

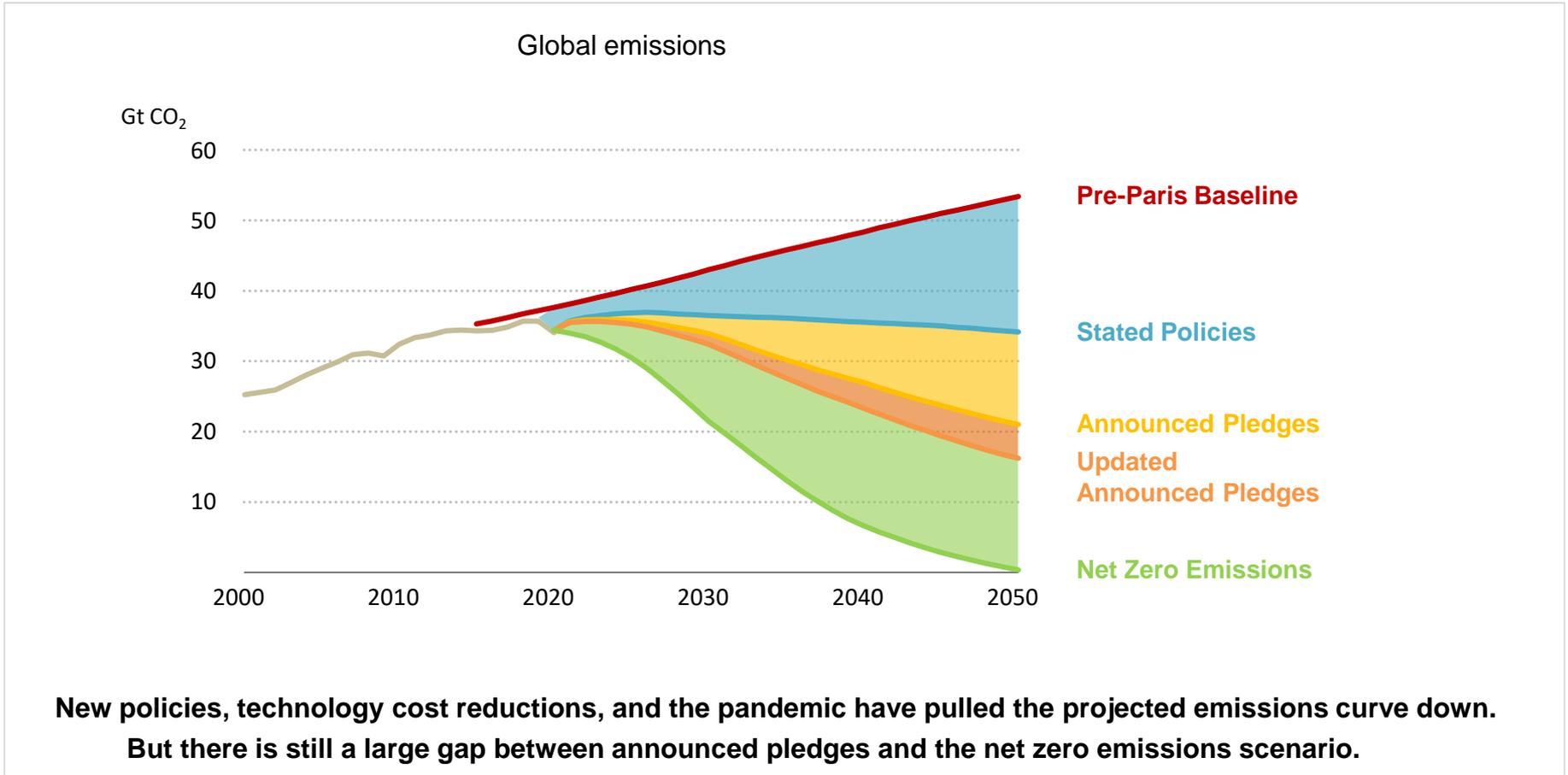


Net Zero by 2050 – A Roadmap for the Global Energy Sector

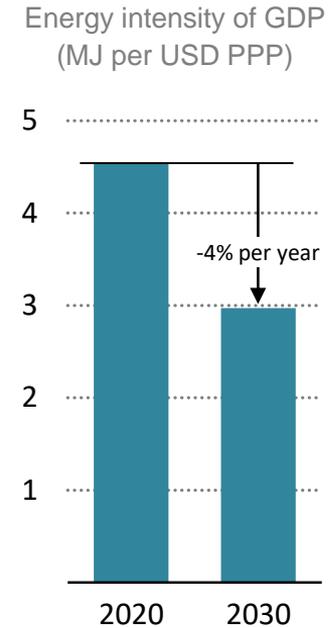
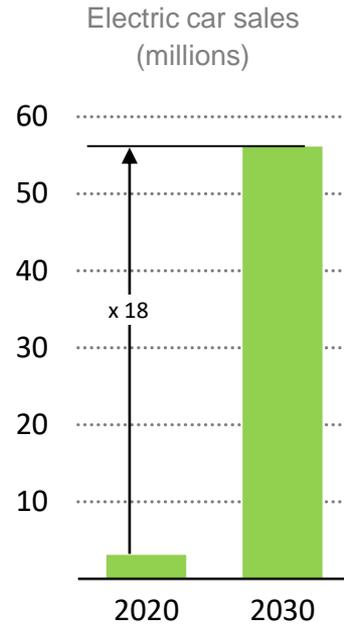
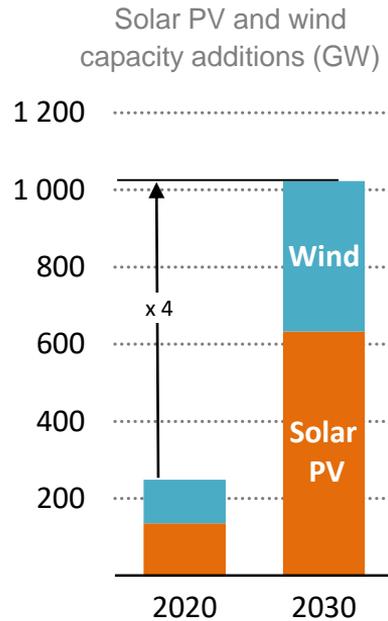
Uwe Remme, Head of Hydrogen and Alternative Fuels Unit, IEA

24 May 2022

