The Role of Bioenergy and Hydrogen in the Net-Zero Emissions 2050 Scenario

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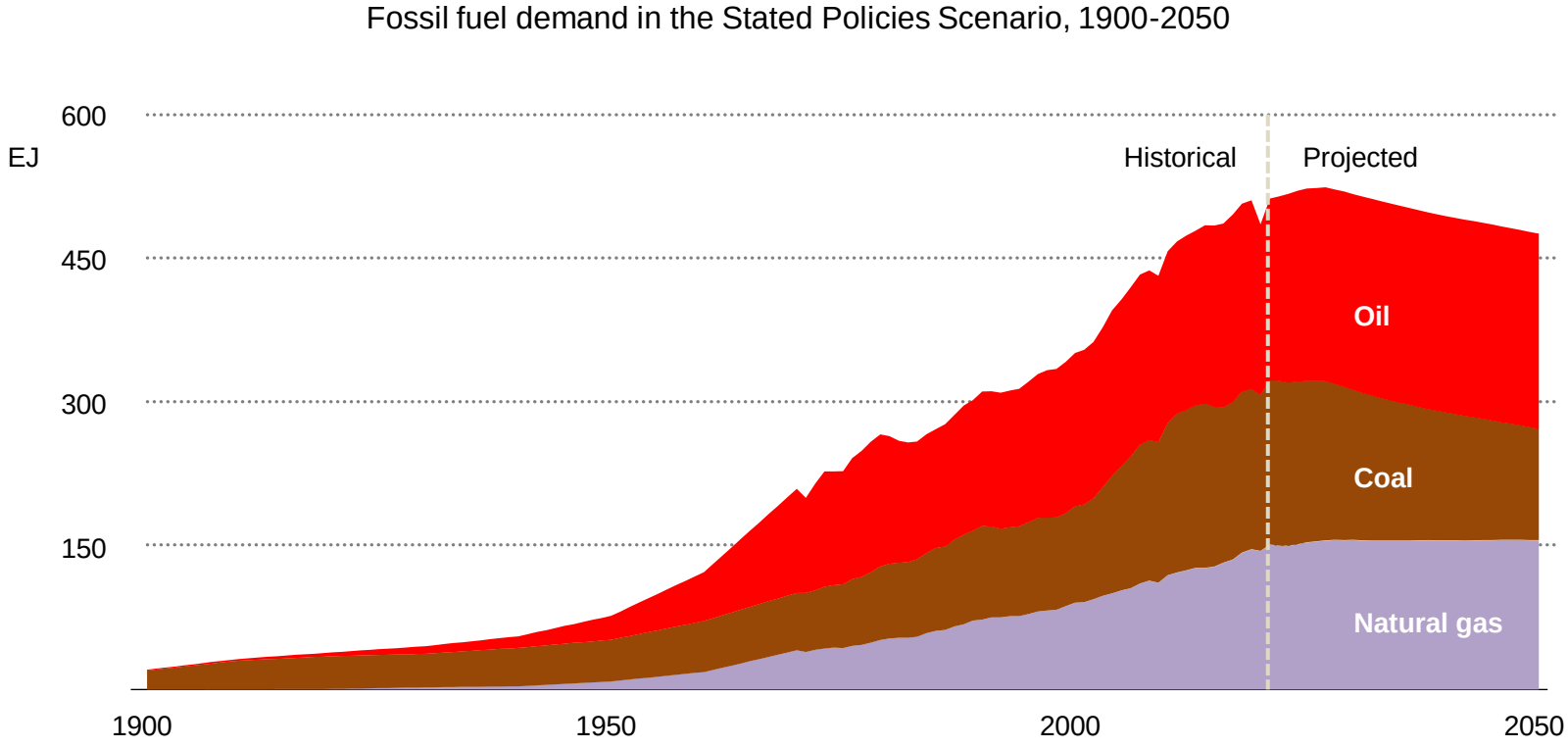
Wed 29 March 2023

