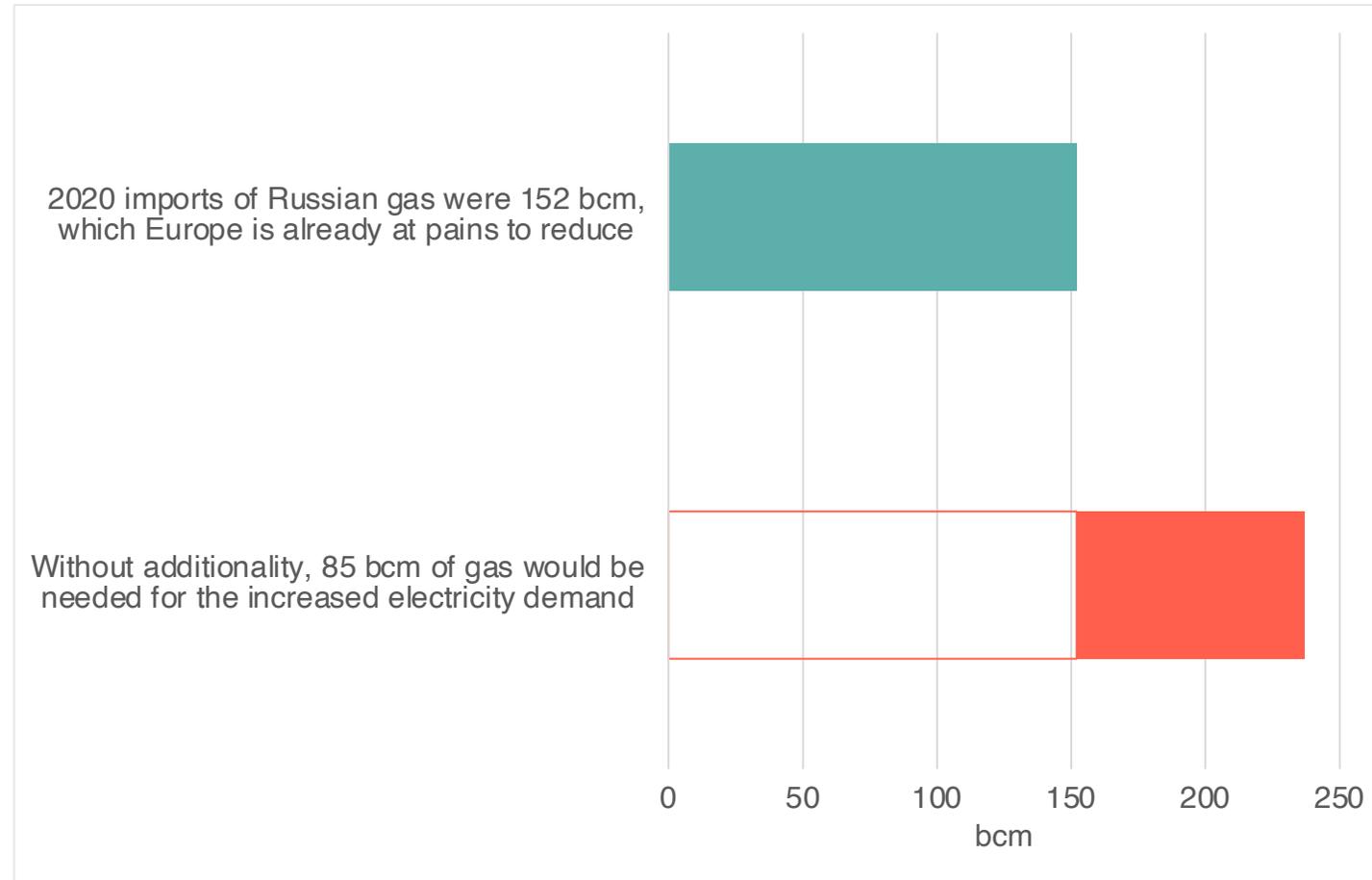
Added electricity demand, like for H2 production, means turning on fossil fuel power generation



Renewables and nuclear power plants in the EU are already running at full capacity almost all of the time.

In order to meet new demand for electricity for hydrogen production, the dispatchable plant turning on will be a fossil power plant.

