



Energy Technology Perspectives 2020

Dr. Timur Gül, Head Energy Technology Policy Division, IEA

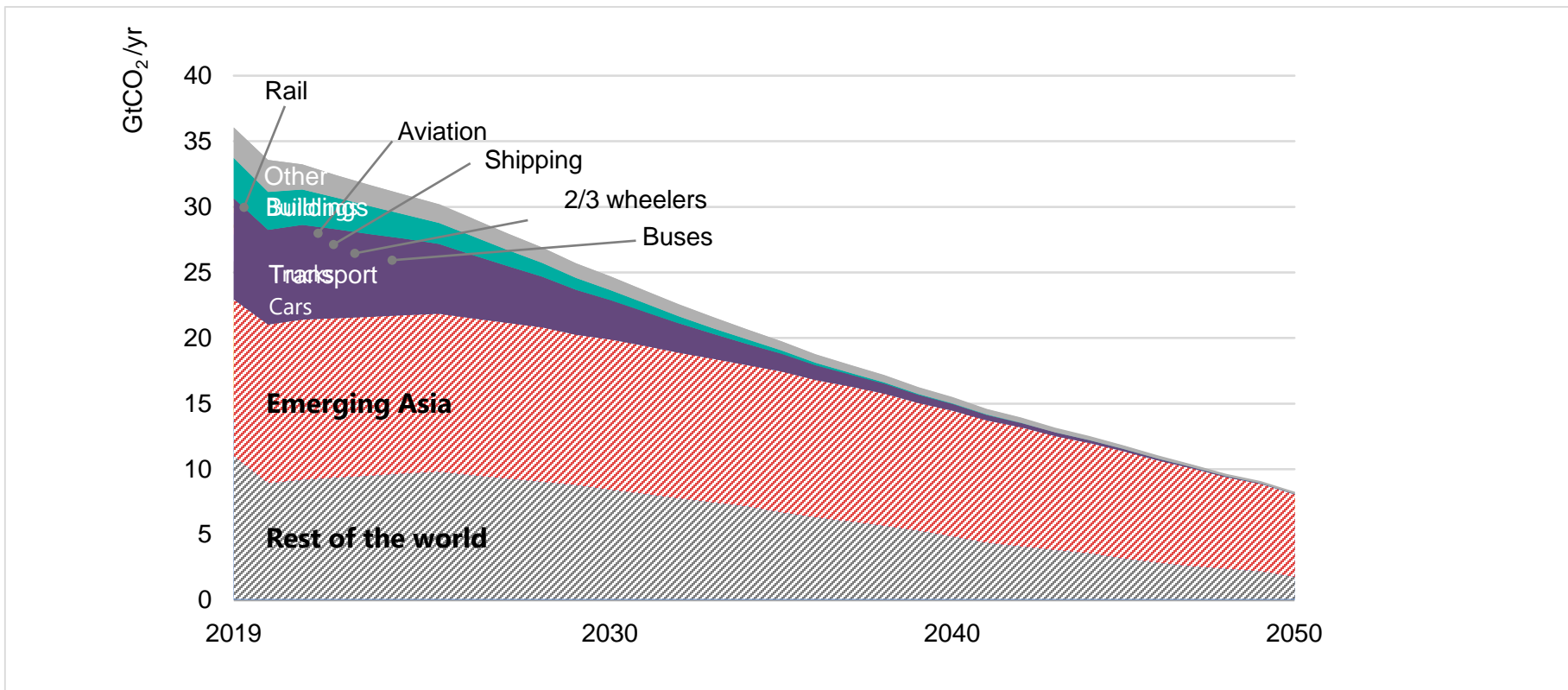
Japan, 30 September 2020

What do net-zero ambitions mean for energy technology?