The world is starting to bend the emissions curve



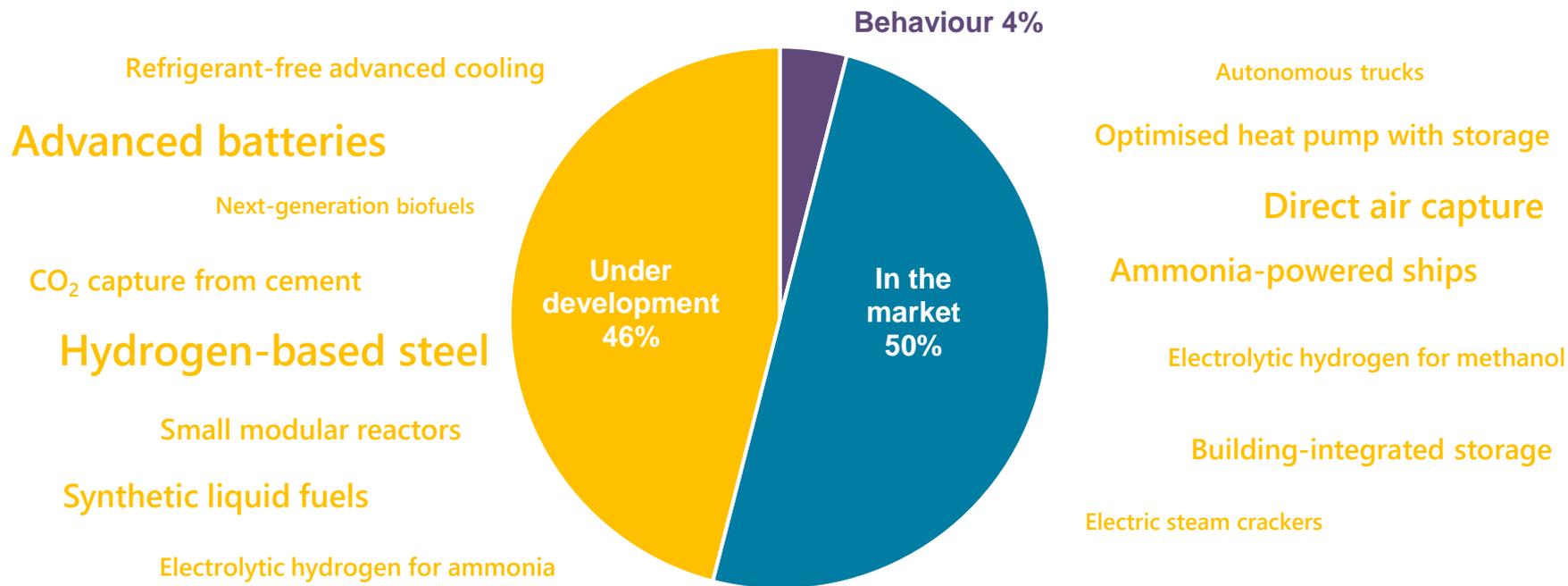
Make the 2020s the decade of massive clean energy expansion



Technologies for achieving the necessary deep cuts in global emissions by 2030 exist, but staying on the narrow path to net-zero requires their immediate and massive deployment.

