



The Future of Hydrogen

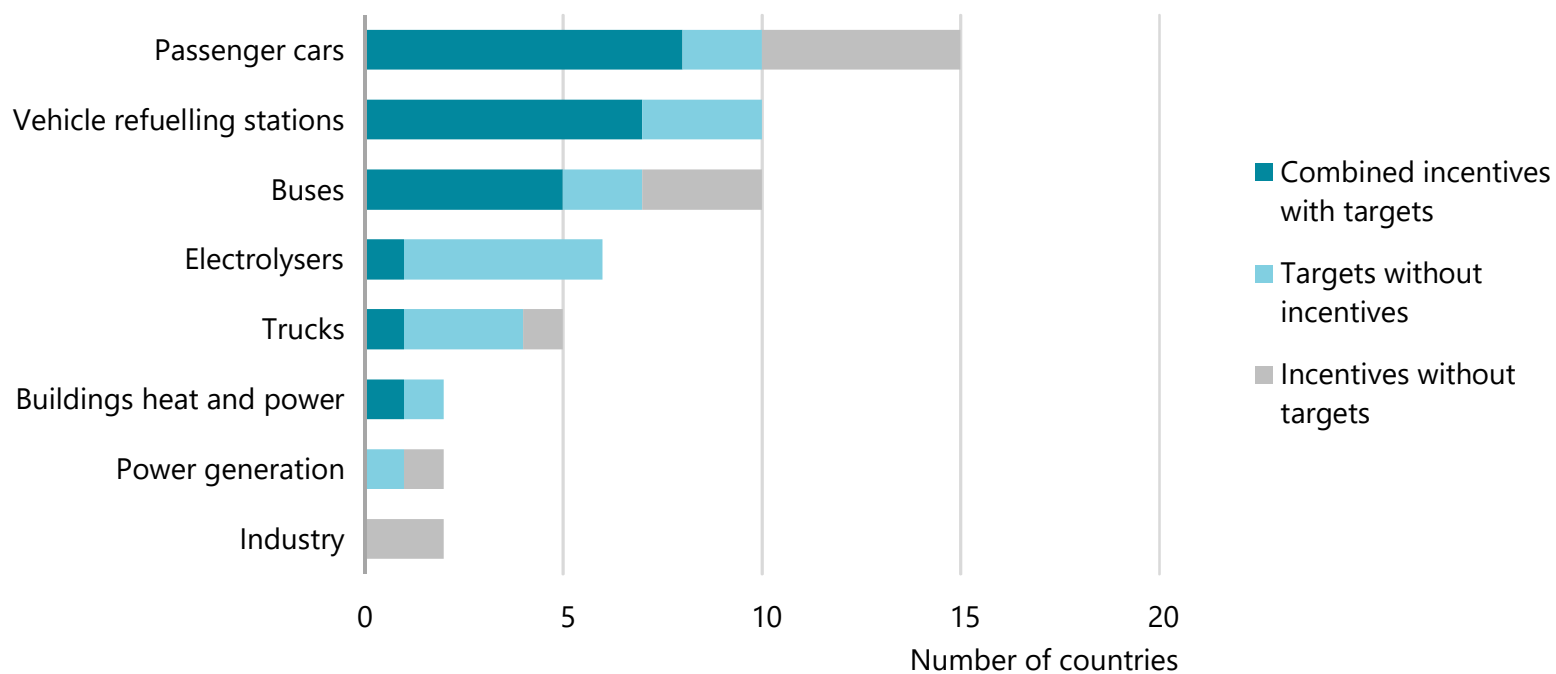
Mechthild Wörsdörfer, Director, Sustainability, Technology and Outlooks

Fuel Cells and Hydrogen Joint Undertaking Stakeholder Forum, Brussels, 21st November 2019

Hydrogen – A common *element* of our energy future?