If the electricity used for hydrogen production is sourced from gas power plants, 85 bcm are needed to meet the target



Assumptions:

- Electricity needed for H2: 500 TWh
- Russian gas imports in 2020: 152 bcm

In this scenario, the additional emissions from hydrogen production are equal to the current emissions from the EU aviation sector

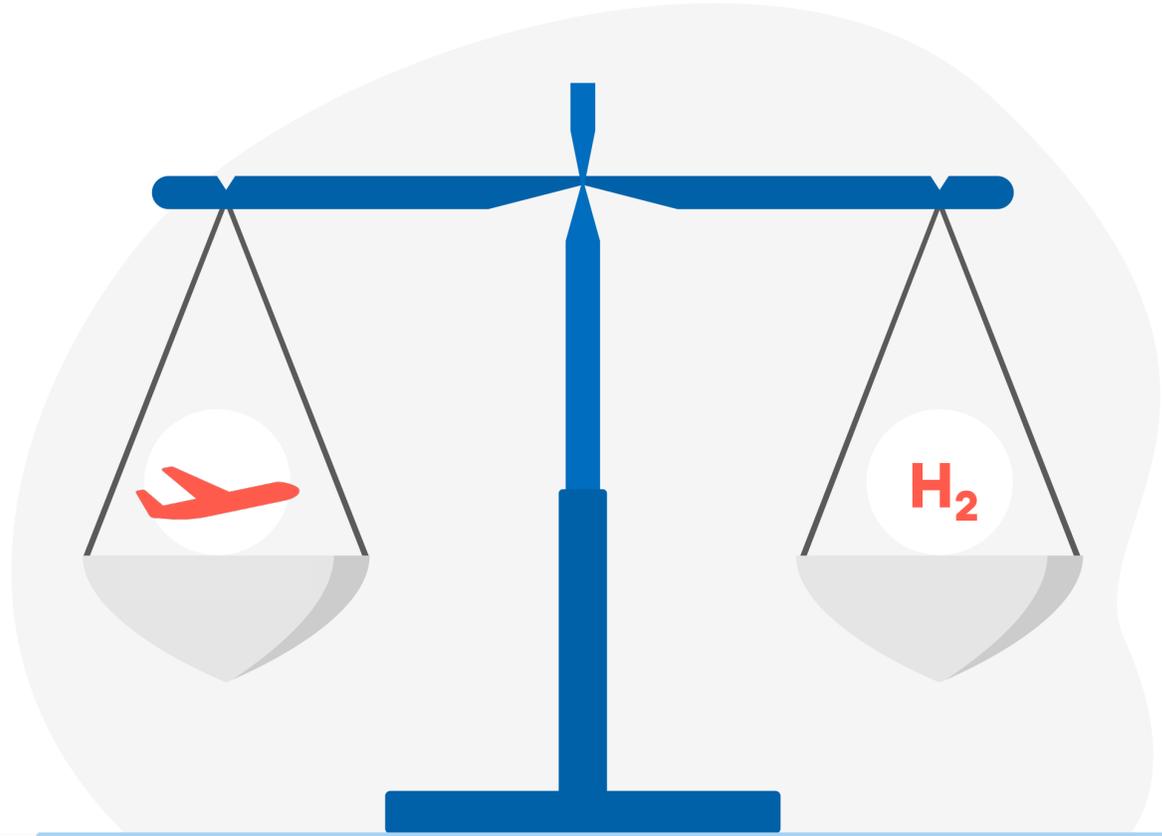


Image by pch.vector on Freepik

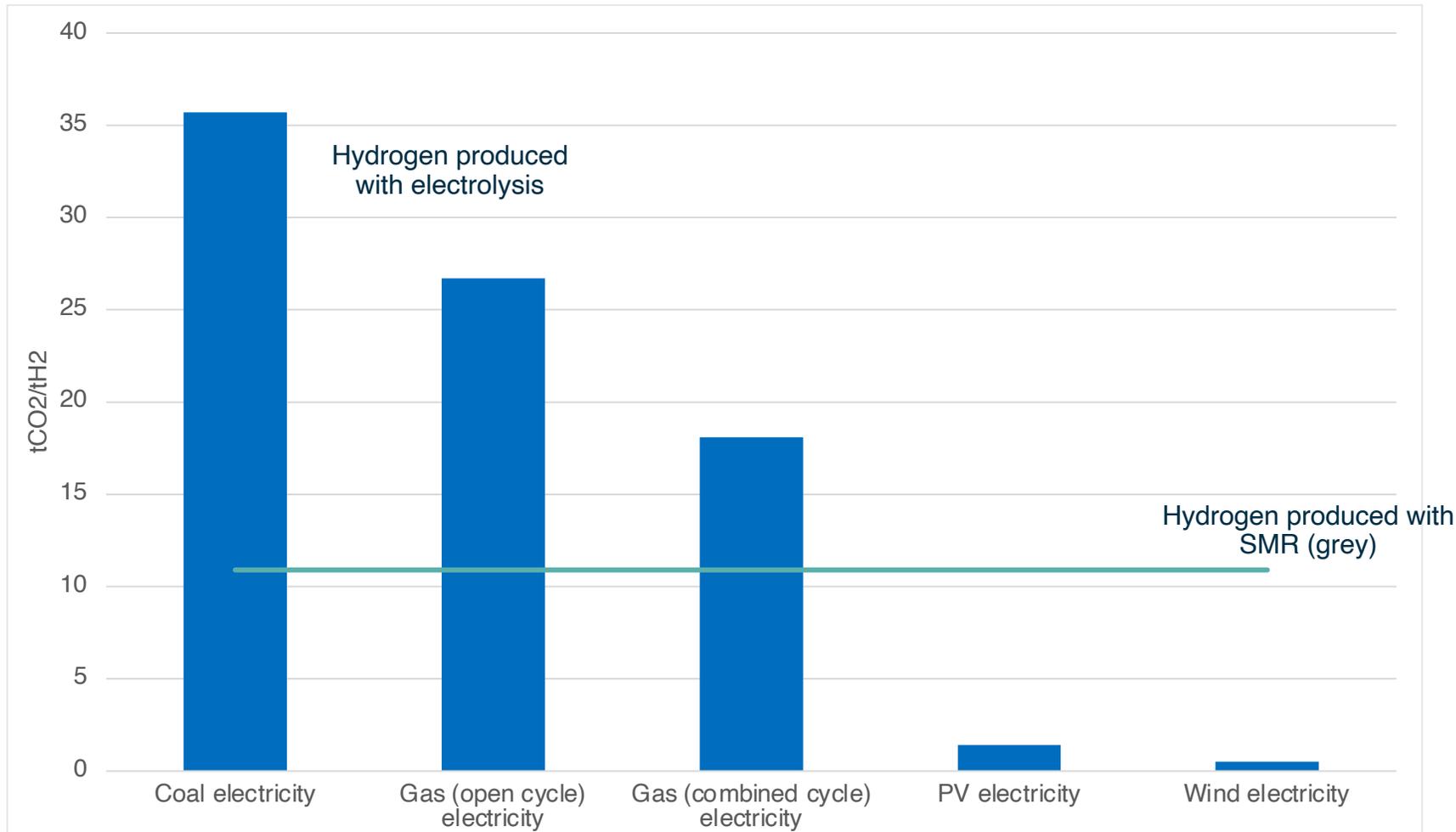
Assumptions:

- Aviation sector emissions from EU27+EFTA departures in 2019: 147 million tonnes of CO₂ per year
- H₂ production (from fossil sources): 130-160 million tonnes of CO₂ per year, equivalent to approximately 95-117% of aviation sector