Prepare for the next phase of the transition by boosting innovation

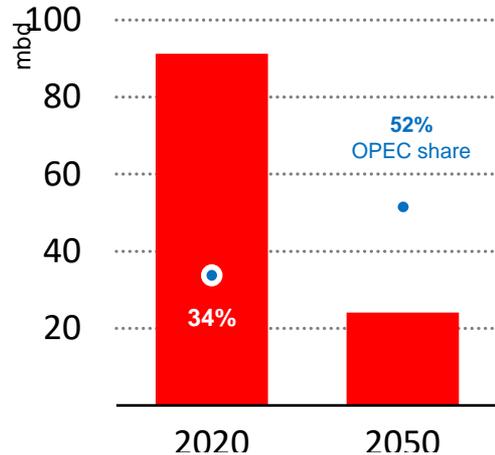
CO₂ savings by technology maturity in 2050, NZE scenario



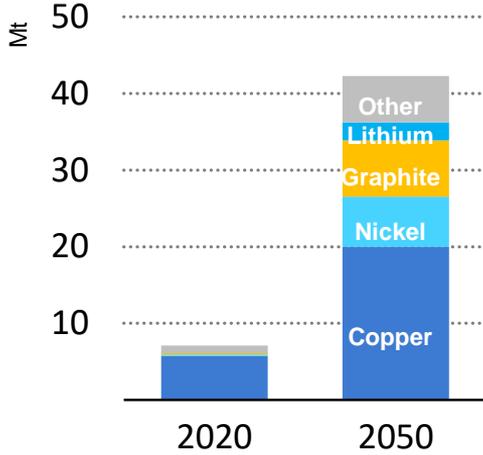
Unlocking the next generation of low-carbon technologies requires more clean energy R&D and \$90 billion in demonstrations by 2030; without greater international co-operation, global CO₂ will not fall to net-zero by 2050.