Expert workshop, IEA Bioenergy TCP

International Energy Agency

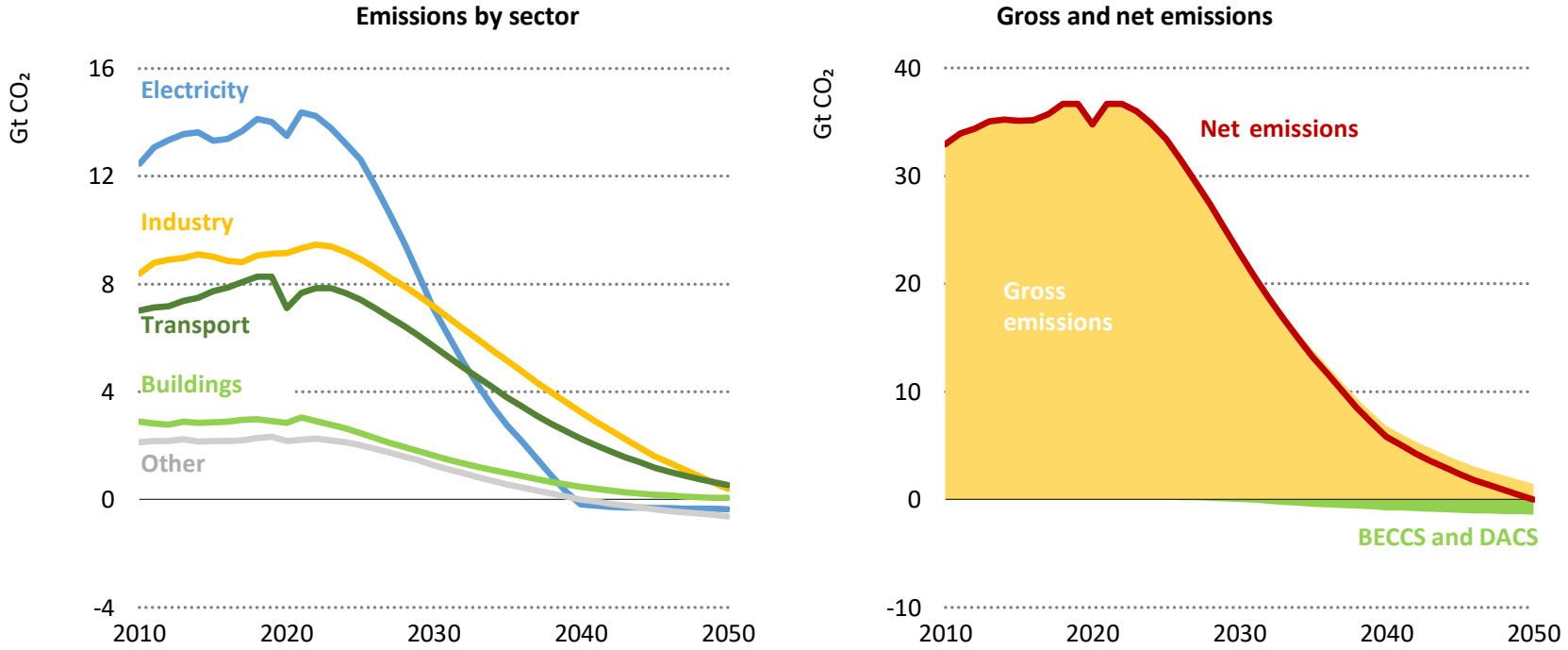
Peak fossil fuel demand is coming this decade



Today's policy settings are now sufficiently strong that they produce a distinct peak in fossil fuel use before 2030