Using electricity in the most efficient way

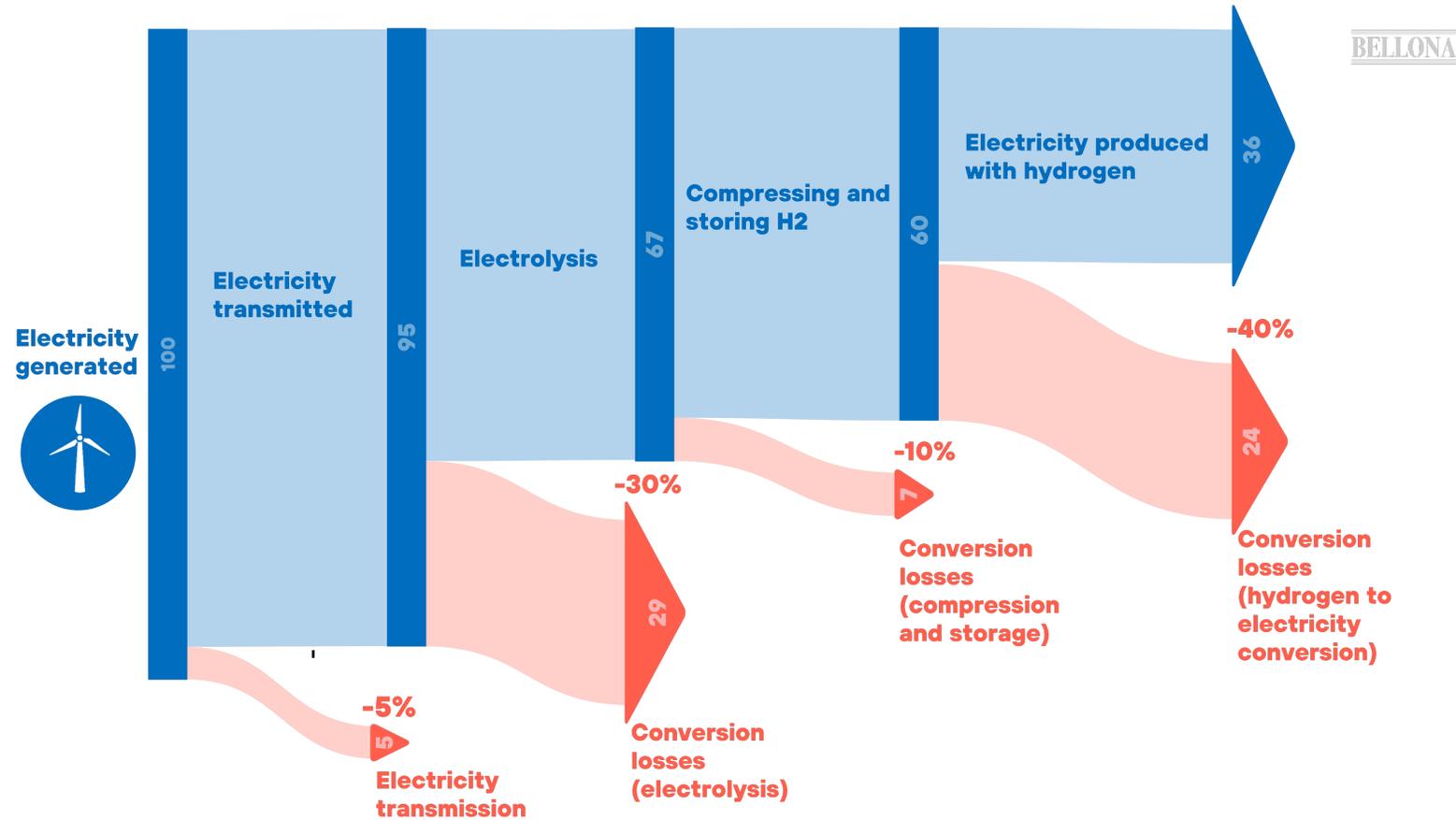
**The use of hydrogen should be weighed against
potential alternatives on a case-by-case basis**

Producing hydrogen from electricity can result in high emissions



If electricity used for electrolysis is sourced from fossil fuels, it results in higher emissions than hydrogen produced directly from fossil fuels.