Address emerging energy security risks now

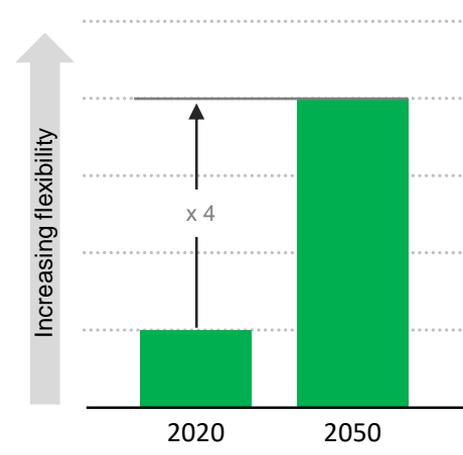
Oil supply and OPEC share



Critical minerals demand

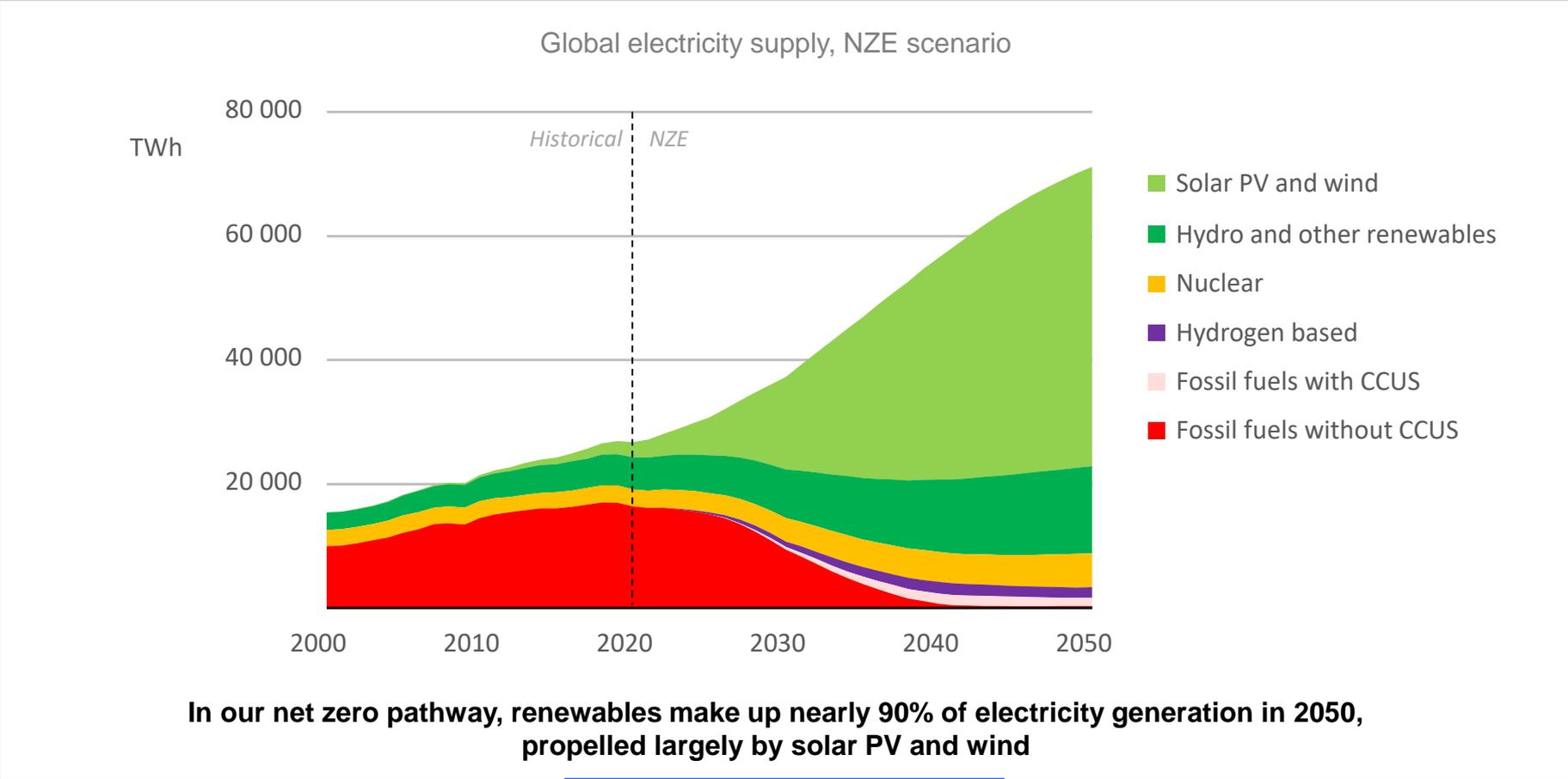


Electricity system flexibility needs



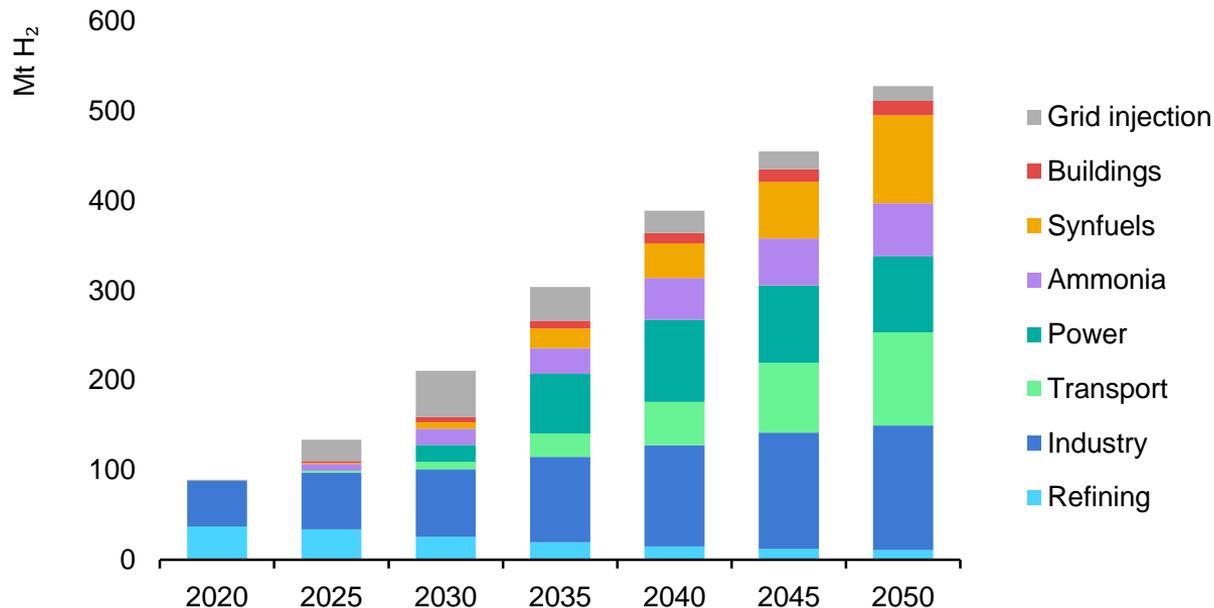
New energy security concerns emerge, and old ones remain; governments need to proactively plan for energy security risks related to market concentration, critical minerals and electricity systems.

