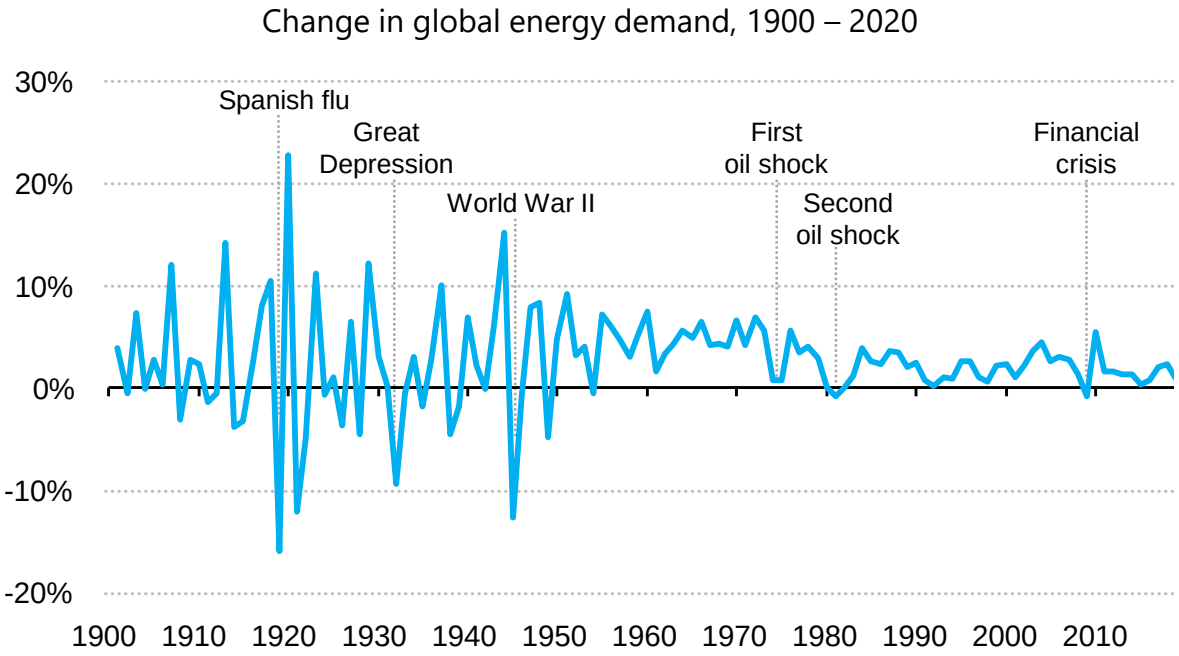
International Energy Agency

The Imperative to Accelerate Energy Innovation

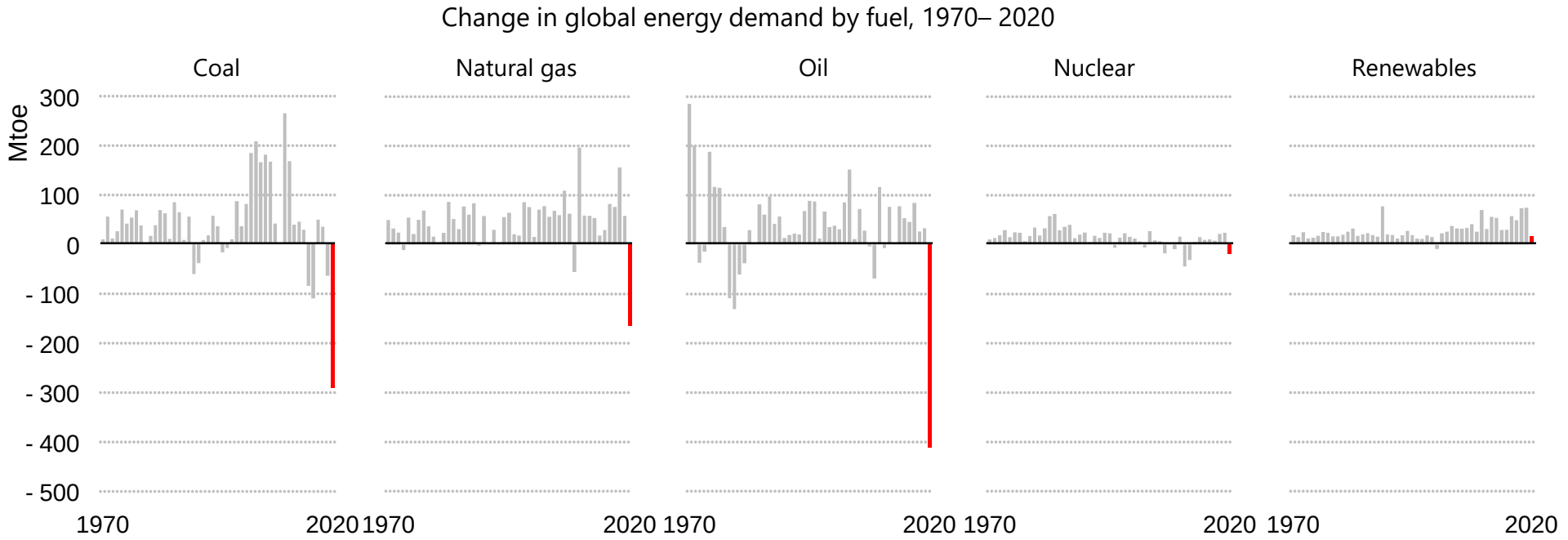
Dave Turk, Acting Deputy Executive Director, 27 July 2020

Coronavirus: a once in century event for energy demand



The shock to energy demand in 2020 is set to be the largest in 70 years. In our estimate, global energy demand declines by 6%, a fall seven times greater than the 2009 financial crisis.

