

# THE BASICS & THE GAPS

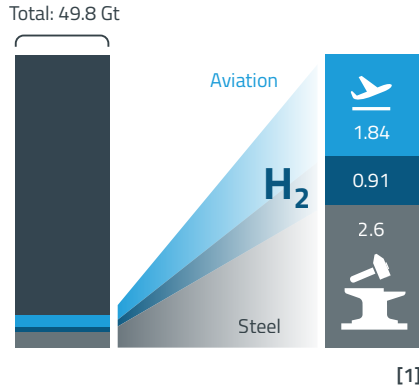
Climate Innovation Factsheet Series #1 / 2022

# HYDROGEN

## HYDROGEN AND CLIMATE CHANGE

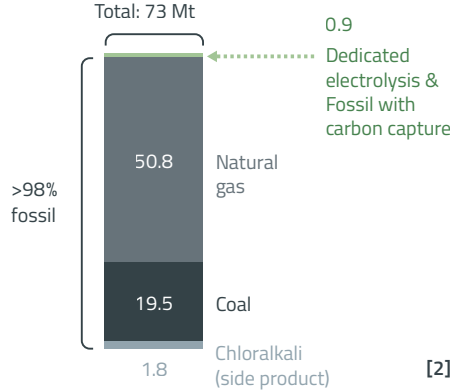
H<sub>2</sub> production is emissions-intensive, but could be a future solution for many sectors.

Worldwide emissions, GtCO<sub>2</sub> equivalent



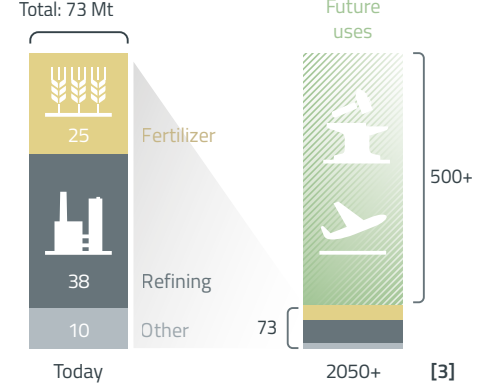
Global production of H<sub>2</sub> is almost completely fossil-based. Green H<sub>2</sub> is still insignificant.

Pure H<sub>2</sub> production, Mth<sub>2</sub>



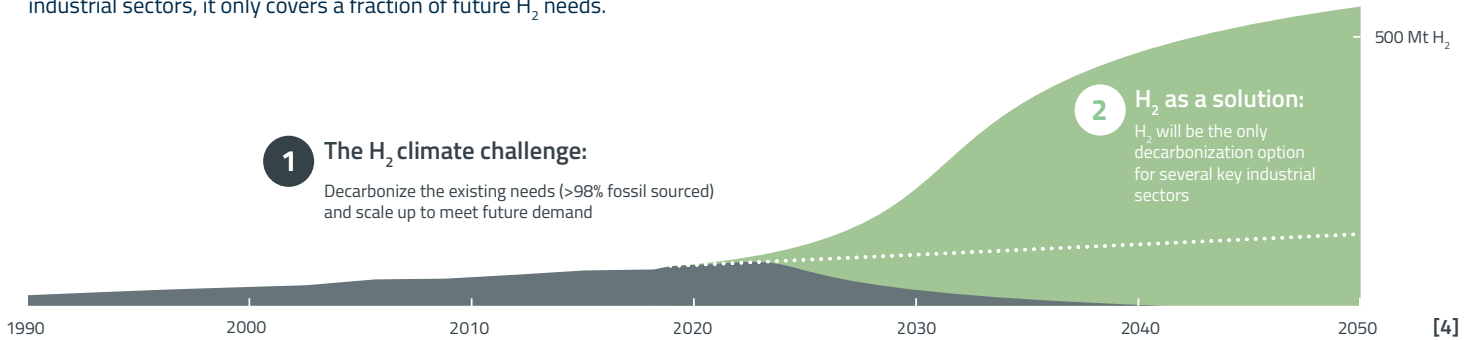
The world is dependent on H<sub>2</sub> for fertilizers and other uses in the future.

Pure H<sub>2</sub> use, Mth<sub>2</sub>



## THE BIG PICTURE

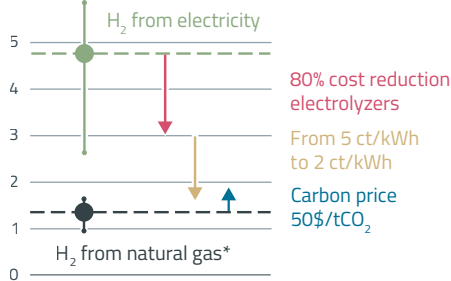
The size of the challenge: While global production of H<sub>2</sub> serves massive industrial sectors, it only covers a fraction of future H<sub>2</sub> needs.



## THE CHALLENGES IN R&D

**!** In any scenario, we must drive down cost for both electrolyzers and clean electricity.

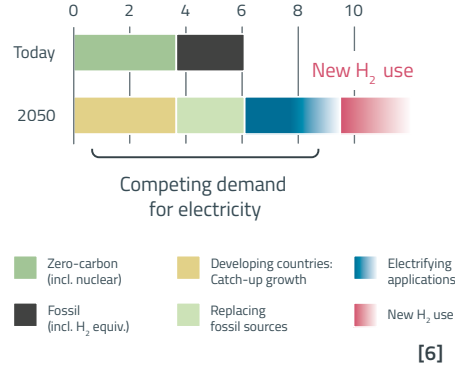
Production cost (EU)  
\$/kgH<sub>2</sub>



\*2030 prediction, assuming normalized historical prices

**!** At the same time, other sectors will drive up electricity demand.

Electricity use per capita, industrialized economy  
kWh, '000



**➡** We must increase R&D efforts and reprioritize funding.

**EXIT:** Abandon sectors that are better decarbonized without H<sub>2</sub>.

**URGENCY:** Infrastructure for transport and production is not ready for the necessary volumes. R&D and scaling needs to be massively accelerated to avoid bottlenecks.

Zero carbon electricity prices need to keep falling. H<sub>2</sub> based on natural gas with CCS may serve to reduce the need for renewable electricity in the medium term – if it delivers on lower emission intensity.

**FOCUS:** Bundle R&D resources in hard-to-abate sectors where H<sub>2</sub> is likely the only option: Seasonal storage, steel, shipping, aviation. Research potential alternative H<sub>2</sub> production methods: Nuclear/solar thermal, new electrolysis.

Sources:  
[1] Climate Watch, ICCT, IEA  
[2, 3, 4] IEA  
[5] IRENA, IEA, Pehl et al., CATF  
[6] McKinsey, IEA, Kakoulaki et al.  
Details available at [fcarchitects.org/h2-factsheet-sources/](https://fcarchitects.org/h2-factsheet-sources/)

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