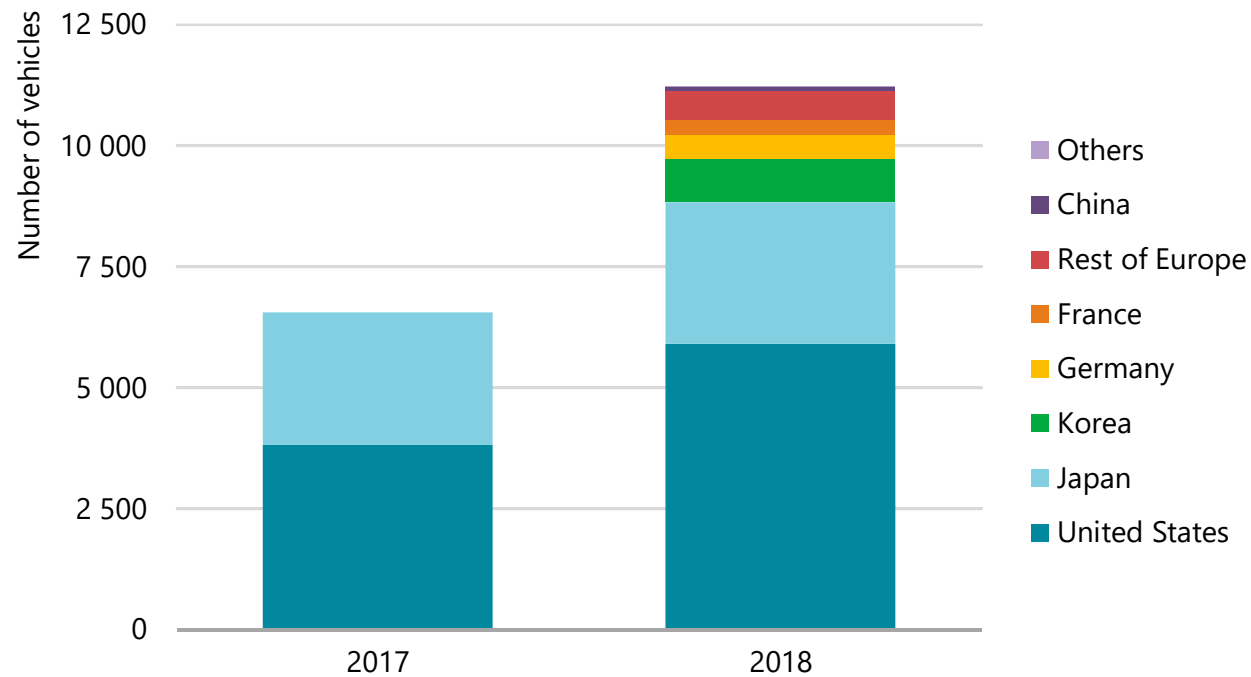
- Momentum currently behind hydrogen is unprecedented, with more and more policies, projects and plans by governments & companies in all parts of the world
- Hydrogen can help overcome many difficult energy challenges
 - **Integrate more renewables**, including by enhancing storage options & tapping their full potential
 - **Decarbonize hard-to-abate sectors** such as steel, chemicals, trucks, ships & planes
 - **Enhance energy security** by diversifying the fuel mix & providing flexibility to balance grids
- But there are challenges: **costs** need to fall; **infrastructure** needs to be developed; **cleaner hydrogen** is needed; and **regulatory barriers** persist

Policy support for hydrogen is increasing



A growing number of countries have policies to encourage hydrogen deployment, mainly focusing on transport.