Emissions trends to 2050

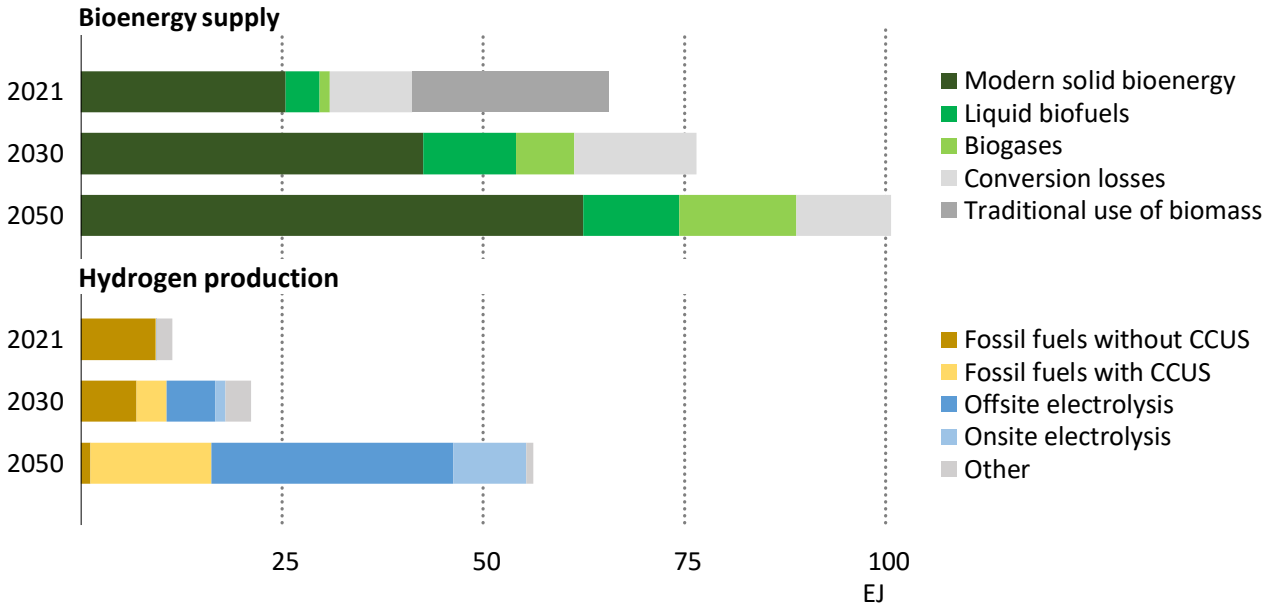
Energy-related CO_2 emissions by sector and gross and net emissions in the NZE Scenario, 2010-2050



The power sector leads emissions reductions to 2030, but all sectors contribute to the net zero emissions goal, with remaining residual emissions balanced by atmospheric removals in 2050

Bioenergy and low-emission hydrogen play a key role in the NZE

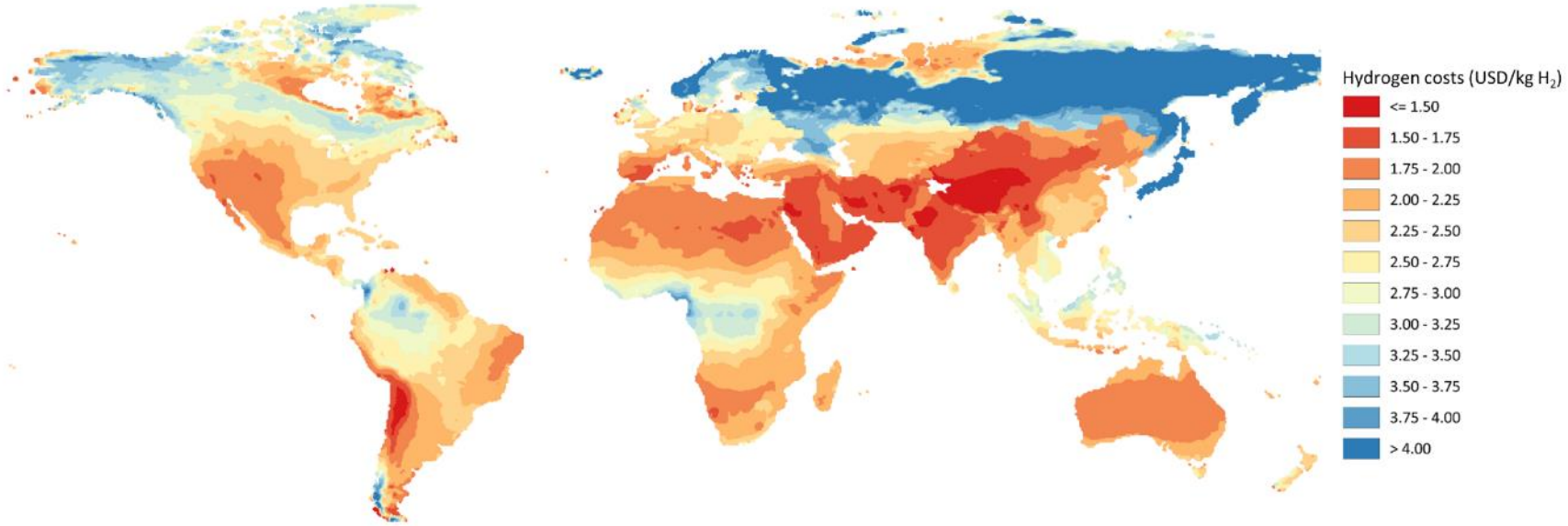
Bioenergy supply and hydrogen production by source in the NZE Scenario, 2021-2050