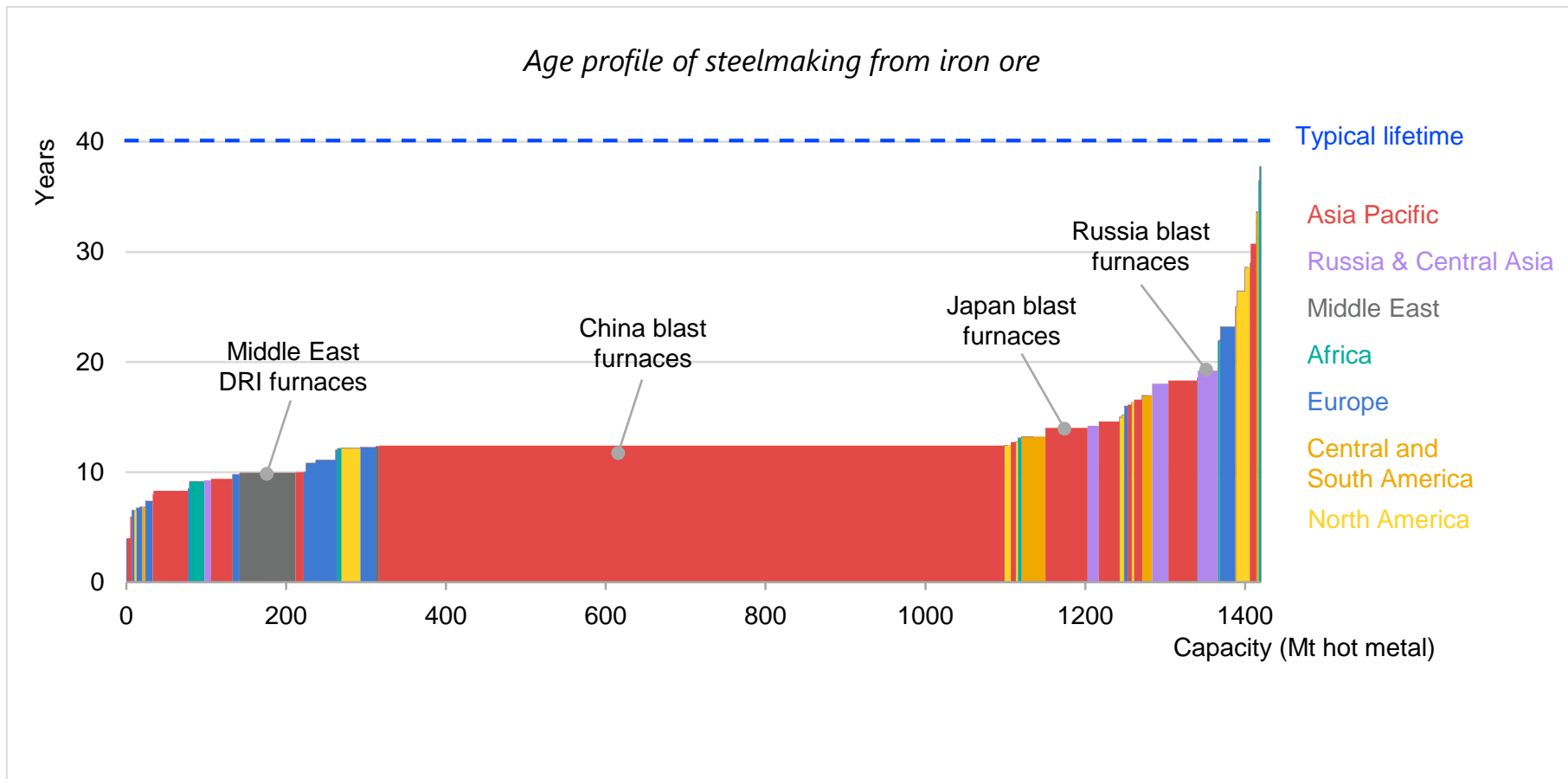
- A growing number of governments & companies are making ambitious pledges to reach net-zero emissions in coming decades. But achieving those goals & ensuring energy security is a big challenge.
- Major progress has been made: the rise of solar PV, wind and batteries has significantly reduced the costs of renewable electricity and electric cars.
- But transitioning the energy system to net-zero emissions requires broader technology efforts in three critical areas:
 - Existing assets in power generation and industry
 - Clean energy technology & innovation
 - Infrastructure that enables rapid technology deployment

Our existing energy infrastructure is too big to ignore



Reaching net-zero emissions requires tackling emissions from long-lived assets in power generation and heavy-industries. In emerging Asia, 80% of existing coal power capacity was built in the past 20 years.