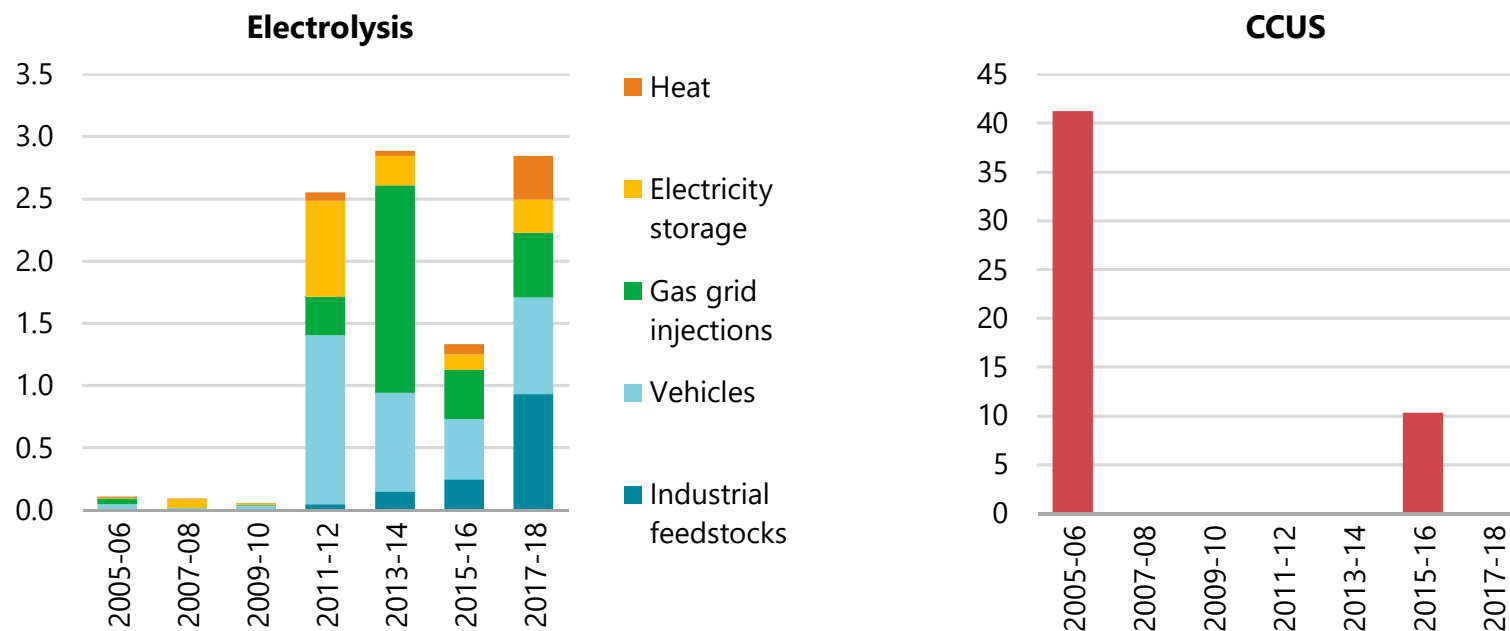
Global stock of fuel cell cars



About 4 000 fuel cell cars were sold in 2018, but they only represent a small fraction of the global light-duty vehicle fleet.

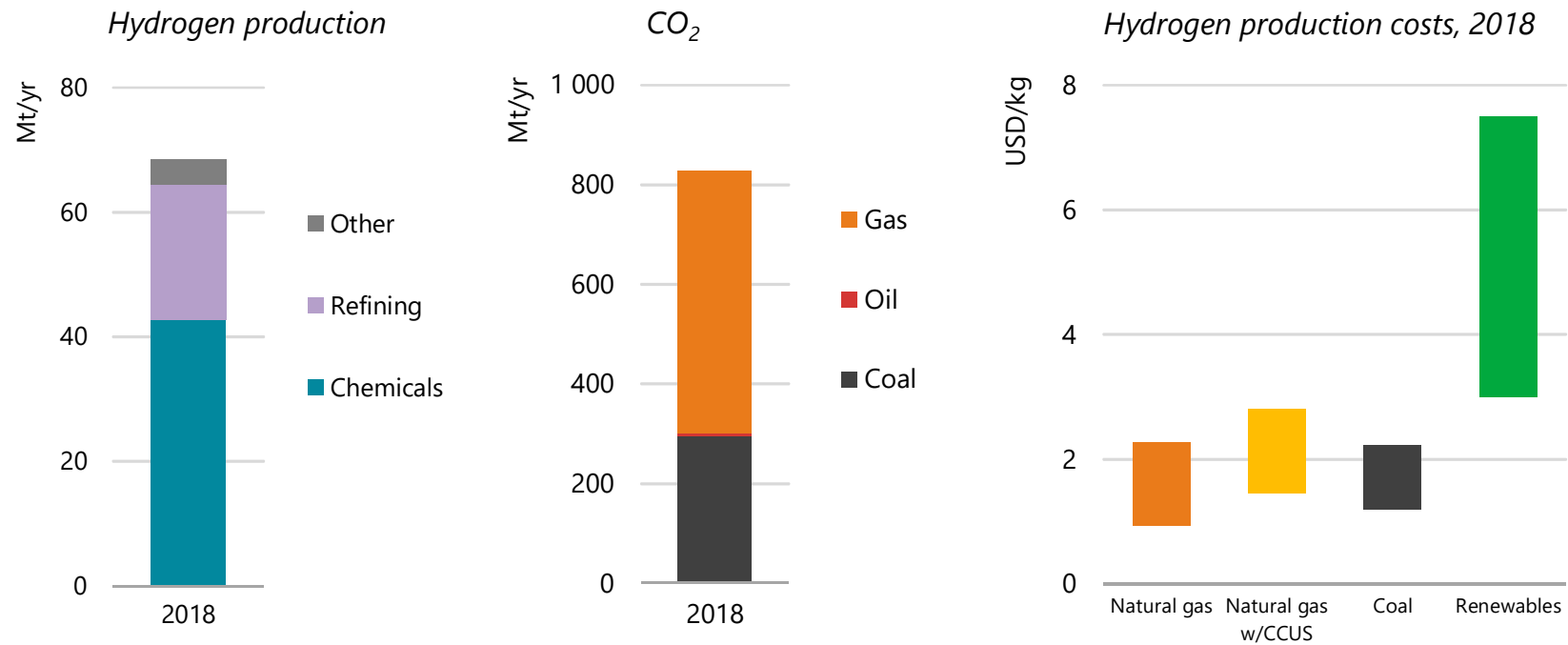
Europe is a global pioneer for clean hydrogen projects