Electricity leads the way to net zero



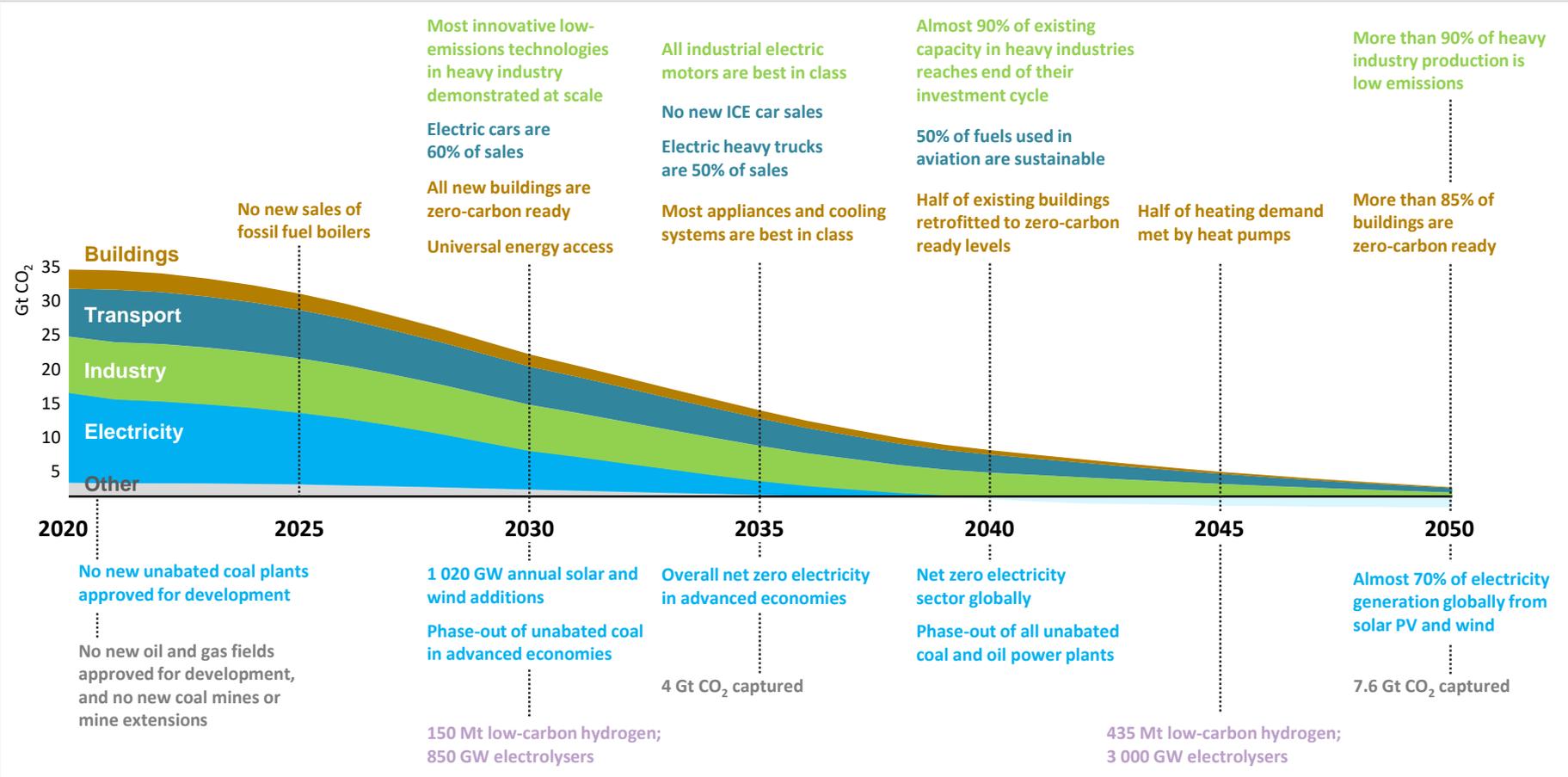
Hydrogen is an important contributor to a net-zero energy system