Many industry assets are still young – iron and steel production

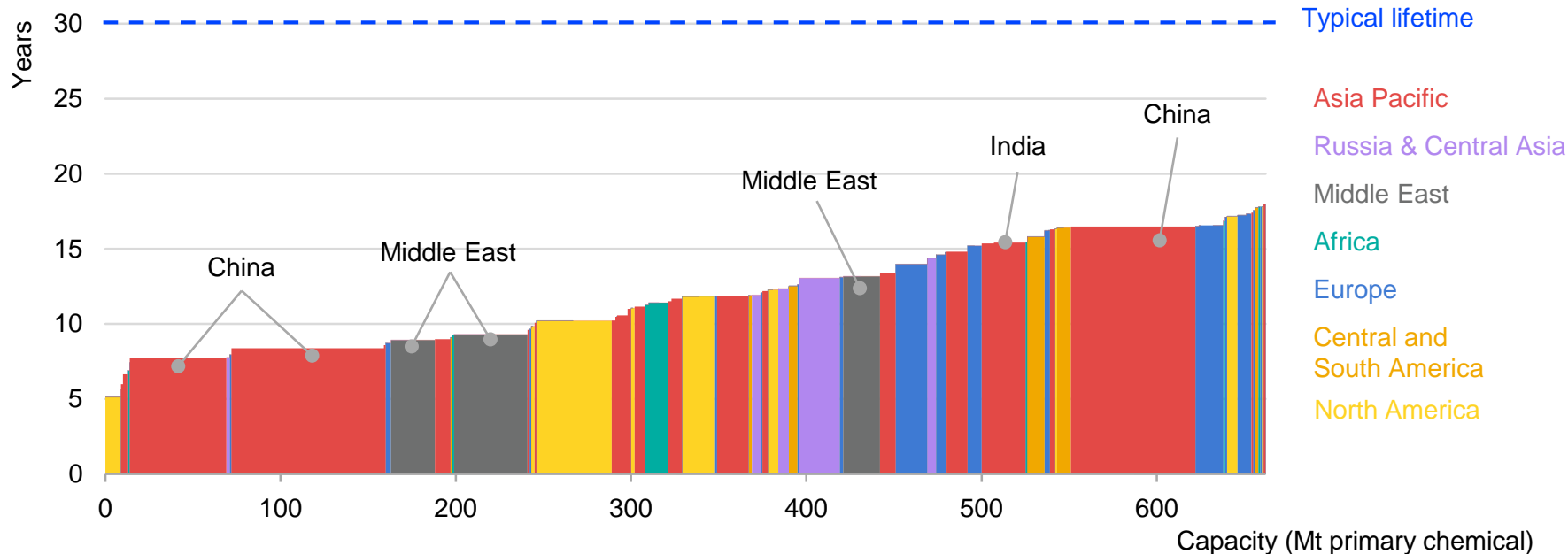


Many industry assets are still young – cement production



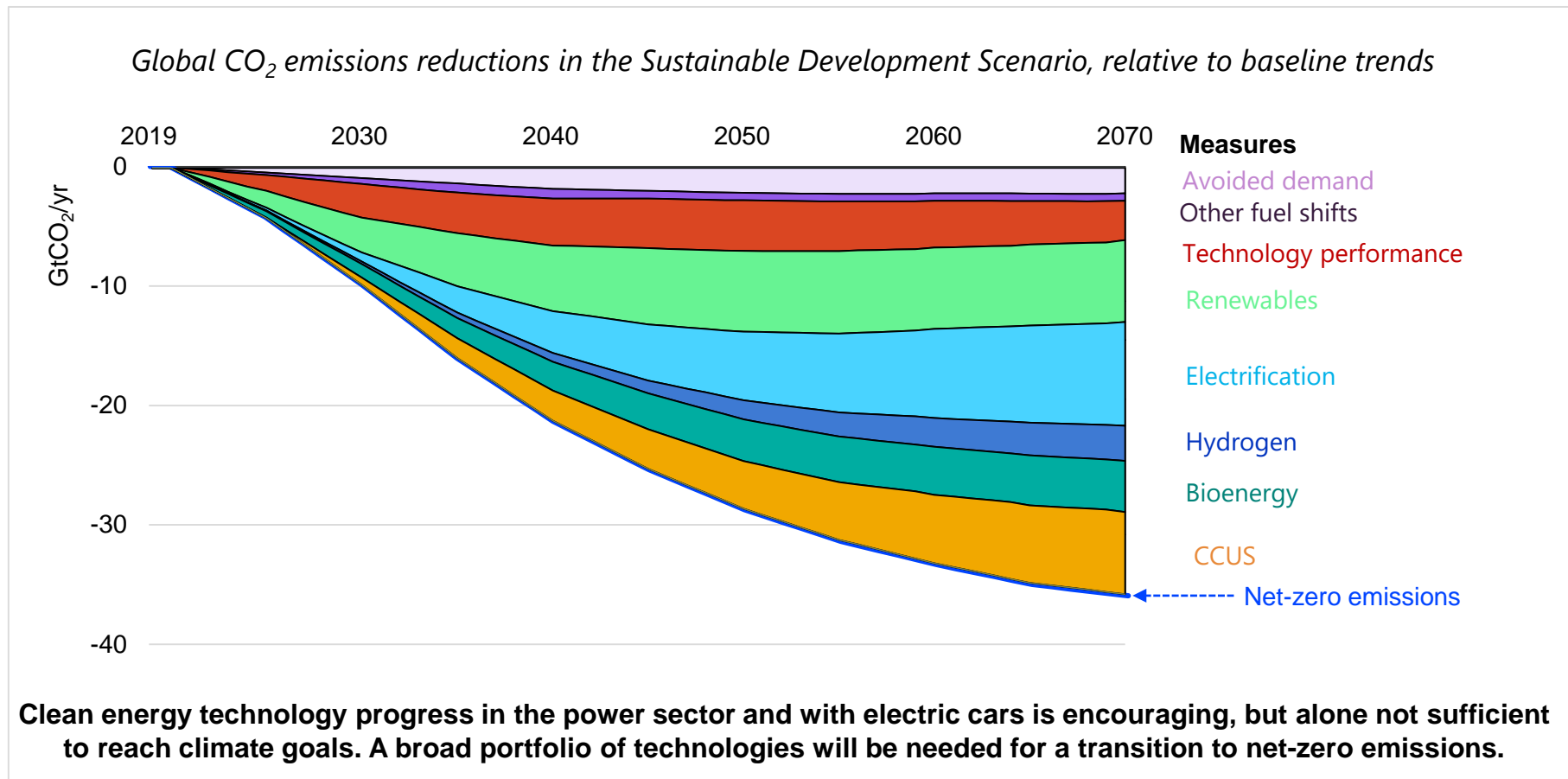
Many industry assets are still young – chemicals production