Clean hydrogen production capacity additions in Europe (thousand tonnes/year)



Electrolysis projects have expanded in Europe, but have much less potential to produce clean hydrogen than two CCUS projects.

Hydrogen is already part of the energy mix



Dedicated hydrogen production is concentrated in very few sectors today, and virtually all of it is produced using fossil fuels, as a result of favourable economics.

Hydrogen production with CO₂ capture is coming online

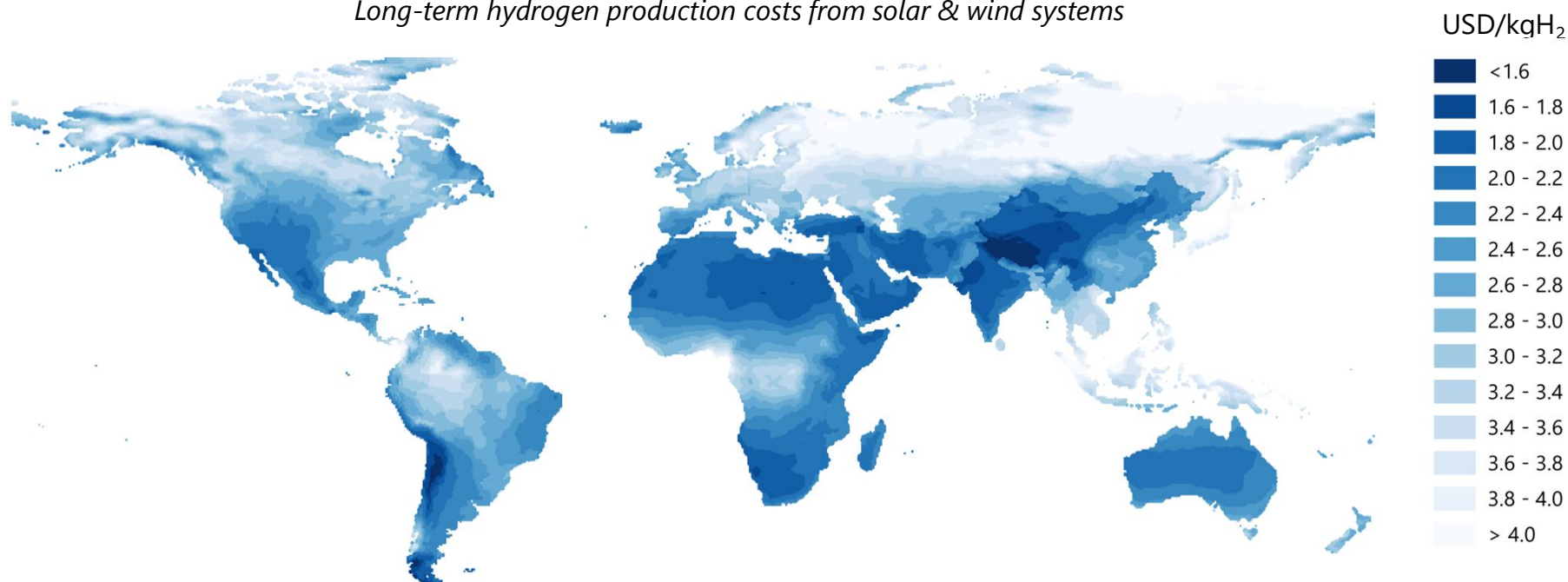
Facilities with hydrogen production and CCUS