Global demand for hydrogen by sector in the NZE, 2020-2050

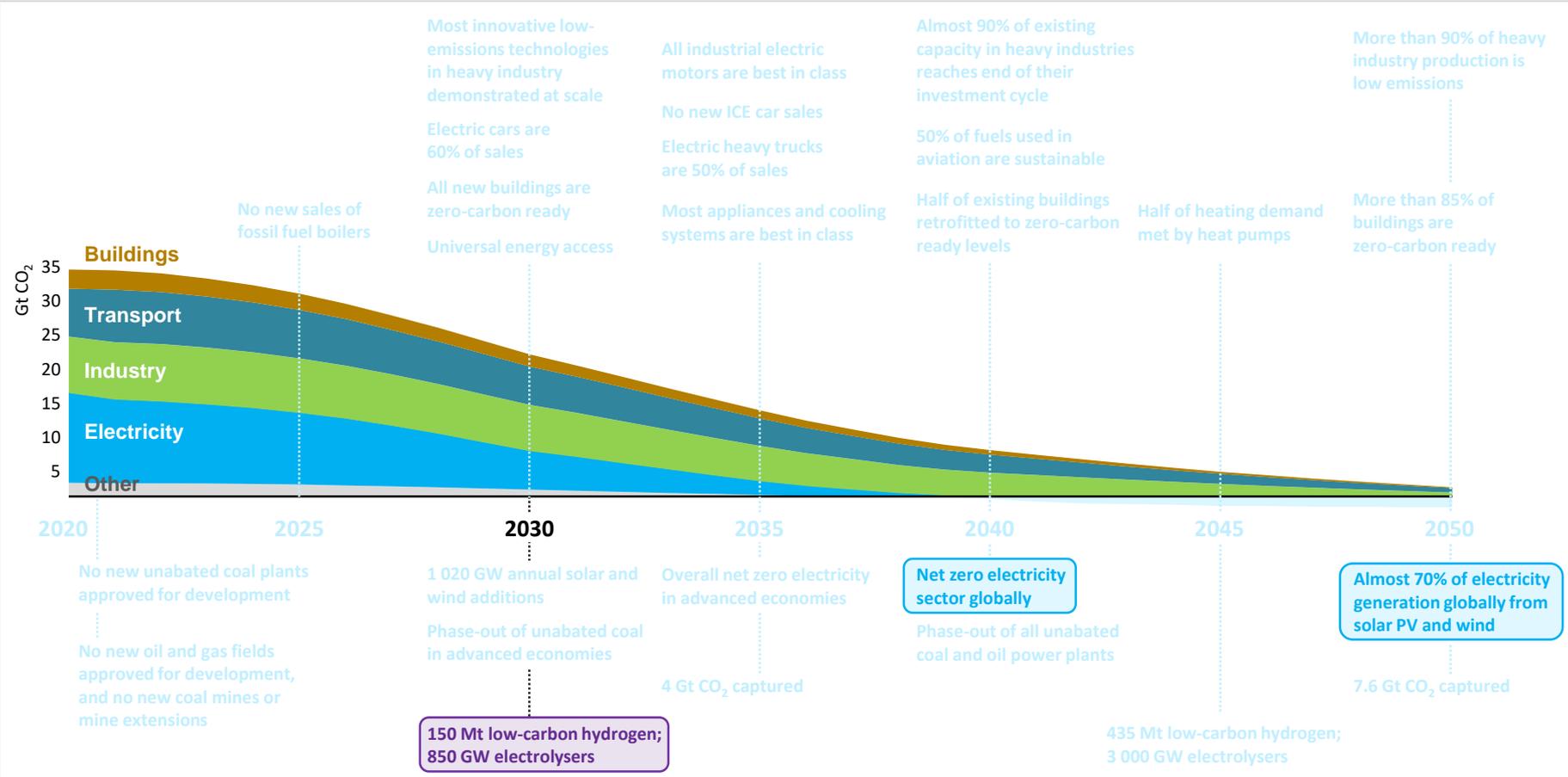


In the NZE, hydrogen demand grows sixfold by 2050, with a critical role in particular in sectors such as industry and long distance transport