Age profile of primary chemicals production facilities

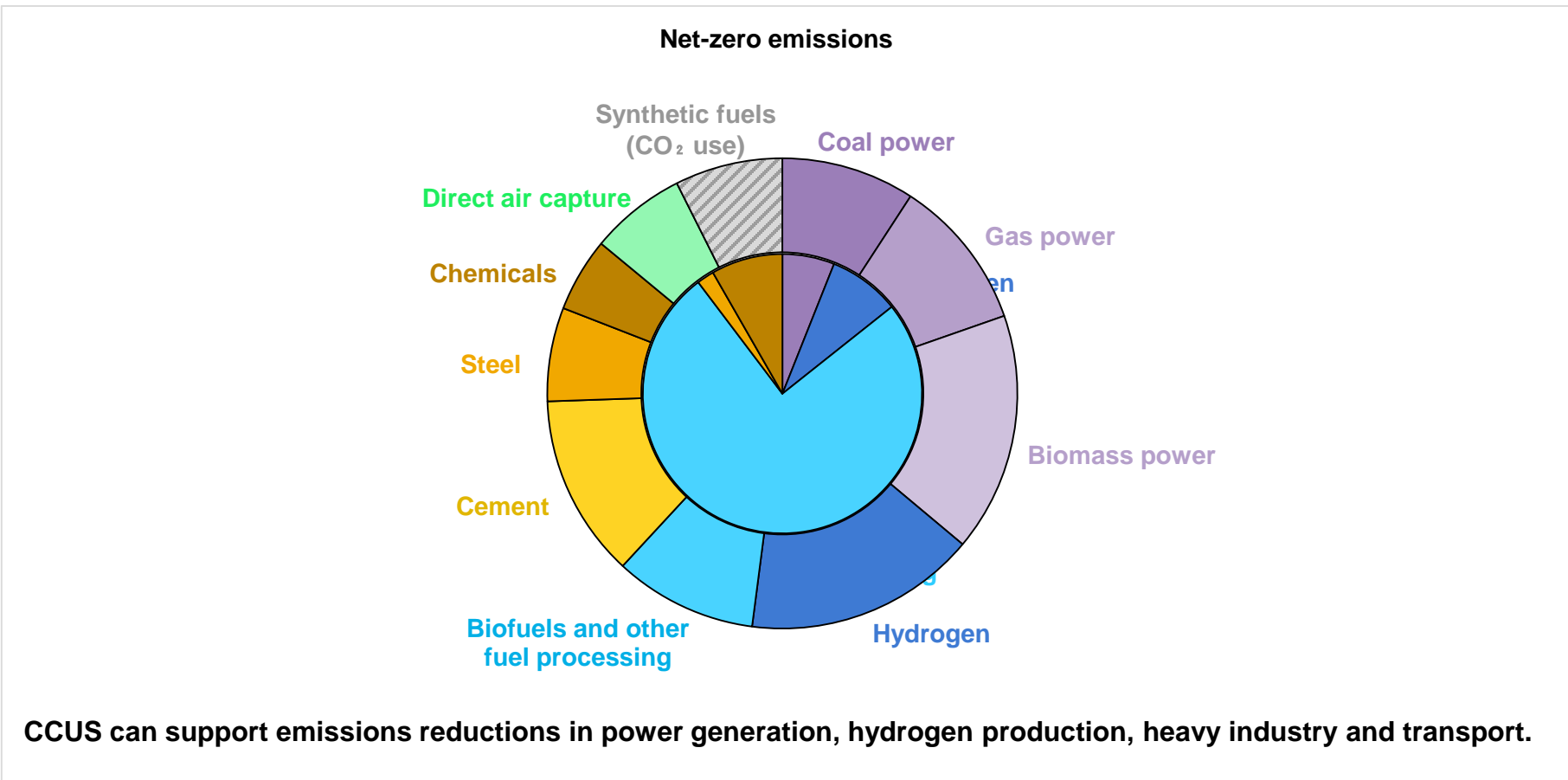


China's middling-to-young production capacity accounts for upwards of 50% of the global total in key industrial sub-sectors. India and the Middle East are also key regions.

