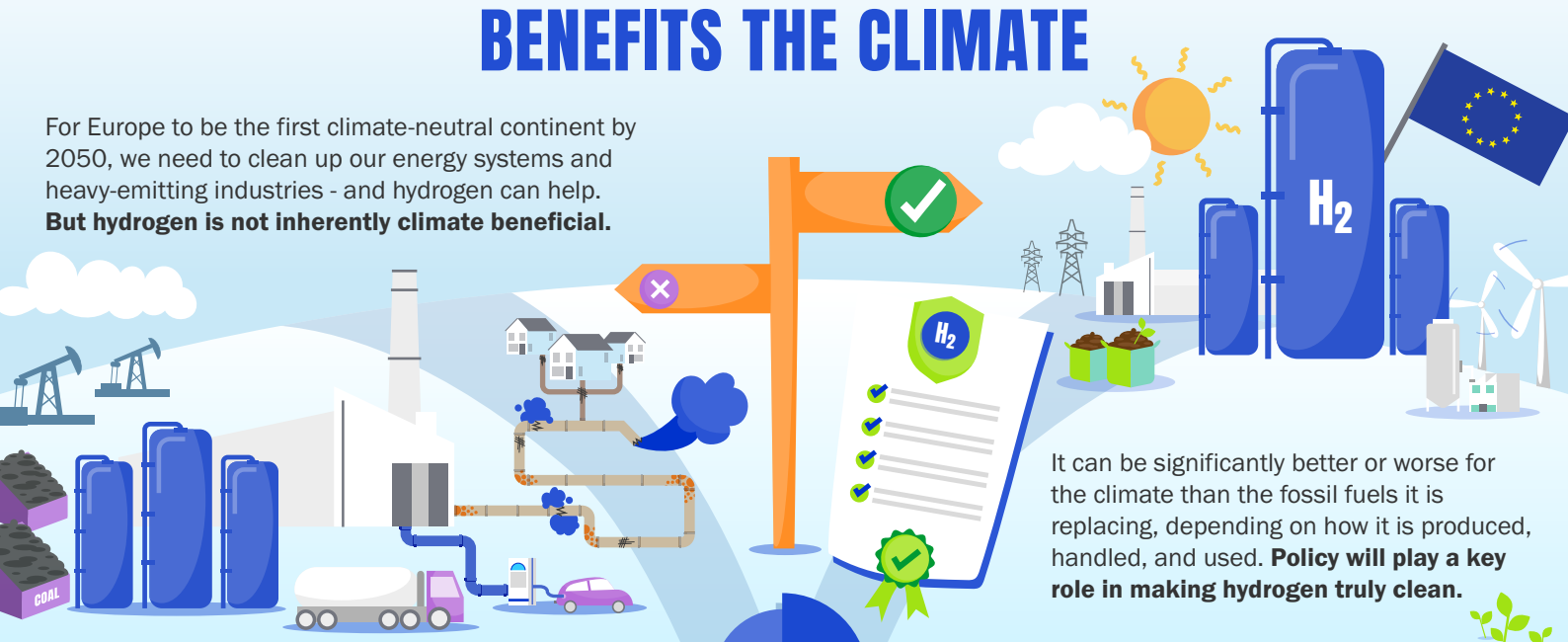
HOW TO ENSURE EU HYDROGEN POLICY BENEFITS THE CLIMATE

For Europe to be the first climate-neutral continent by 2050, we need to clean up our energy systems and heavy-emitting industries - and hydrogen can help. **But hydrogen is not inherently climate beneficial.**