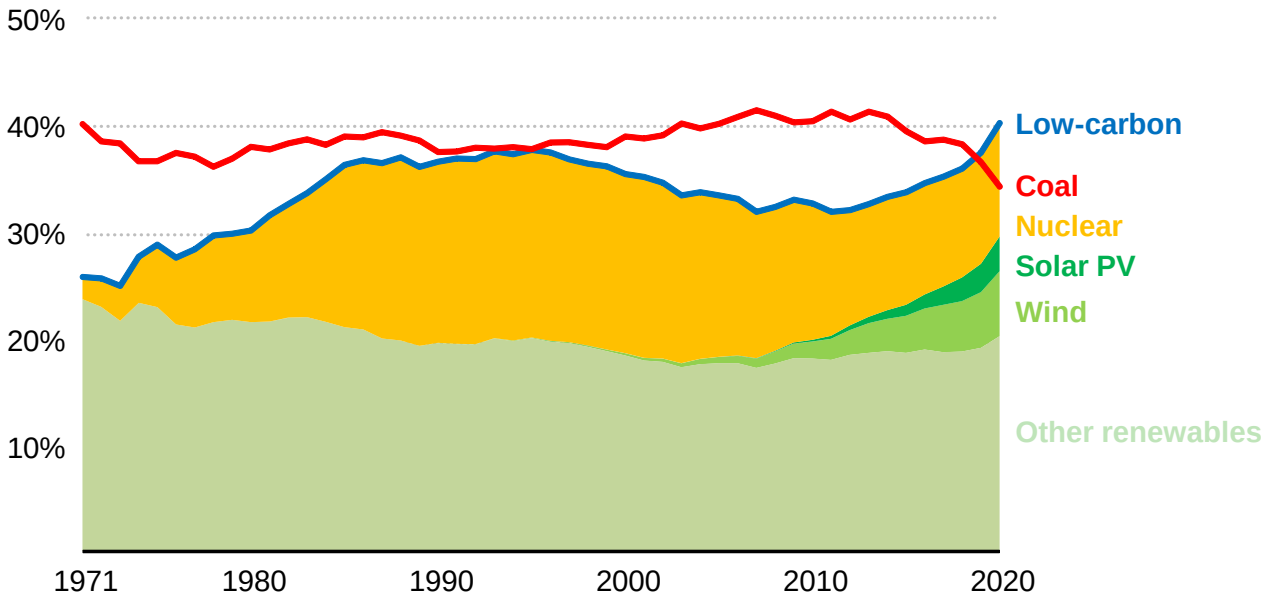
Fossil fuels are set for a dismal 2020



Coal is set for the largest decline since World War II, alongside sharp reductions for gas and oil. Nuclear power is less affected by lockdown measures, while renewables are the only energy source on the rise in 2020.

Low-carbon sources extend their lead in the power mix

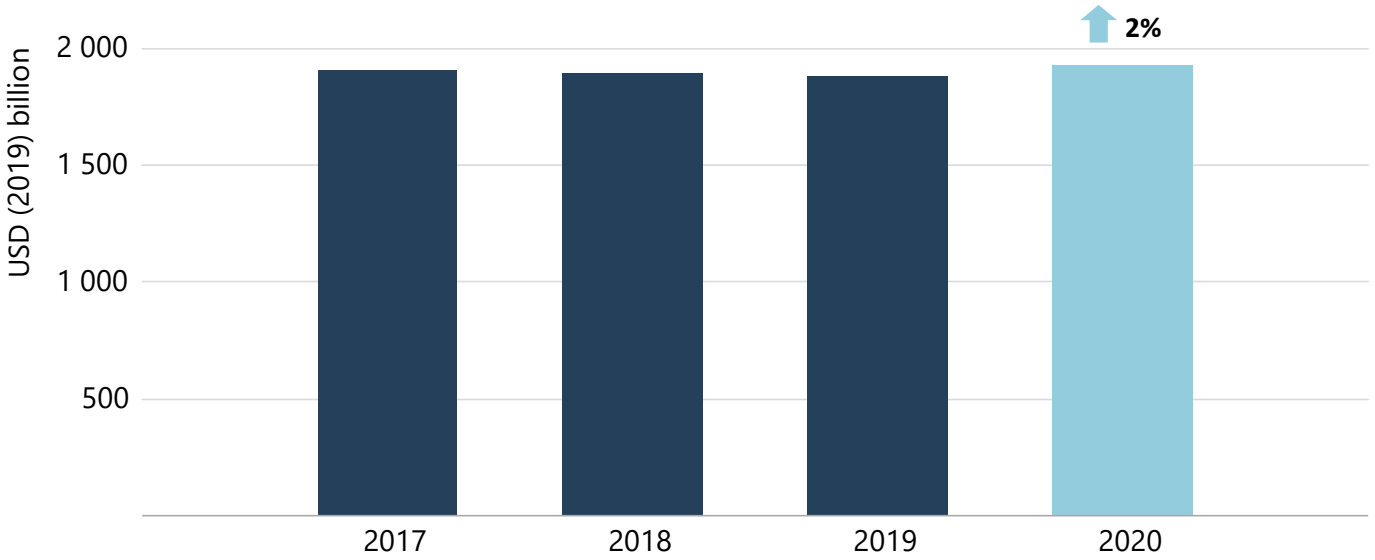
Global generation shares from coal and low-carbon sources, 1971-2020



For the first time in 50 years, low carbon technologies overtook coal as the leading source of electricity in 2019, and they are moving further ahead in 2020.