Focusing on the power sector is not enough to reach climate goals



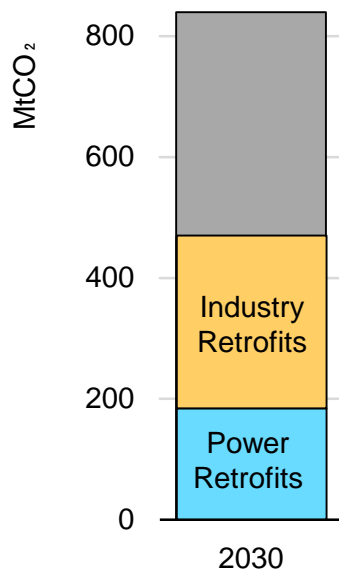
The role of CCUS extends across the global energy system



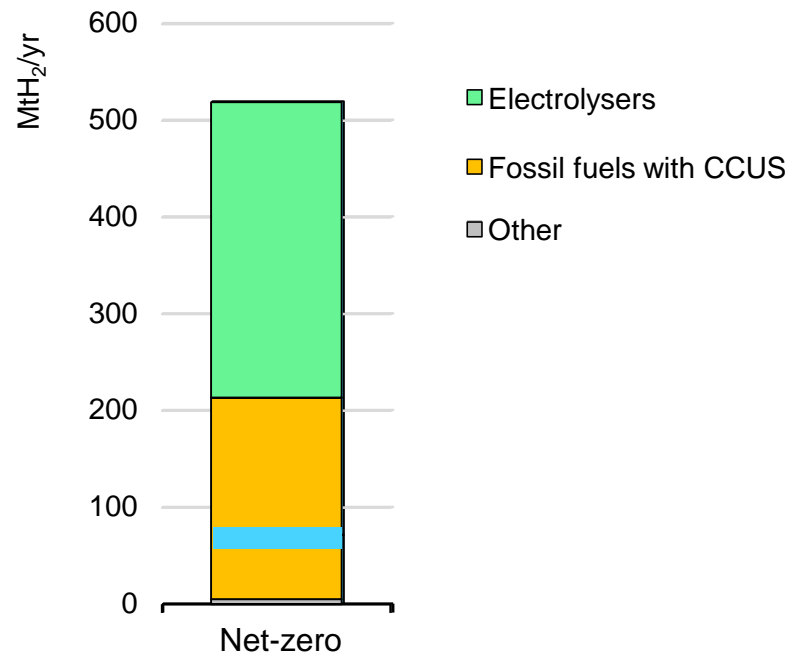
CCUS can support emissions reductions in power generation, hydrogen production, heavy industry and transport.

Four strategic roles for CCUS

1. Tackling emissions from existing infrastructure



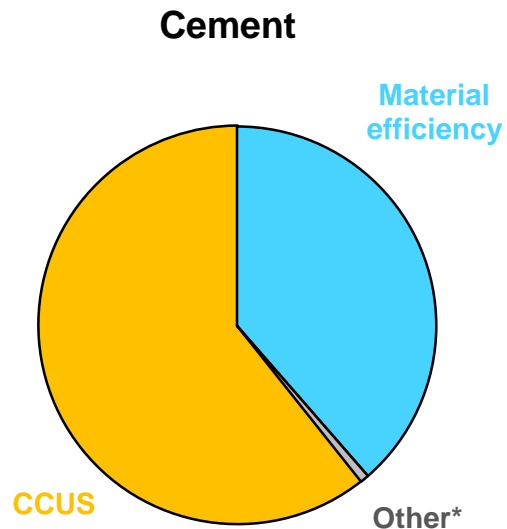
2. A platform for low-carbon hydrogen production



CCUS enables the continued operation of power and industrial plants – many of which have only recently been built
It is a low-cost option for low-carbon hydrogen production in many regions