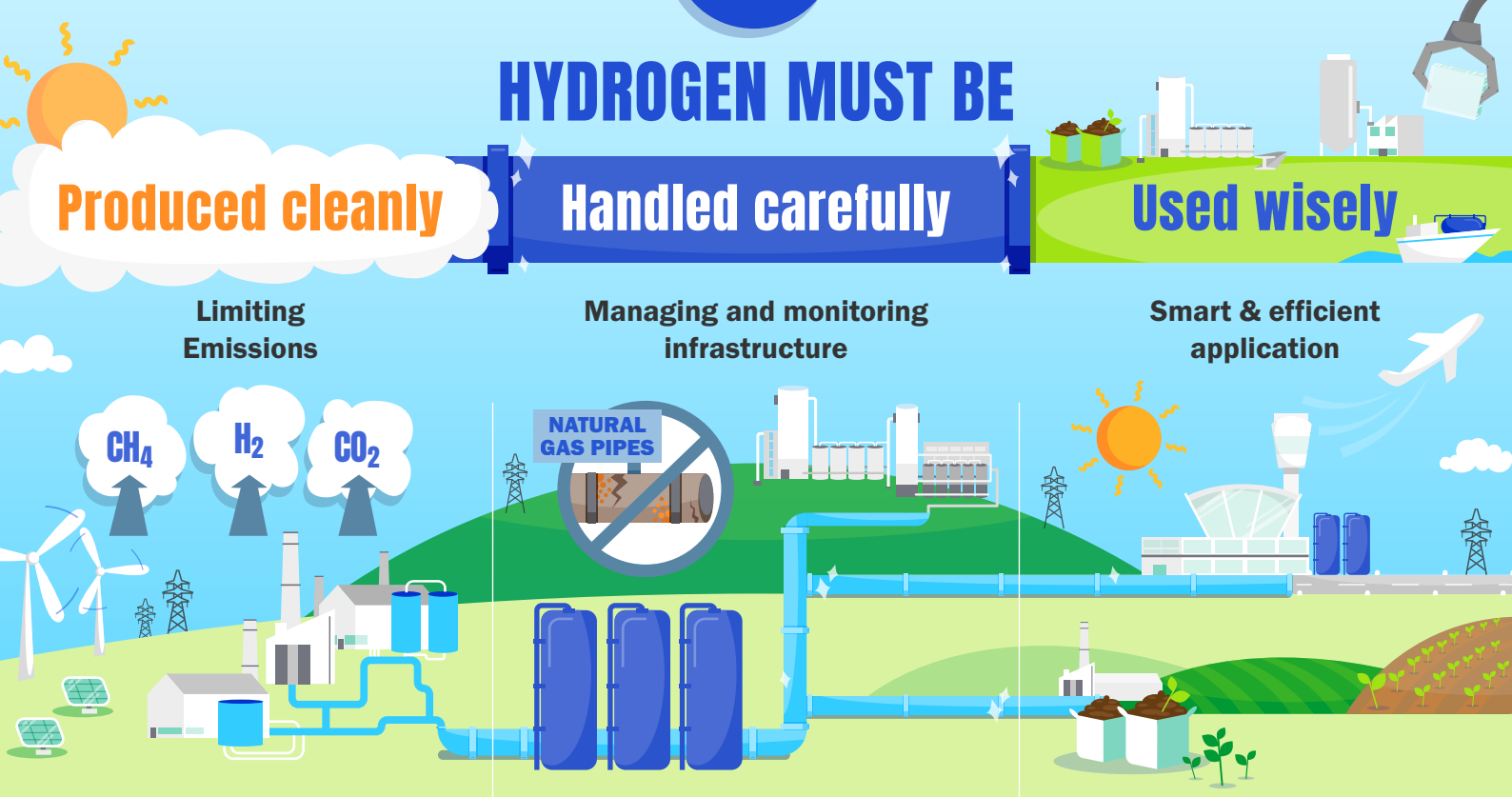


It can be significantly better or worse for the climate than the fossil fuels it is replacing, depending on how it is produced, handled, and used. **Policy will play a key role in making hydrogen truly clean.**

EU MANDATE: clean hydrogen must result in at least **70%** **EMISSIONS SAVINGS** compared to fossil fuels[1]

HYDROGEN MUST BE

Produced cleanly | **Handled carefully** | **Used wisely**



Produce H_2 cleanly:

- Clean up today's 99% unabated fossil-based H_2, which leaves a substantial carbon footprint.[2]
- H_2 production is an energy intensive process - ensure there is sufficient new renewable energy supply to meet H_2 demand.
- Ensure all future H_2 produced is truly clean, limiting all climate-warming emissions.

Handle H_2 carefully:

- Invest in infrastructure that is designed specifically for H_2's physical and chemical properties.
- Enforce and incentivise best-practices to minimise emissions.
- Measure emissions along the supply chain, and incorporate plans for MRV and LDAR programmes.

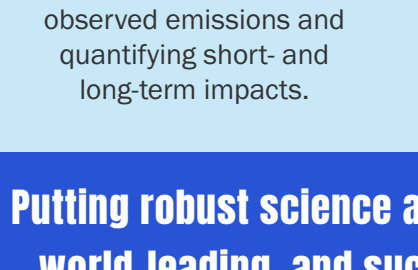
Use H_2 wisely:

- Compare H_2 to other solutions; there's very often an alternative that is cheaper, safer, more efficient, and better for the climate.
- Prioritise H_2 for the 20-30% of global CO_2 emissions than can't be reduced from direct electrification alone.[3] This includes decarbonising industries like cement, fertilisers, and shipping.