Key near-term milestones to get on track to NZE



Key near-term milestones to get on track to NZE

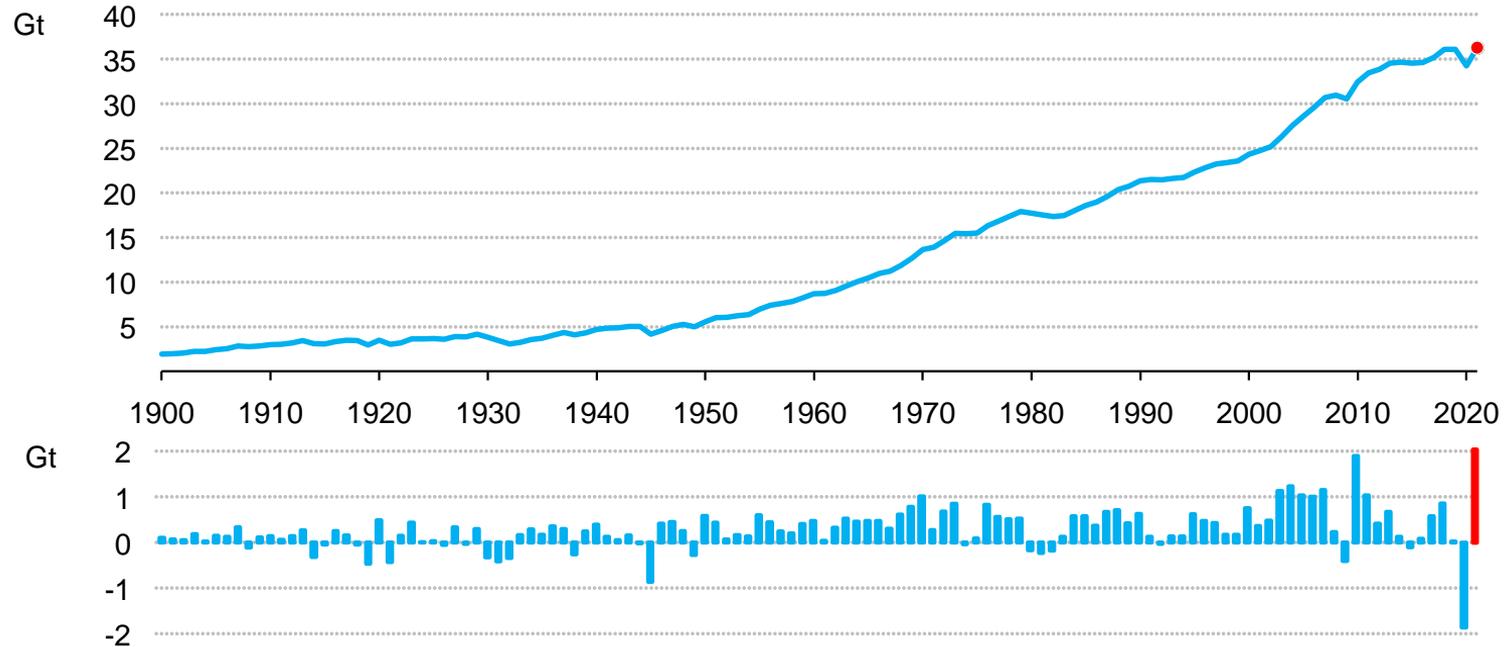


The logo for the International Energy Agency (IEA), consisting of the lowercase letters 'iea' in a bold, blue, sans-serif font. The 'e' is stylized with a horizontal bar that extends to the left and loops back under the 'a'.

Where are we heading?

2021: the largest ever annual increase in global CO2 emissions

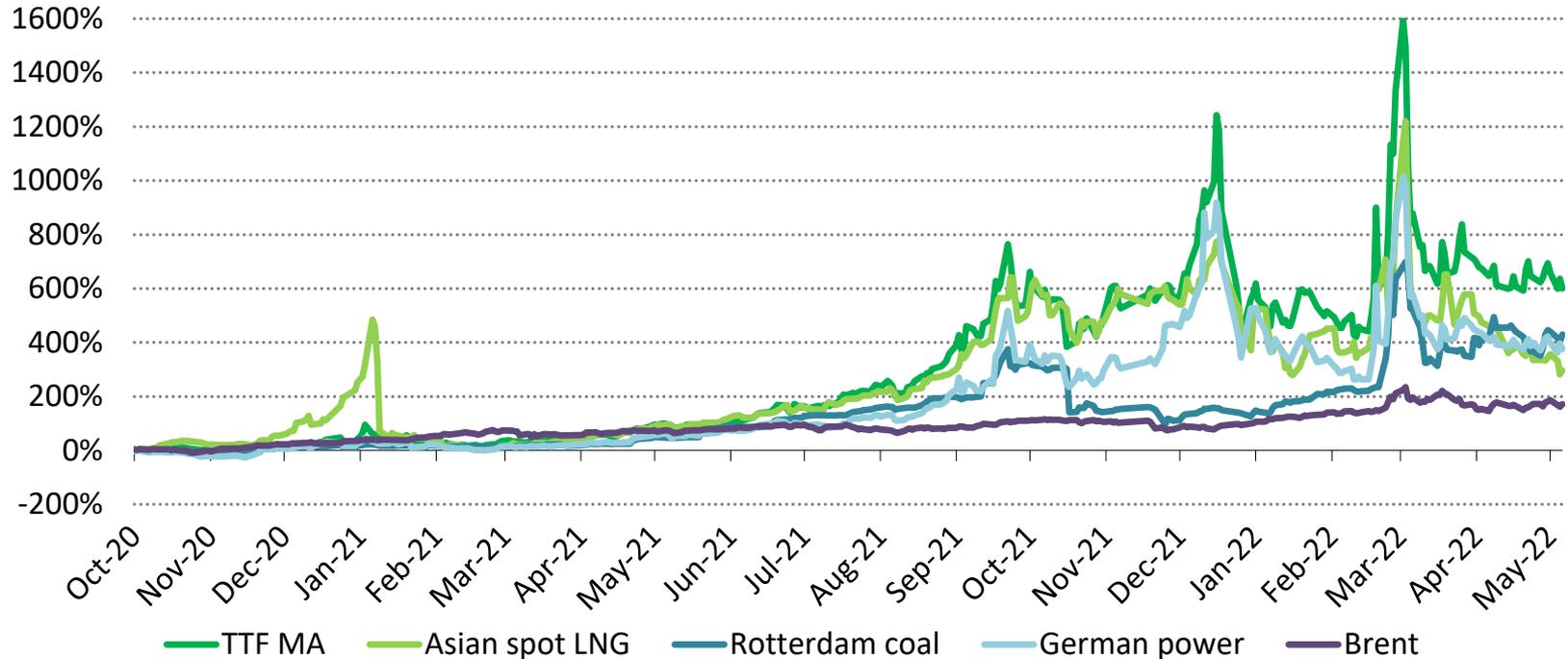
CO2 emissions from energy combustion and industrial processes and annual change, 1900-2021



Increased use of coal was the main factor driving up global energy-related CO2 emissions by over 2 billion tonnes, their largest ever annual rise in absolute terms, pushing emissions to their highest ever level.