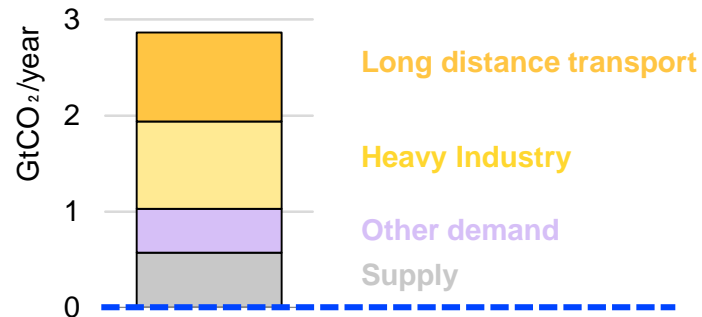
Four strategic roles for CCUS

3. A solution for the most challenging emissions



*Hydrogen, bioenergy, electrification, and fuel shifts

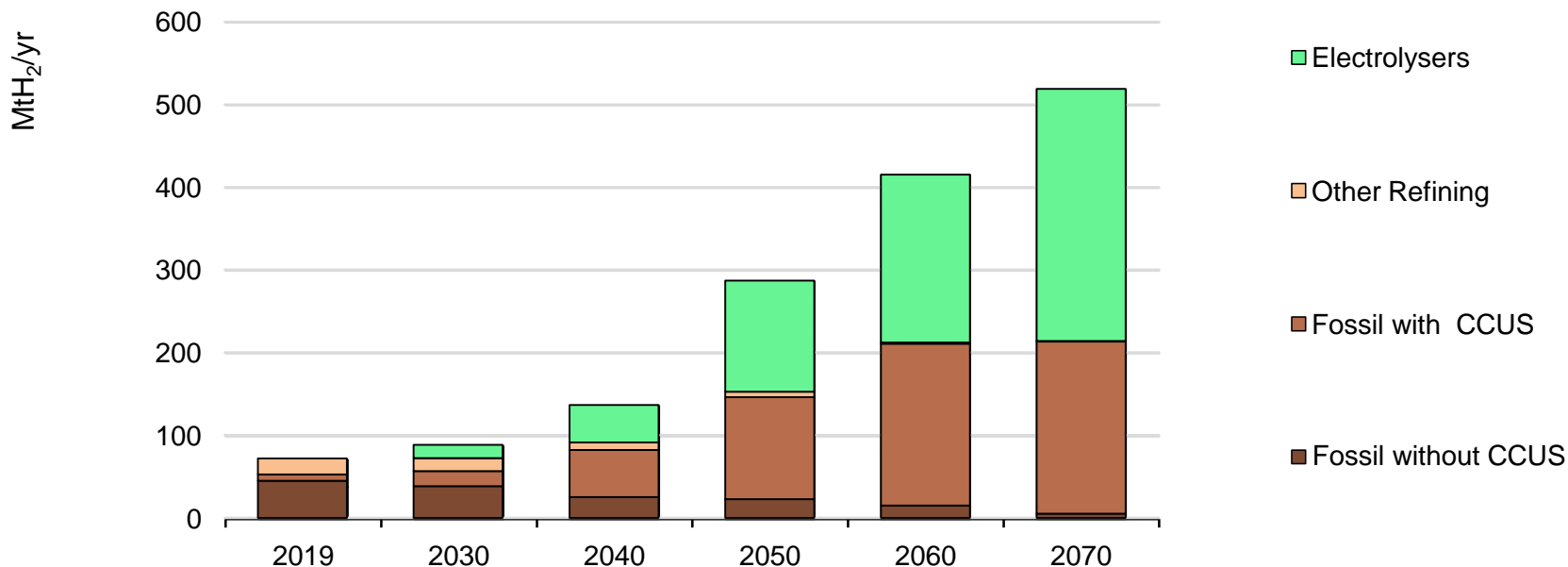
4. Removing carbon from the atmosphere



CCUS plays an indispensable role in heavy industry, particularly cement
Bioenergy with CCS and direct air capture can balance hard-to-abate emissions for net zero