Low-carbon hydrogen from fossil fuels is produced at commercial scale today, with more plants planned. It is an opportunity to reduce emissions from refining and industry.

Renewables hydrogen costs are set to decline

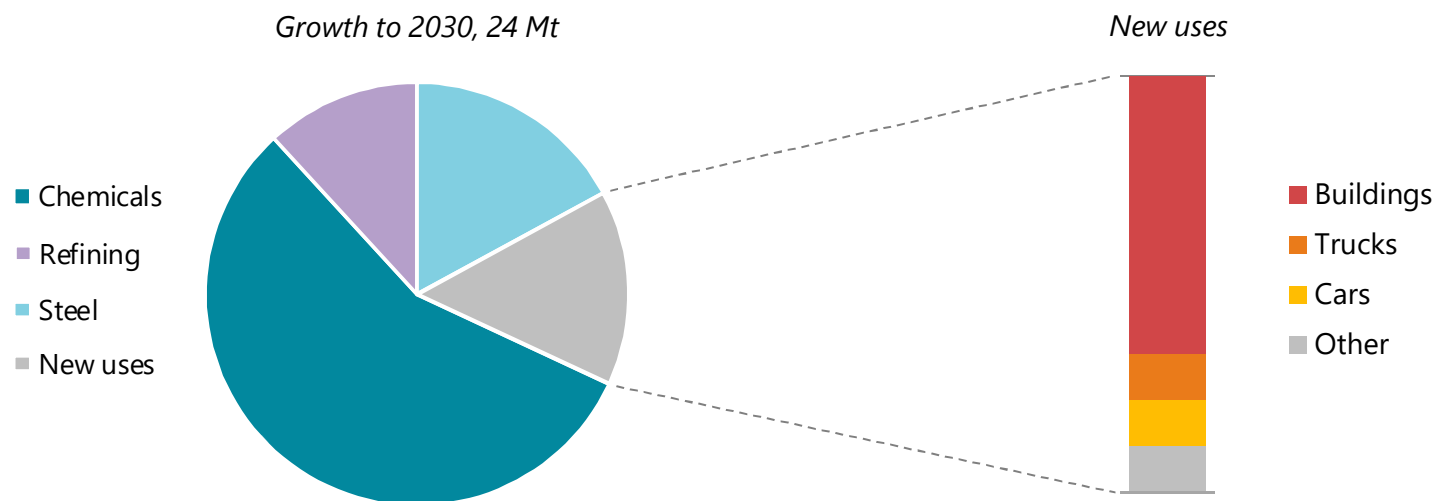
Long-term hydrogen production costs from solar & wind systems



The declining costs of solar PV and wind could make them a low-cost source for hydrogen production in regions with favourable resource conditions.