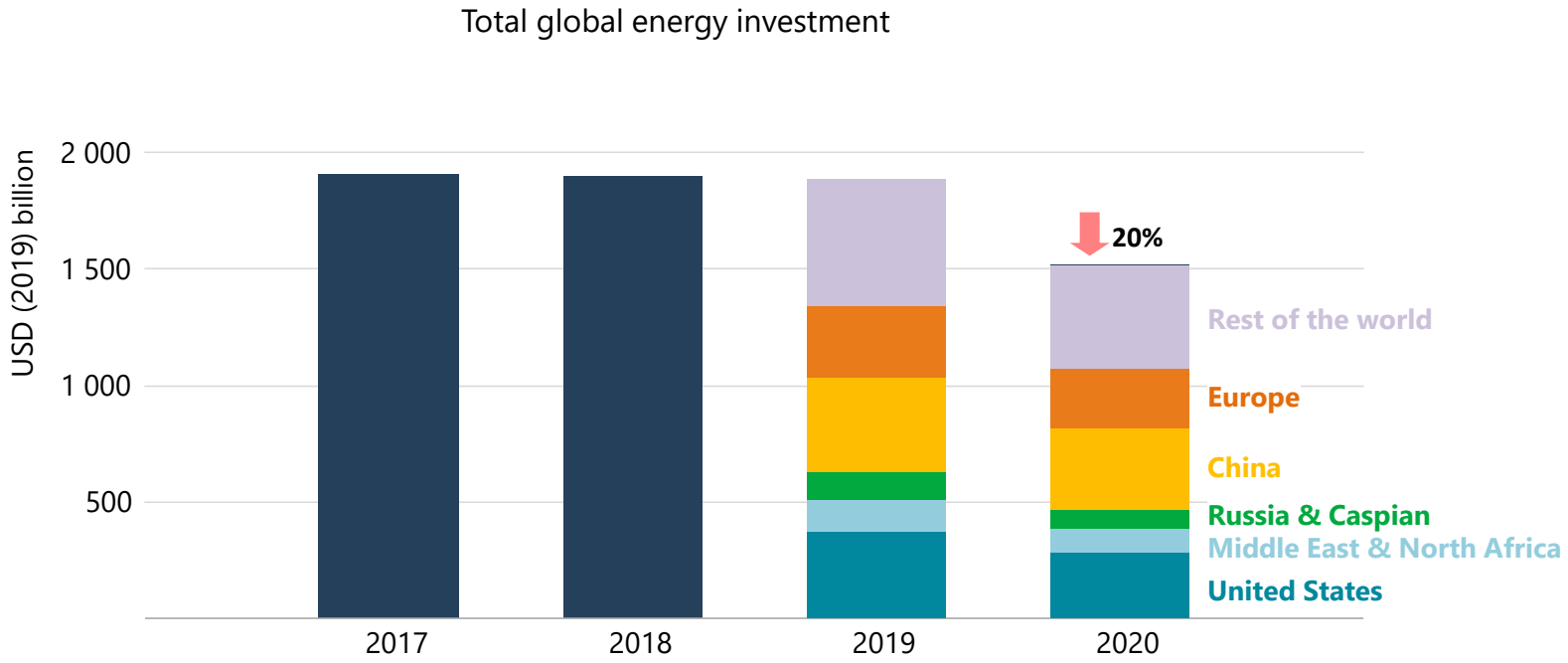
Pre-crisis expectations of a return to energy investment growth…

Total global energy investment based on pre-Covid-19 expectations



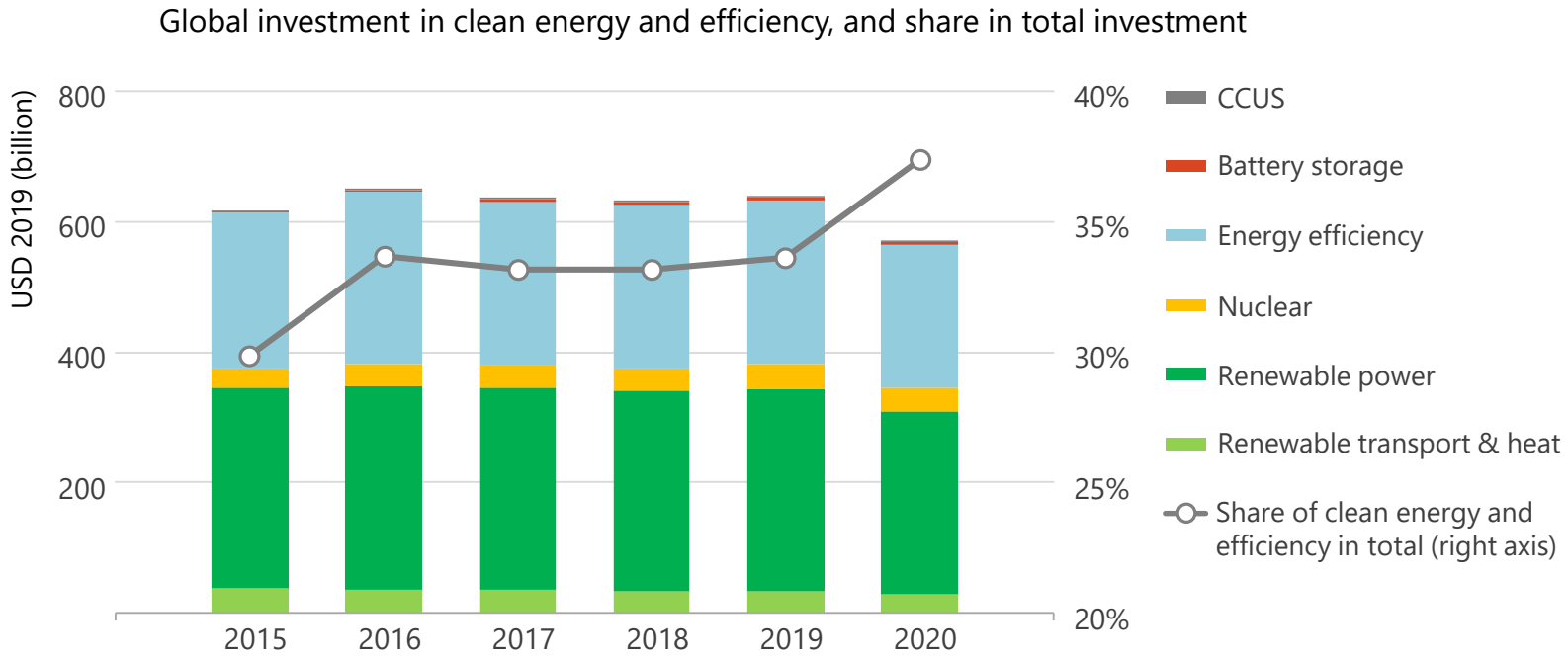
At the start of the year, expectations for 2020 pointed towards modest growth in renewables, upstream oil & gas and efficiency, pushing global energy investment up for the first time in recent years