Hydrogen – a key pillar for reaching energy & climate goals

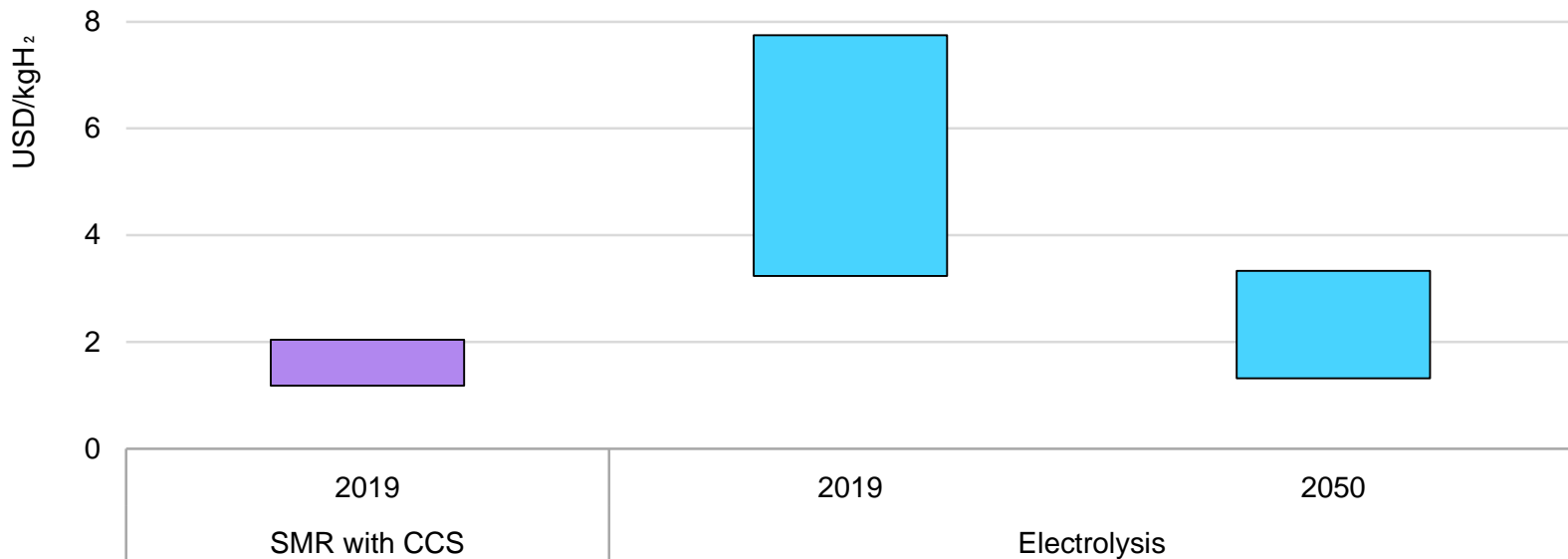
Global hydrogen production and use by sector in the Sustainable Development Scenario, 2019-2070



Global hydrogen production and use grows sevenfold by 2070 compared to today in the Sustainable Development Scenario, with demand growth almost completely met by low-carbon hydrogen.

Opportunities to reduce clean hydrogen production costs

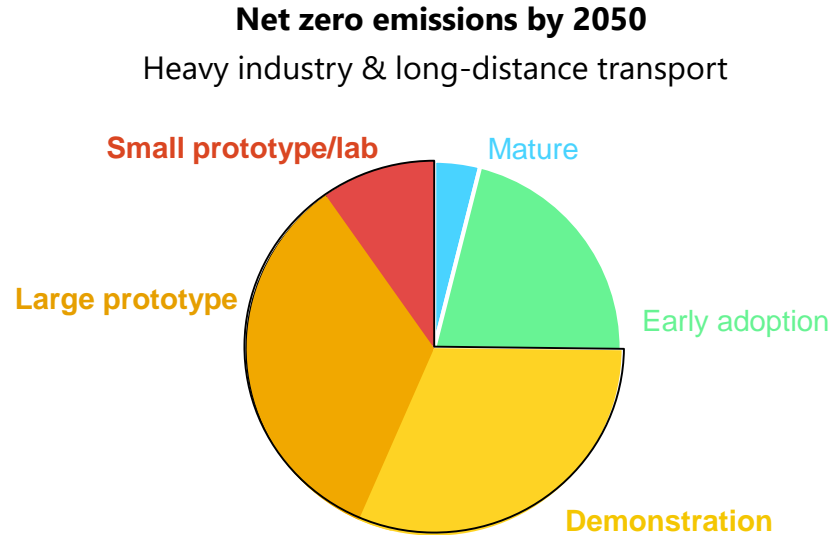
Hydrogen production costs by technology in the Sustainable Development Scenario, 2019 and 2050



Low-carbon hydrogen production through electrolysis is not currently competitive with that based on fossil fuels, but could become competitive in the long term as large-scale deployment brings down costs.

Clean energy technology progress hinges on innovation

Cumulative emissions reductions by technology maturity relative to baseline trends



In the Faster Innovation Case, almost half of the emissions reductions for reaching net-zero by 2050 rely on technologies that are not yet commercial today. The share is higher in heavy industry & long-distance transport.