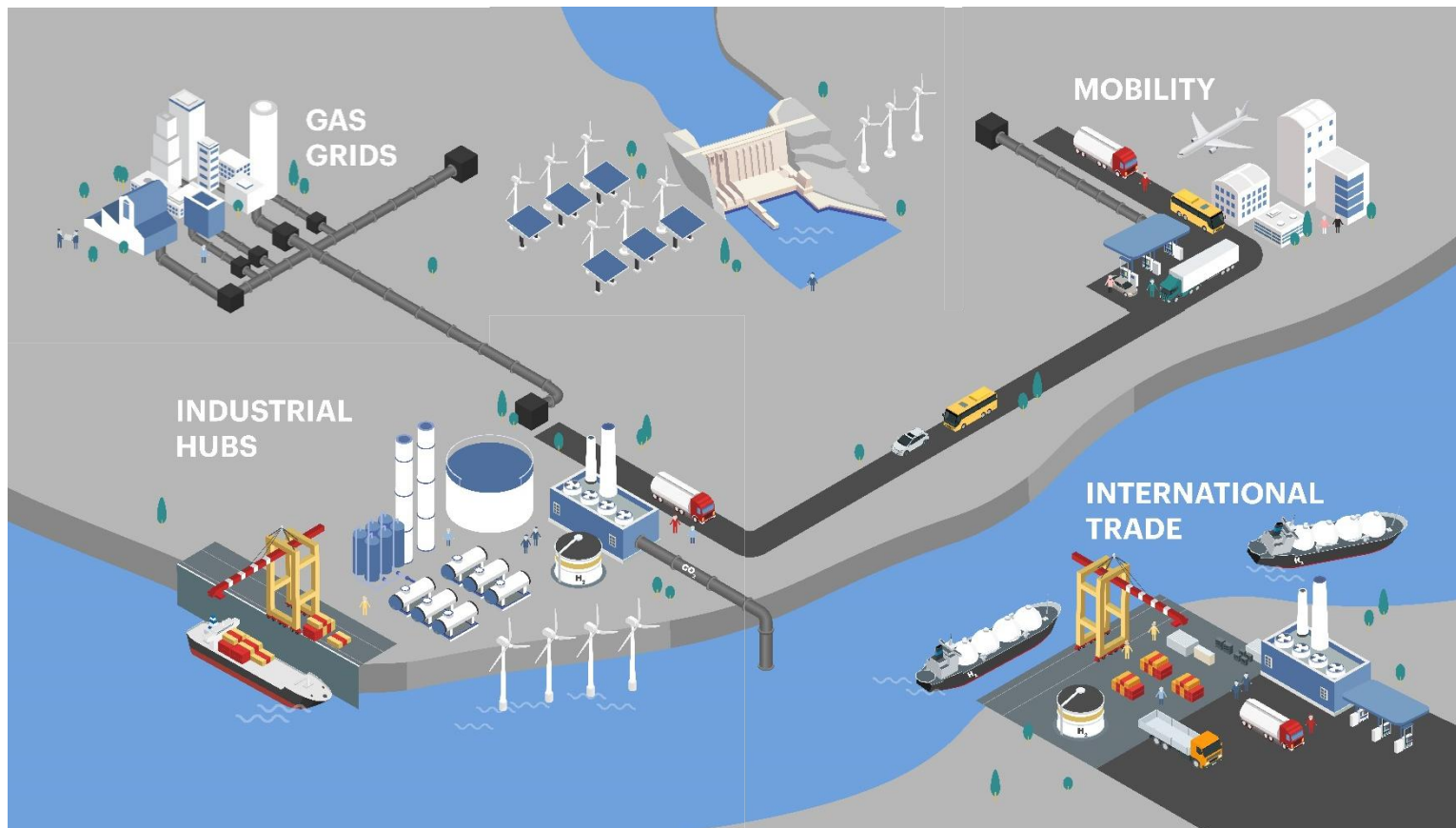
The challenge to 2030: expand hydrogen beyond existing applications

Growth in hydrogen use based on announced policies, 2018-2030



Dependable demand from current industrial applications can boost clean hydrogen production; policies & industry targets suggest increasing use in other sectors, but ambition needs to increase.

Four key opportunities for scaling up hydrogen to 2030



The IEA's 7 key recommendations to scale up hydrogen

1. Establish a role for hydrogen in long-term energy strategies
2. Stimulate commercial demand for clean hydrogen
3. Address investment risks for first-movers
4. Support R&D to bring down costs
5. Eliminate unnecessary regulatory barriers and harmonise standards
6. Engage internationally and track progress
7. Focus on four key opportunities to further increase momentum over the next decade

Stay tuned for upcoming analysis – the IEA will be launching ETP 2020 in June next year, which will include an assessment of cost effective technology choices to enhance energy security and reach net-zero emissions.

iea