...have turned into an unparalleled decline



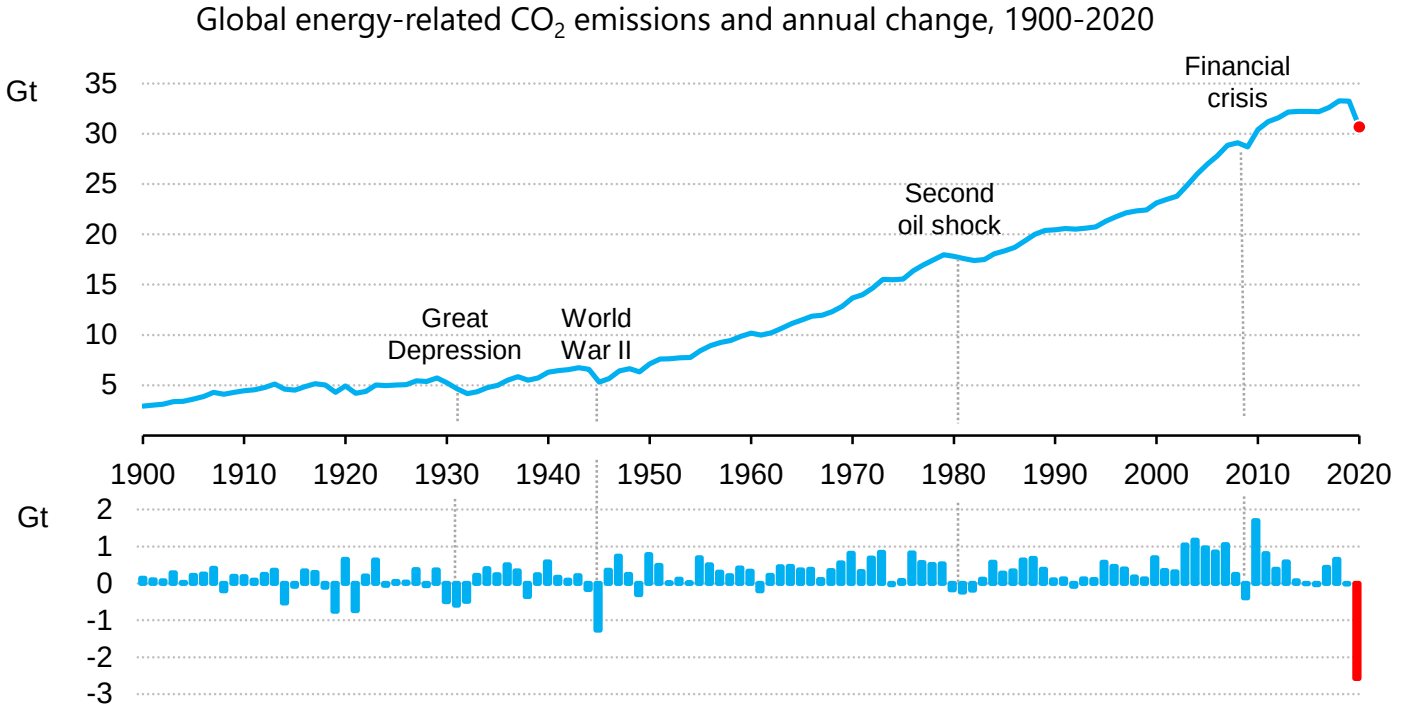
Disruption from Covid-19 is expected to push 2020 energy investment down by almost $400 billion. All parts of the world are affected, but major producers of oil & gas have seen the largest falls

Clean energy investment has been resilient…and insufficient



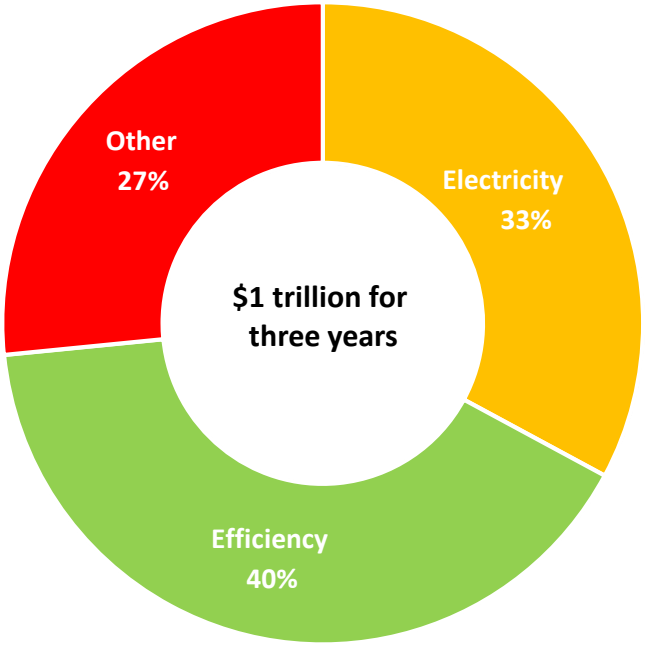
The uptick in the 'clean' share of total investment is not a breakthrough: absolute investment in energy transitions remain far short of what would be required for a more sustainable pathway