Hydrogen production rises nearly fivefold from today to 2050, while modern bioenergy increases by two-and-a-half-times, becoming the second largest energy source by 2050.

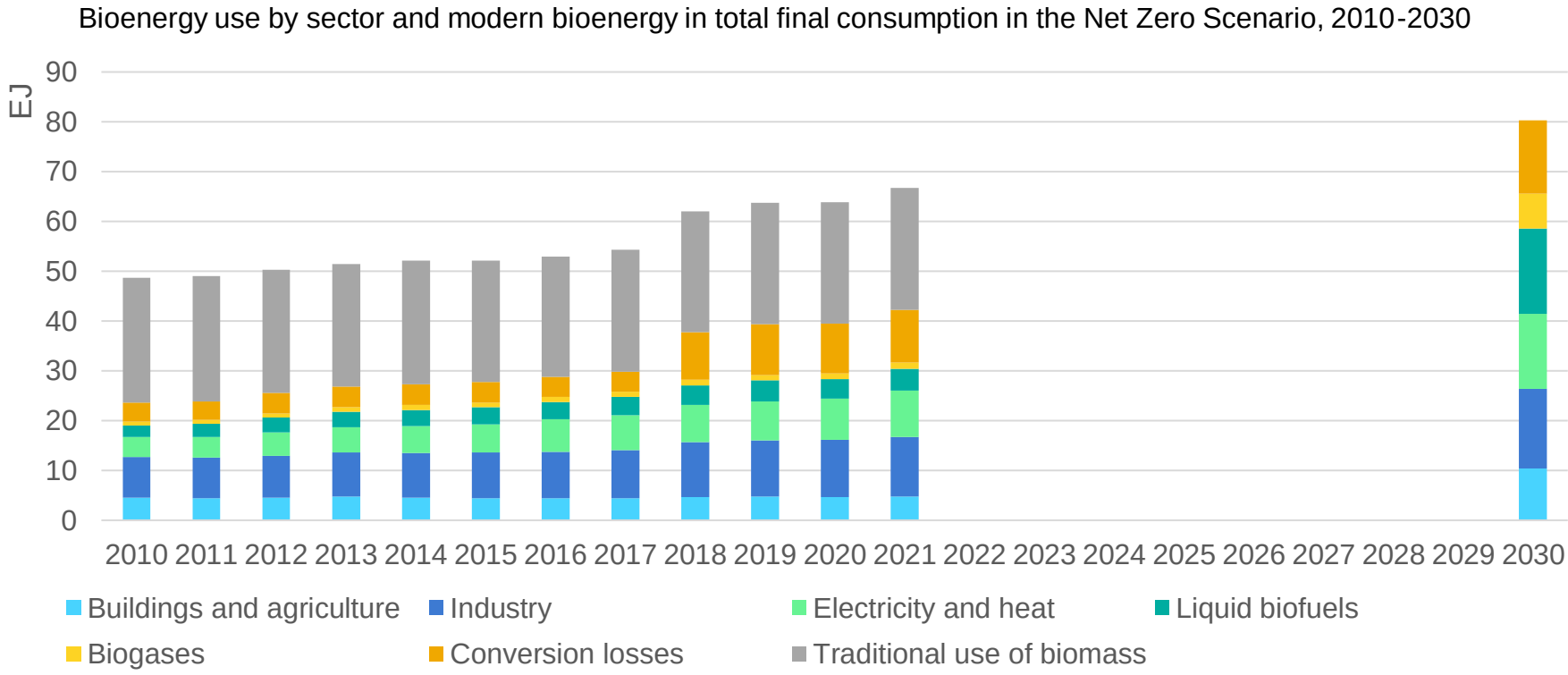
Opportunities for renewable-based hydrogen production