Changing energy form makes you lose energy along the value chain

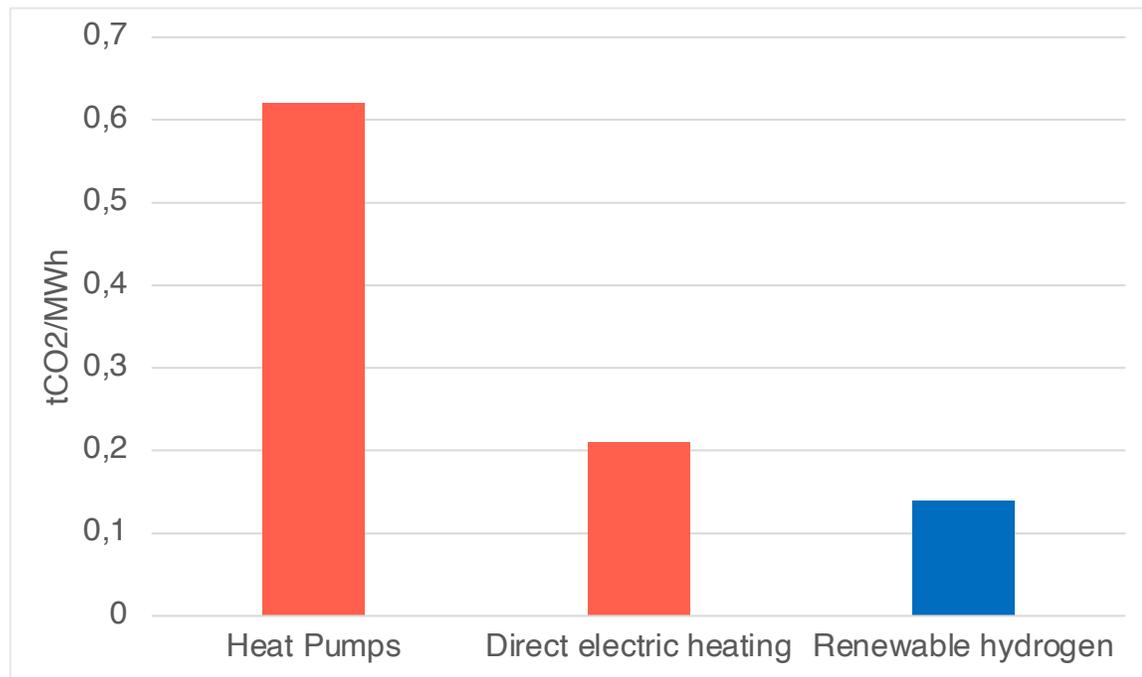


A power plant using 100% renewable hydrogen would consume almost 3 times the electricity it produces.

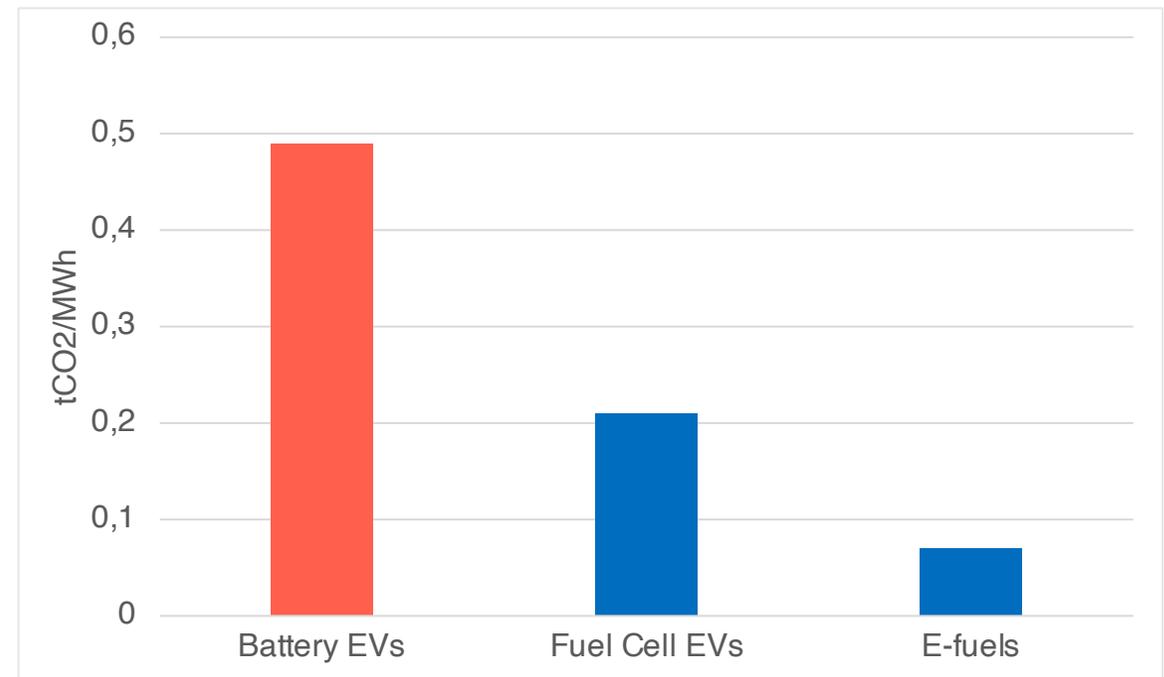
Hydrogen is not efficient to decarbonise sectors when direct electrification is possible