CO_2 emissions drop the most ever due to the COVID-19 crisis



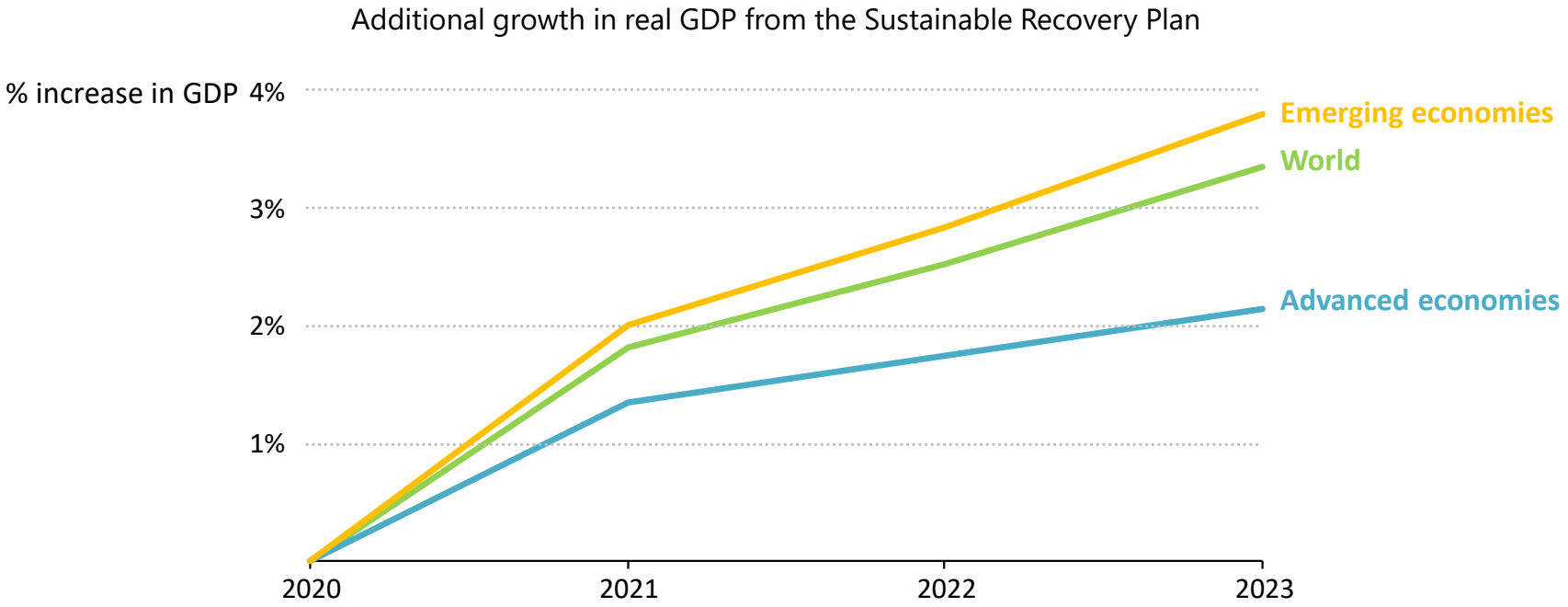
Global energy-related CO_2 emissions are set to fall nearly 8% in 2020 to their lowest level in a decade. Reduced coal use contributes the most. Experience suggests that a large rebound is likely post crisis.

A plan for a Sustainable Recovery post Covid-19



The Sustainable Recovery Plan provides an integrated approach to support economic recovery and jobs while improving the resiliency & sustainability of the energy system

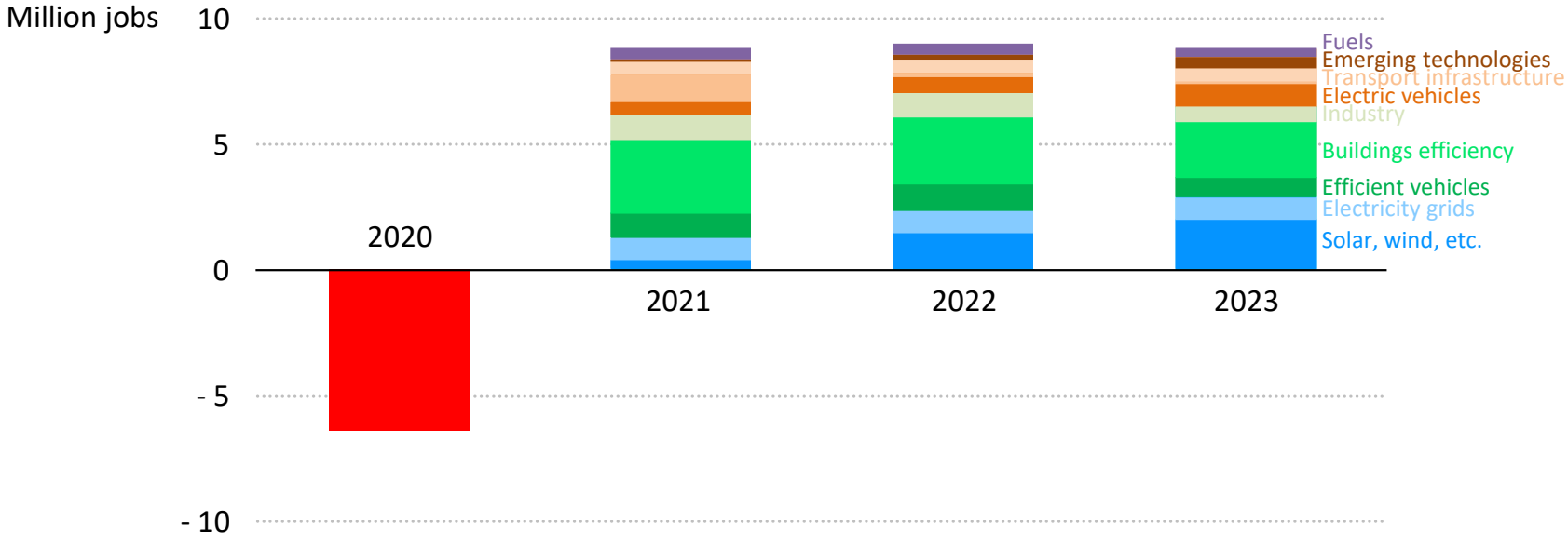
The energy sector could be a major driving force for economic growth



An assessment conducted in co-operation with the International Monetary Fund shows that the Sustainable Recovery Plan would boost average annual global GDP growth by 1.1% to 2023.