For hydrogen to be a climate solution, we need to limit all climate-warming emissions

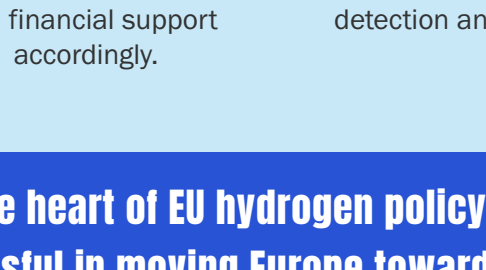
3 CLIMATE-WARMING EMISSIONS THAT NEED TO BE MINIMISED

METHANE



CH_4 emissions associated with the hydrogen value chain must be minimised. Methane has more than **80x the warming power of carbon dioxide** in the first 20 years after its release.[4]

HYDROGEN



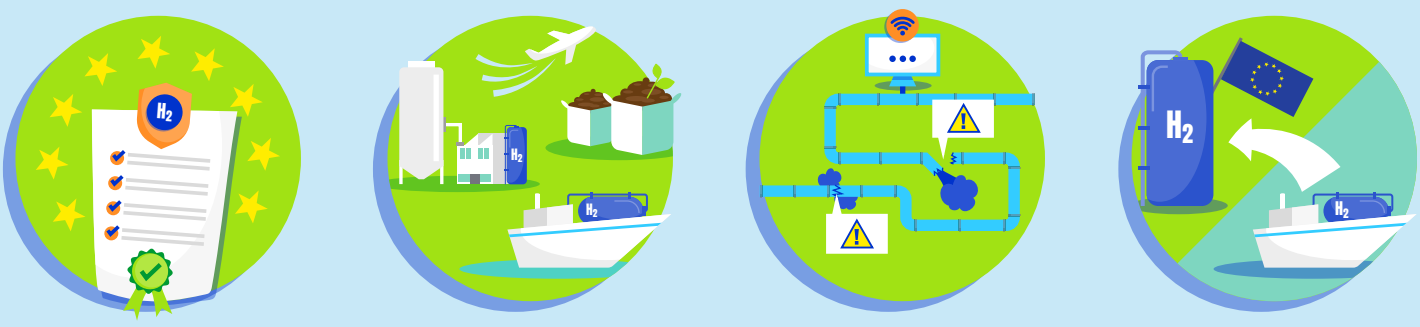
H_2 is a small, "slippery" molecule that is difficult to contain - and it is also a climate-warming gas.

In its Fourth Annual Report 2007, the IPCC included the 100-year warming potential of hydrogen (GWP 5.8).[5] Most recently, global teams of scientists have updated hydrogen's potency to 12x more powerful in the long term (100 year) and 37x in the near term (first 20-years) than CO_2.[6]

CARBON DIOXIDE

CO_2 left over when H_2 is extracted from fossil sources must be captured and kept out of the atmosphere through high-integrity CCS. This means achieving **consistently high (>95%), verified carbon capture rates** and monitoring long-term carbon storage effectiveness.

SCIENCE-BASED POLICY GUIDELINES FOR MAXIMISING HYDROGEN'S CLIMATE BENEFITS



Robust certification framework accounting for all climate warming emissions, including observed emissions and quantifying short- and long-term impacts.

Prioritise deployment in sectors where it makes most sense setting both targets and financial support accordingly.

Infrastructure specifically designed for H_2 with required leak detection and repair.

Apply the same high standards for EU hydrogen production to any H_2 imported into the EU.

Putting robust science at the heart of EU hydrogen policy will ensure it is best-in-class, world-leading, and successful in moving Europe towards climate neutrality by 2050.

Visit **www.edf.org/issue/hydrogen** for more insights on getting hydrogen right.

Environmental Defense Fund

REFERENCES: 1) European Commission, Directive (EU) 2018/2001, and Directive (EU) 2024/1788. **2)** IEA Global Hydrogen Review (2023) **3)** Harvard School of Engineering (2022) **4)** IPCC 6th Assessment Report (2021) **5)** IPCC 4th Assessment Report (2007) **6)** Warwick et al. (2023); Sand et al. (2023); Derwent et al. (2023); Hauglustaine et al. (2022). **Design by Noble.studio**