GHG reduction using available RES to displace fossil fuels in tCO₂/MWh

Home heating



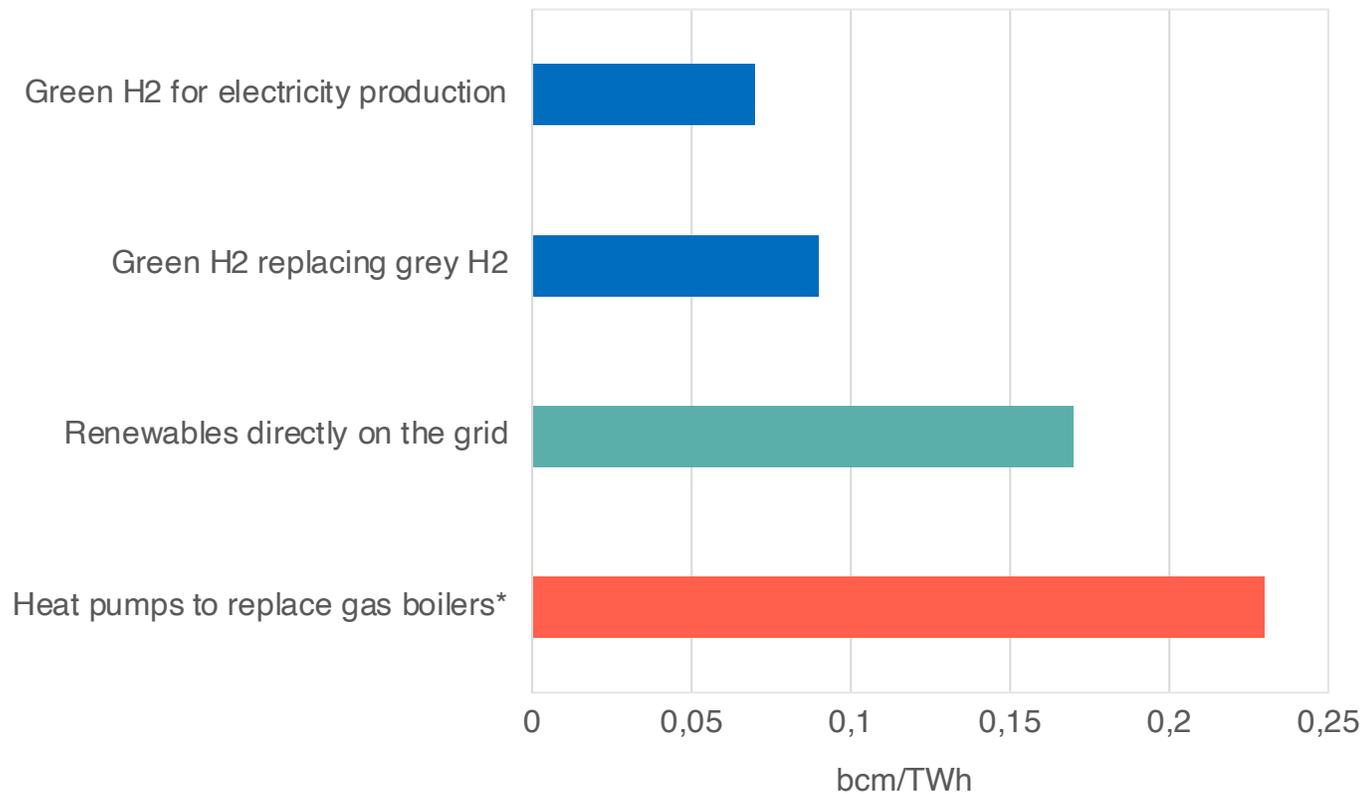
Light duty transport



Assumptions: The GHG reductions for the home heating sector are calculated assuming that the different technologies displace gas boilers for home heating, while for light duty transport ICEs are displaced.