A Sustainable Recovery Plan creates new jobs

Energy-related jobs at risk due to Covid-19 in 2020 and new jobs created by the Sustainable Recovery Plan

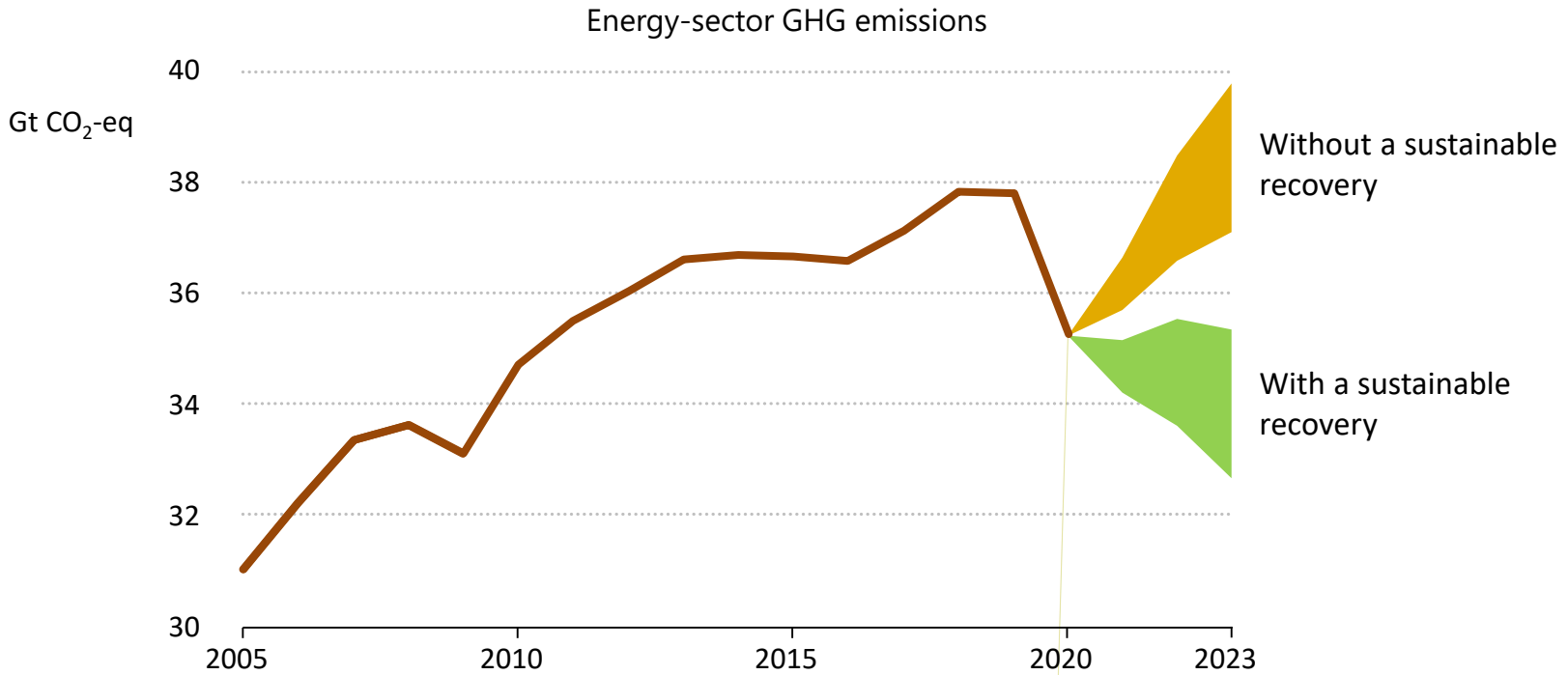


With 6 million jobs that could be permanently lost due to the crisis, the plan could create or save some 9 million jobs in every year between 2021 and 2023 with most being in efficiency and in power.

Measures in the Sustainable Recovery Plan act across 6 key sectors

Sector	Measure
Electricity	• Expand and modernise grids • Accelerate the growth of wind and solar PV • Maintain the role of hydro and nuclear power • Manage gas- and coal-fired power generation
Transport	• New vehicles • Expand high-speed rail networks • Improve urban infrastructure
Buildings	• Retrofit existing buildings and more efficient new constructions • More efficient and connected household appliances • Improve access to clean cooking
Industry	• Improve energy efficiency and increase electrification • Expand waste and material recycling
Fuels	• Reduce methane emissions from oil and gas operations • Reform fossil fuel subsidies • Support and expand the use of biofuels
Strategic opportunities in technology innovation	• Hydrogen technologies • Batteries • Small modular nuclear reactors • Carbon capture, utilisation and storage

Energy systems would shift towards structurally cleaner ones



The plan would make 2019 the definitive peak in global emissions, reducing GHG emissions by 4.5 billion tonnes and putting them on a path towards achieving long-term climate goals, including the Paris Agreement.

Tracking Clean Energy Progress 2020 (www.iea.org/tcep)

Power

- Renewable power
  - Solar PV
  - Onshore wind
  - Offshore wind
  - Hydropower
  - Bioenergy
  - Geothermal
  - CSP
  - Ocean
- Nuclear power
- Gas-fired power
- Coal-fired power
- CCUS in power

Industry

- Chemicals
- Iron and steel
- Cement
- Pulp and paper
- Aluminium
- CCUS in industry & transformation

Transport

- Electric vehicles
- Fuel economy
- Trucks & buses
- Transport biofuels
- Aviation
- Shipping
- Rail

Buildings

- Building envelopes
- Heating
- Heat pumps
- Cooling
- Lighting
- Appliances & equipment
- Data centres & networks