Hydrogen production cost from hybrid solar PV and wind systems in the NZE, 2030



Ambitious policy for deployment can make hydrogen from electrolysis competitive with hydrogen from fossil fuels within this decade

Meeting NZE requires more modern and phasing out traditional biomass



Bioenergy growth needs to be sustainable, minimising negative impacts to biodiversity, food availability and quality of life. Under the Net Zero Emissions scenario in 2030, 60% of bioenergy supply comes from waste and residues that do not require land use.

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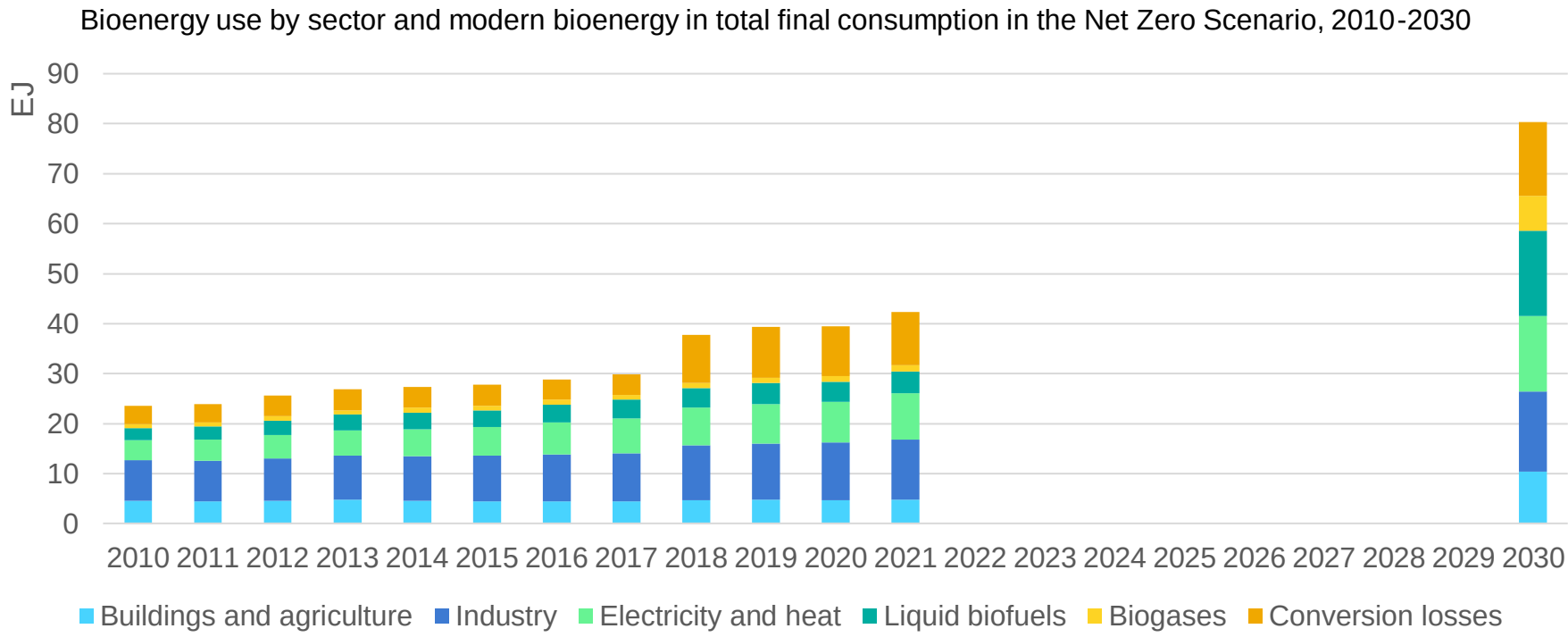