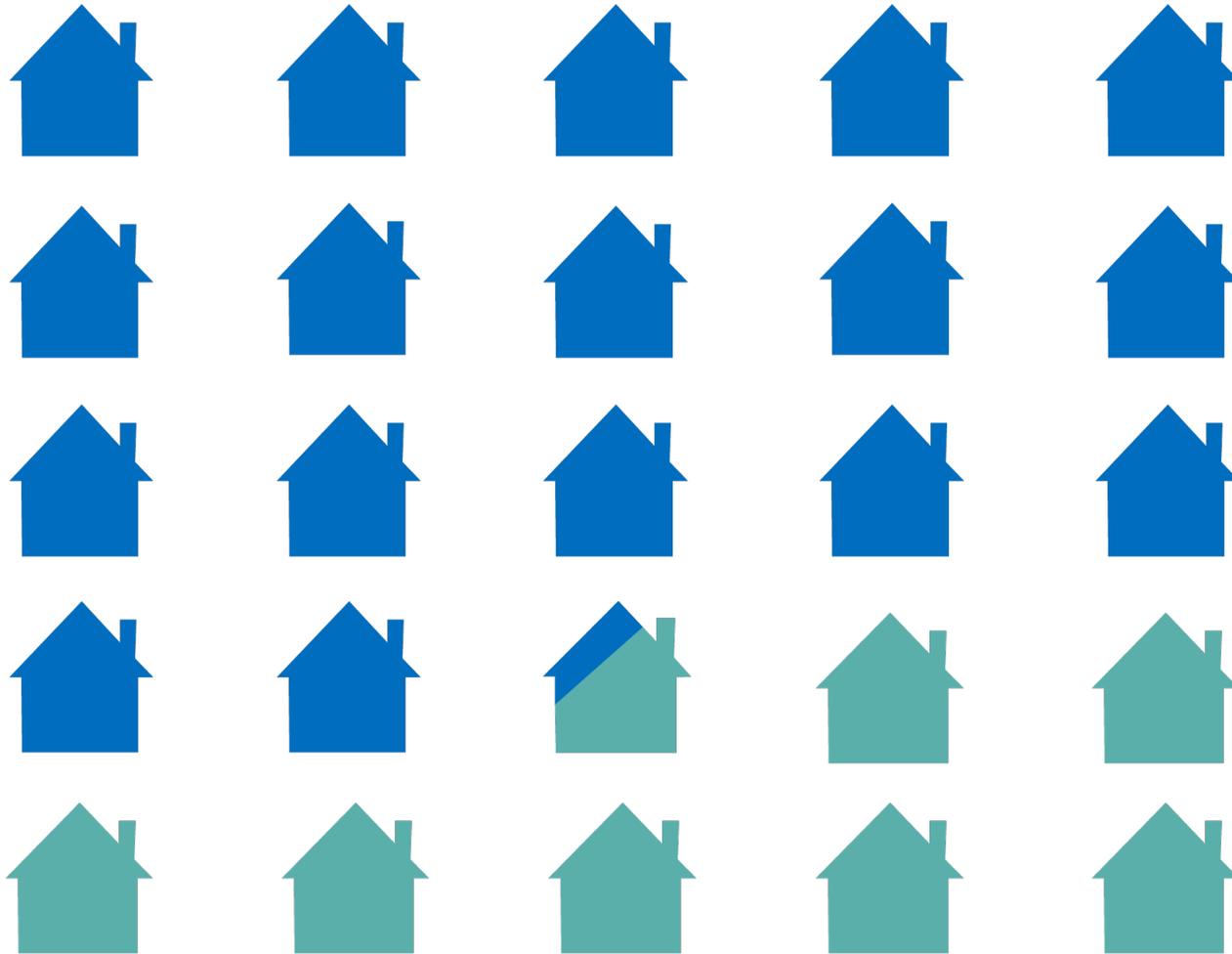
Source: Bellona "[Effective Use of Renewables to Reduce Emissions](#)"

To displace fossil gas, and increase European energy security, there are far better options than hydrogen



Fossil gas displaced
in bcm per TWh of
renewable electricity.