Fuel supply

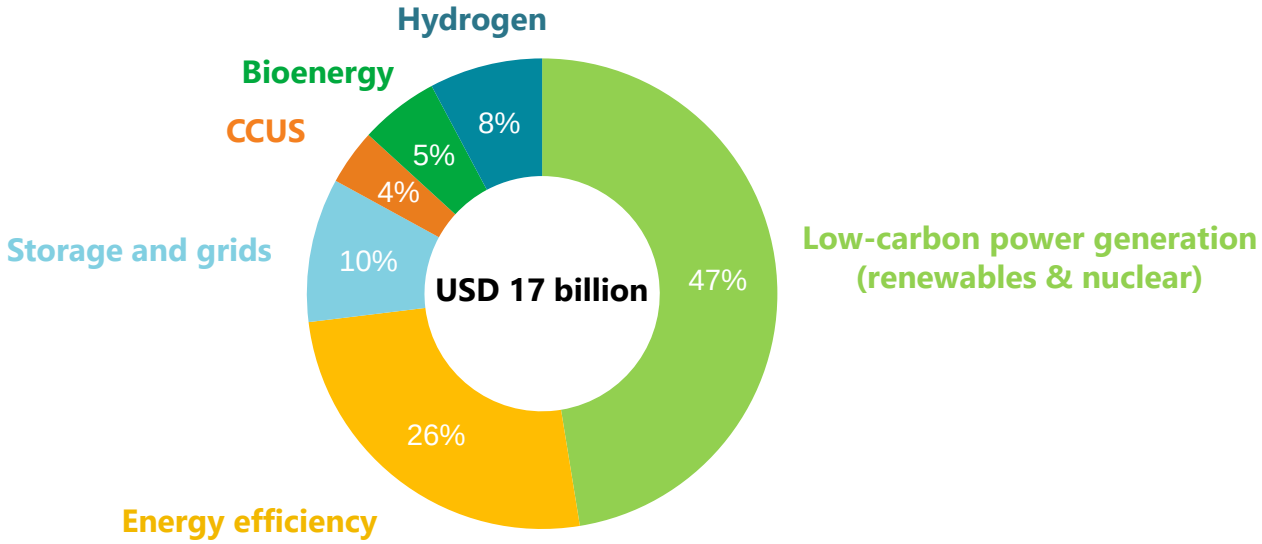
- Methane emissions from oil and gas
- Flaring emissions

Energy integration

- Energy storage
- Hydrogen
- Smart grids
- Demand response
- Direct air capture

R&D spending on net-zero emissions priorities is not sufficient

Global public low-carbon energy R&D allocated to specific technology areas, 2019

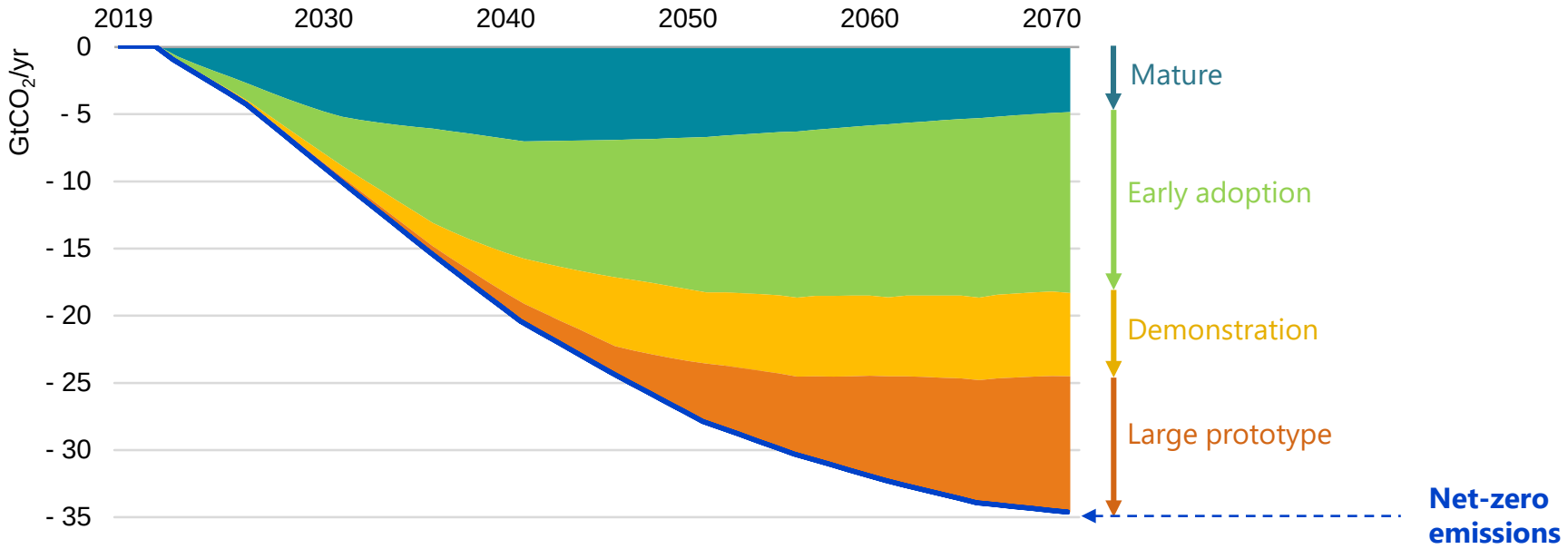


Note: total public R&D for low-carbon energy technologies is USD 25 billion

Today, only around one quarter of public R&D spending applied to low-carbon energy technologies is for electrification, CCUS, bioenergy and hydrogen – key areas for reaching net-zero emissions.

Net-zero emissions is not viable without a lot more innovation

Global CO_2 emissions reductions in the Sustainable Development Scenario, relative to baseline trends



Technologies at prototype or demonstration stage today contribute almost 35% of the emissions reductions to 2070; a further 40% comes from technologies that are at early stages of adoption.