The world is seeing a huge energy and commodity price shock

Changes of key international energy price benchmarks since October 2020



Prices for fossil fuels, critical minerals and other energy-related commodities have skyrocketed, driven by the strong rebound since COVID and the supply-side shock of the Russia-Ukraine war.

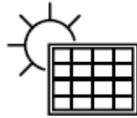
A 10-Point Plan to reduce the EU's Reliance on Russian Natural Gas

Action 1



No new gas supply contracts with Russia

Action 4



Accelerate the deployment of new wind and solar projects

Action 7



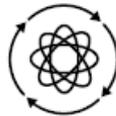
Speed up the replacement of gas boilers with heat pumps

Action 2



Replace Russian supplies with gas from alternative sources

Action 5



Maximise generation from existing dispatchable low-emissions sources: bioenergy and nuclear

Action 8



Accelerate energy efficiency improvements in buildings and industry

Action 9



Encourage a temporary thermostat adjustment by consumers

Action 3



Introduce minimum gas storage obligations to enhance market resilience

Action 6



Enact short-term measures to shelter vulnerable electricity consumers from high prices

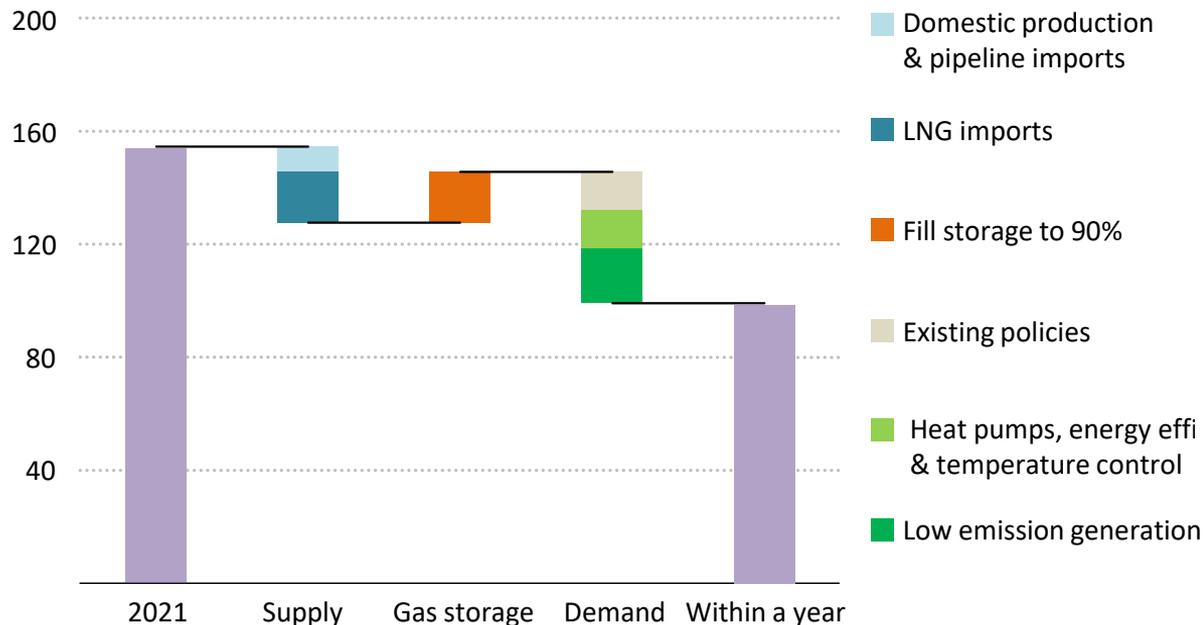
Action 10



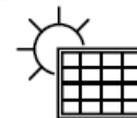
Step up efforts to diversify and decarbonise sources of power system flexibility

A 10-Point Plan to reduce the EU's Reliance on Russian Natural Gas

EU gas import from Russia (bcm)

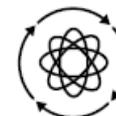


Action 4



Accelerate the deployment of new wind and solar projects

Action 5



Maximise generation from existing dispatchable low-emissions sources: bioenergy and nuclear

Measures implemented this year could bring down gas imports from Russia by over one-third, in a way that is consistent with the European Green Deal and that supports energy security and affordability

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