What this renewable electricity could be used for instead

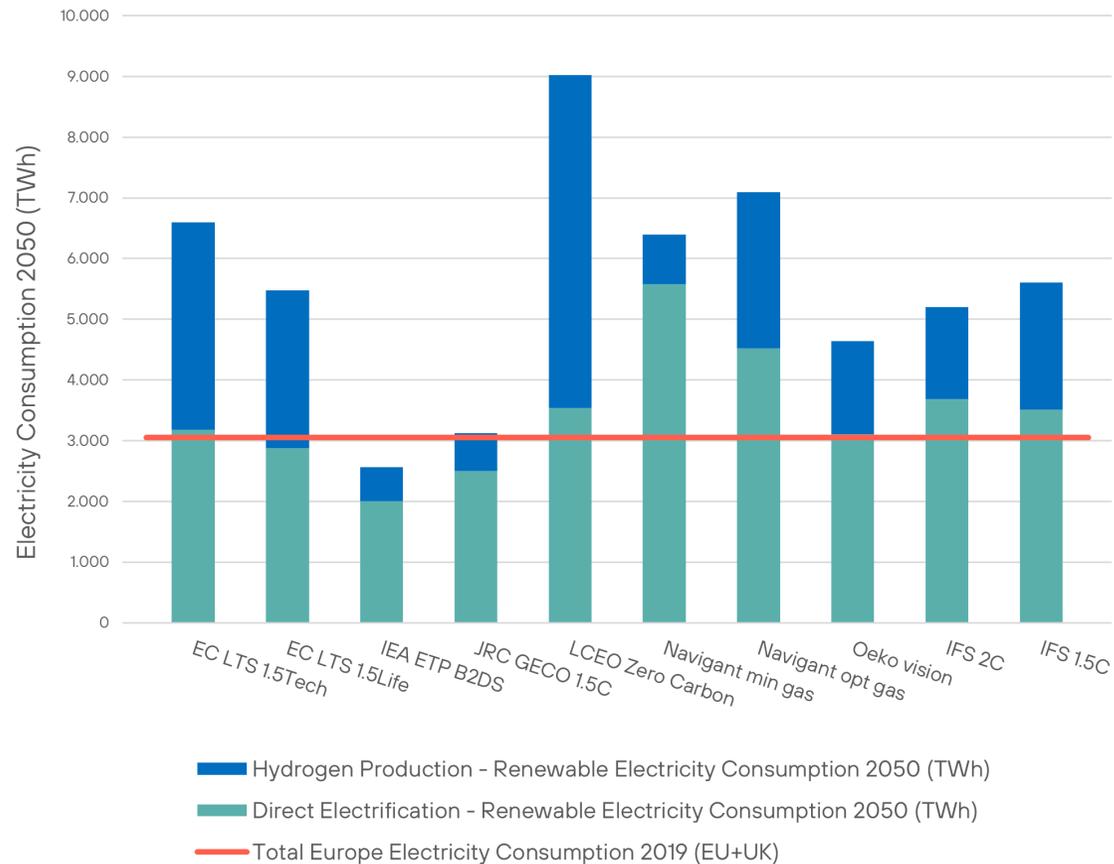


500 TWh of renewable electricity for hydrogen production could power 69% of EU households instead.

What's needed?

Massive electricity generation deployment is needed to decarbonise the power sector and hydrogen production

Meeting hydrogen targets requires additional deployment of renewable electricity generation



Nearly all scenarios for 2050 expect a significant increase in electricity consumption.

Hydrogen production will be a big driver of increased electricity demand while offering modest emissions reductions.

Key Conclusions

- The ambitious 2030 targets for hydrogen need to be matched with the **deployment of renewable electricity generation resources** at the equivalent scale and pace.
- **Additionality** is key to safeguard climate benefits and energy security.
- To avoid wasting resources, **efficiency** needs to be central. Therefore, the use of hydrogen should always be compared to alternatives on a case-by-case basis to ensure the most efficient use of resources.
- **Direct electrification** wherever possible needs to be prioritised.

Get in touch!



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