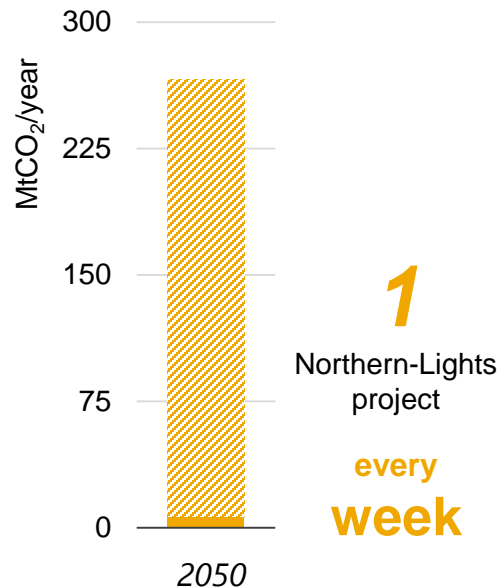
Net zero requires a major push to build clean energy infrastructure

Selected indicators to reach net-zero emissions by 2050 through technology



Northern-Lights CCS plant

Additional CO₂ captured



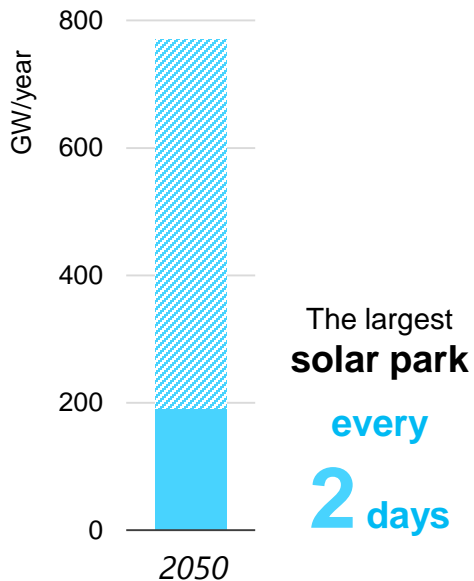
Reaching net-zero emissions by 2050 would require a rollout of clean energy technologies & enabling infrastructure at unprecedented scale. Significant changes to consumer behaviour can moderate – but not eliminate – the needs.

Net zero requires a major push to build clean energy infrastructure

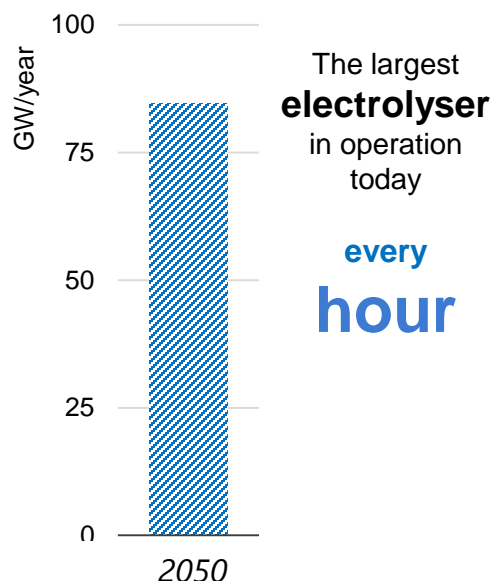


Selected indicators to reach net-zero emissions by 2050 through technology

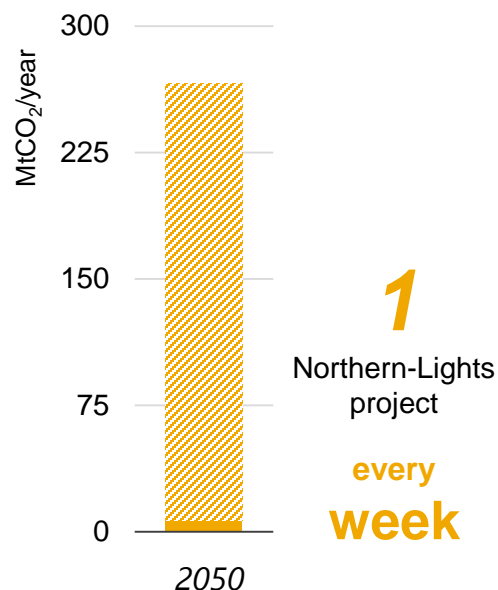
Renewable capacity additions



Electrolyser capacity additions



Additional CO₂ captured



Reaching net-zero emissions by 2050 would require a roll out of clean energy technologies & enabling infrastructure at unprecedented scale. Significant changes to consumer behaviour can moderate – but not eliminate – the needs.

Governments will need to play the decisive role

Markets are vital for mobilising capital and catalysing innovation, but they will not deliver net-zero emissions on their own. Effective policy toolkits must address five core areas:

1. Tackle emissions from existing assets
2. Strengthen markets for technologies at an early stage of adoption
3. Develop and upgrade infrastructure that enables technology deployment
4. Boost support for research, development and demonstration
5. Expand international technology collaboration

The logo for the International Energy Agency (IEA), consisting of the lowercase letters 'iea' in a bold, blue, sans-serif font.

Contact: report@tky.ieej.or.jp