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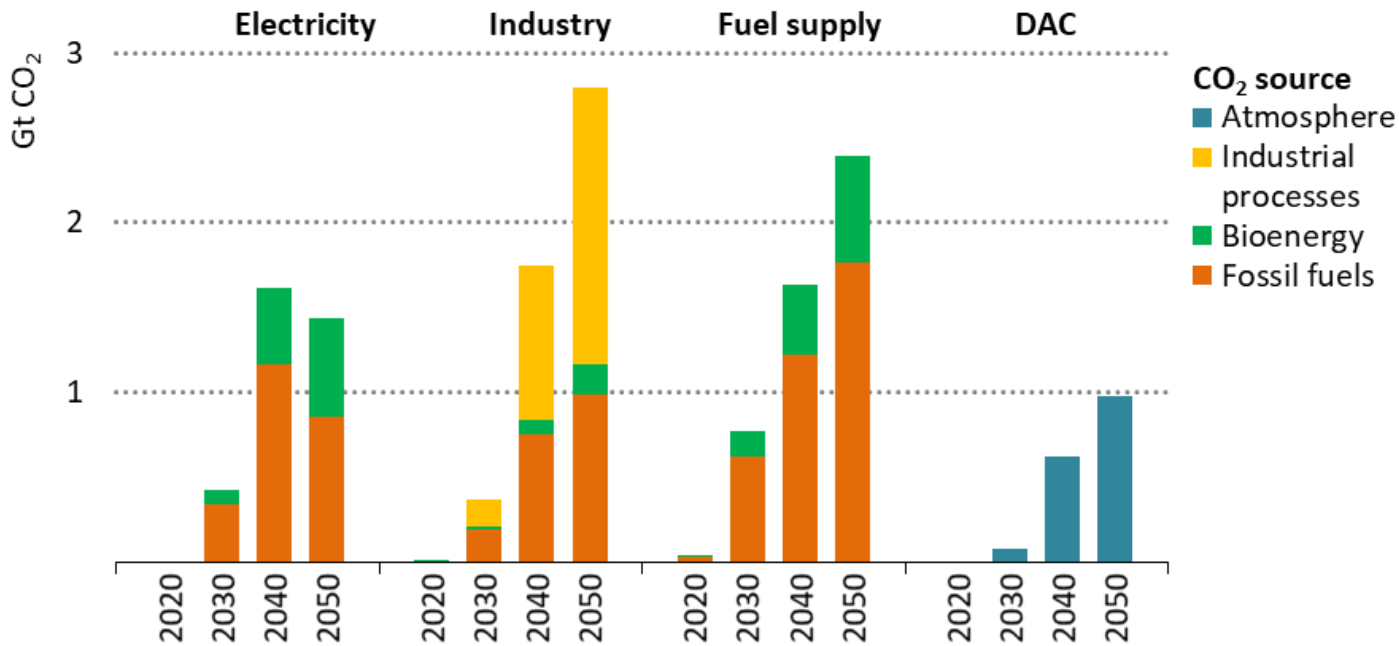
CCUS plays significant role in off-setting residual emissions

CCUS by sector and emissions source in the NZE



By 2050, 7.6 Gt of CO2 is captured per year from a diverse range of sources.
A total of 2.4 Gt CO2 is captured through BECCS and DACCS, of which 1.9 Gt CO2 is permanently stored.