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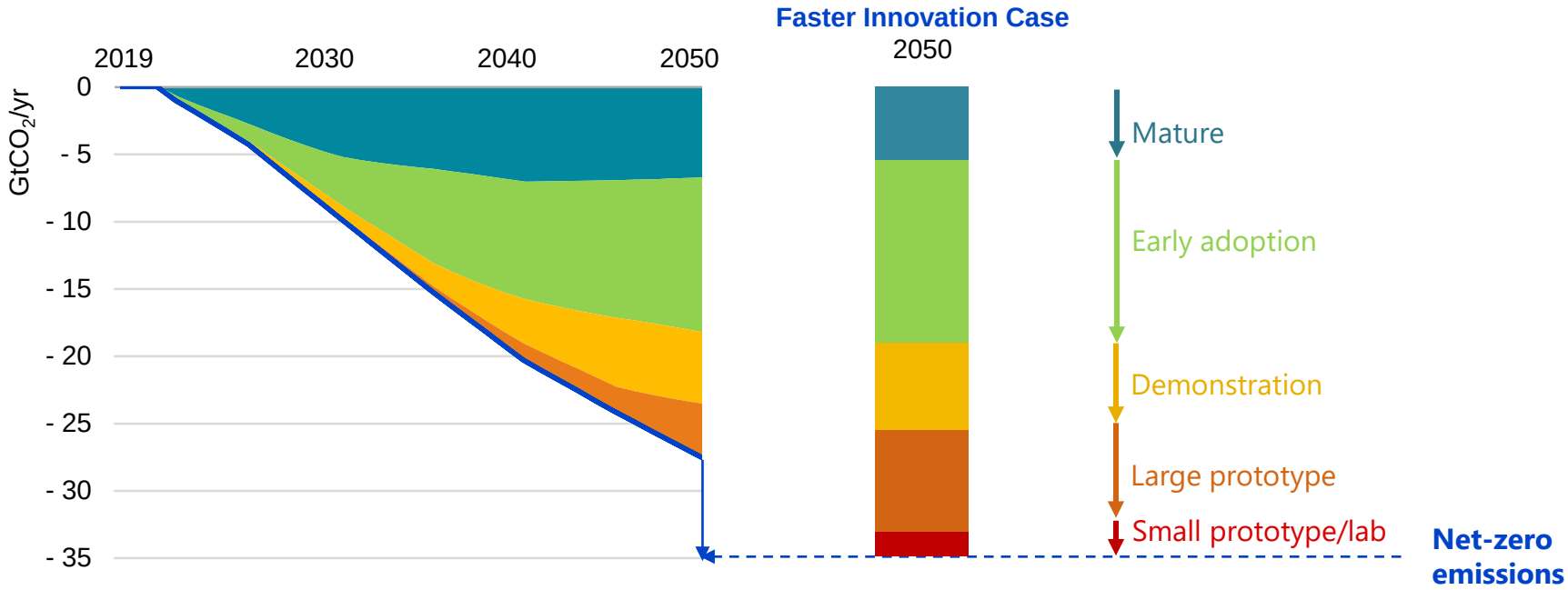
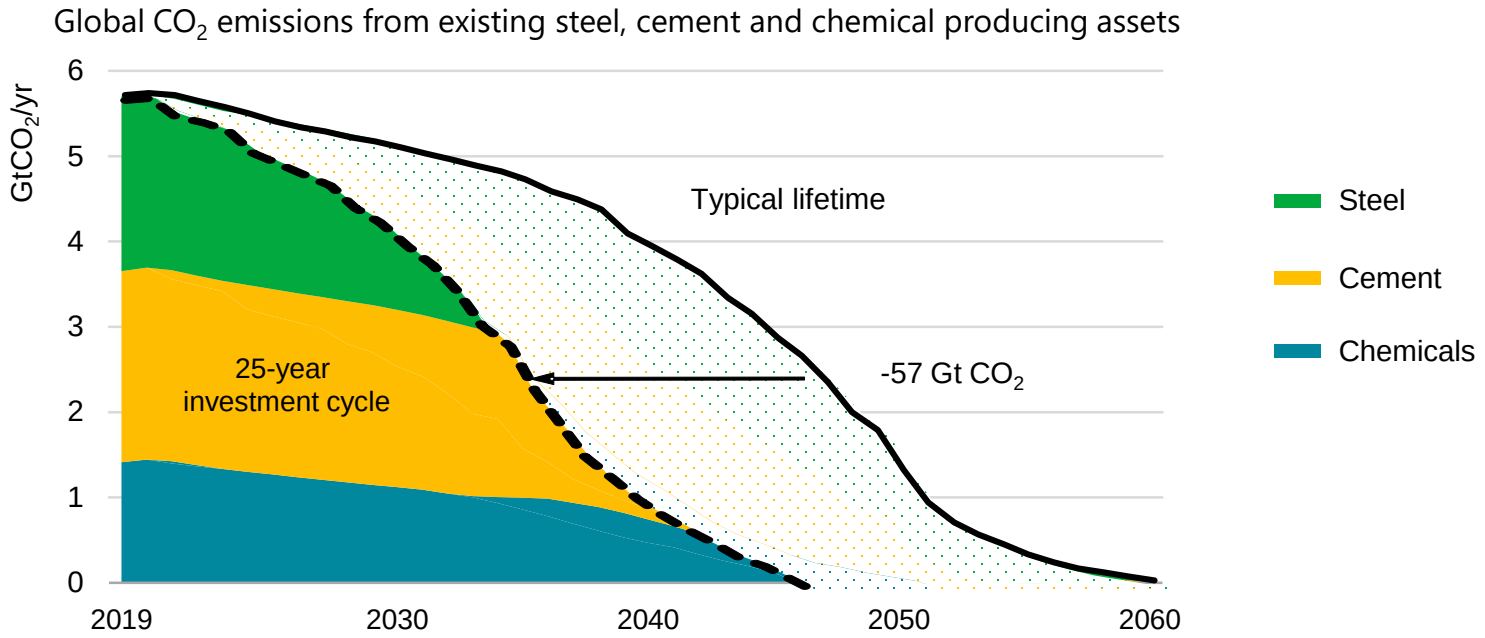


Rapidly commercialising today's newest & most promising technologies would help save enough CO_2 emissions to reach net-zero by 2050. Lack of policy support could delay achieving net-zero emissions.

A once-in-a-generation opportunity to reshape the future



Key technologies such as hydrogen and CCUS need to become commercially available by 2030 in different applications in heavy industry to take advantage of the next refurbishment cycle.

Accelerating clean energy innovation

- The IEA Clean Energy Technology Guide maps out the level of maturity of around 400 clean energy technologies across the whole energy system, along with performance targets and key actors.

- There are five key principles to fast-track clean energy innovation:

    1. Prioritise, track and adjust

    2. Raise public R&D and market-led private innovation

    3. Address all links in the value chain

    4. Build enabling infrastructure

    5. Work globally for regional success