



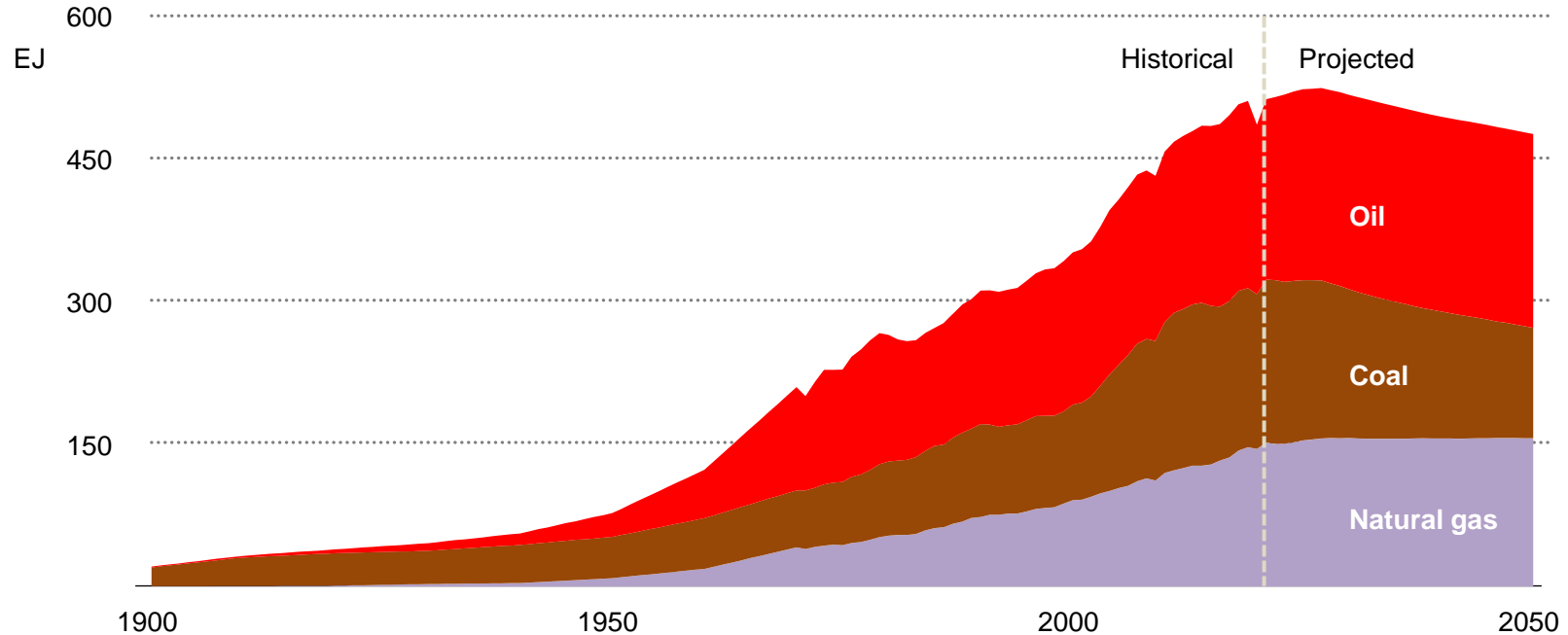
The role of negative emissions in clean energy transitions

Dr Ilkka Hannula

NEGEM final seminar, Brussels 18 April 2024

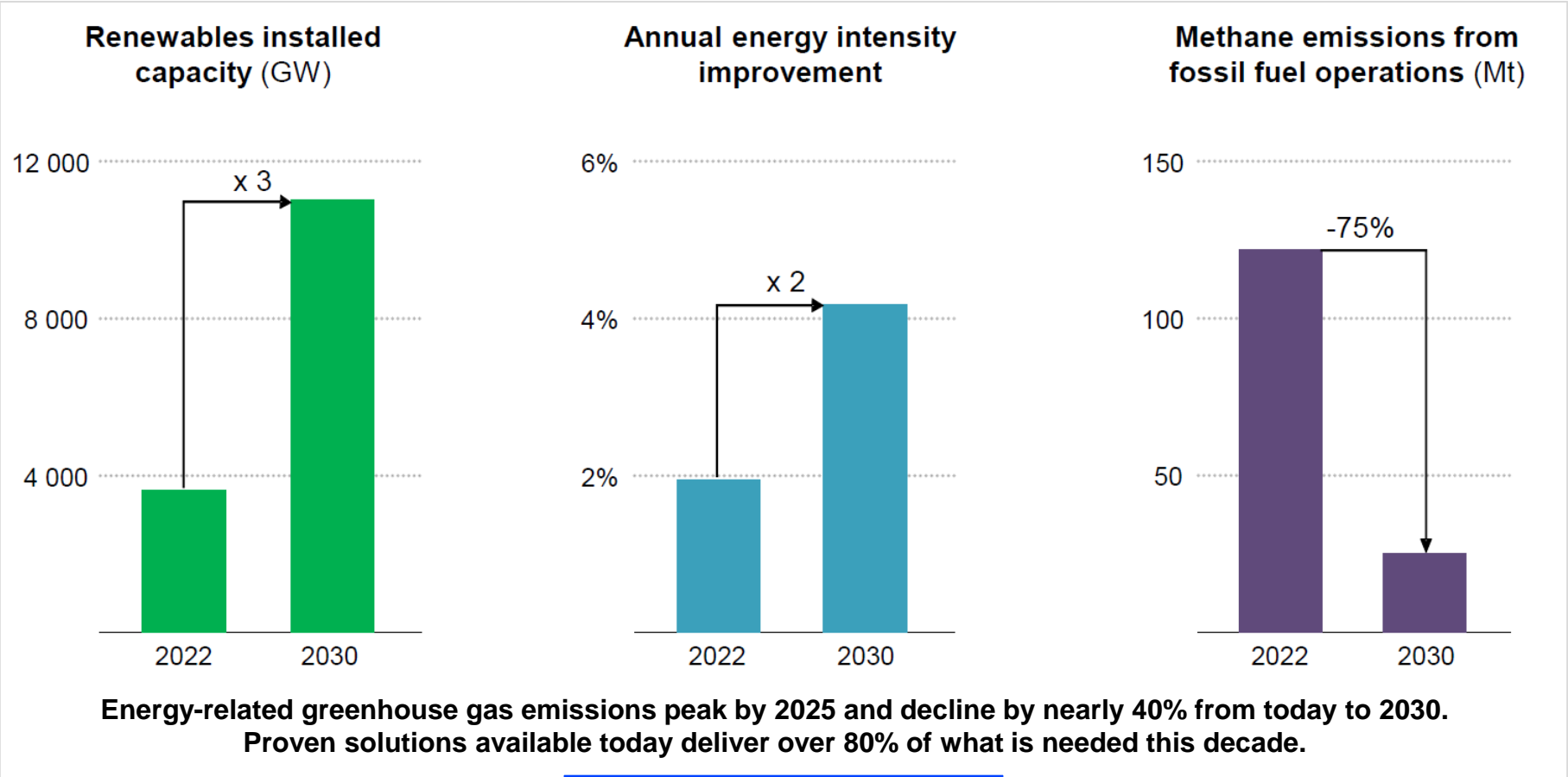
Peak fossil fuel demand is coming this decade

Fossil fuel demand in the Stated Policies Scenario, 1900-2050



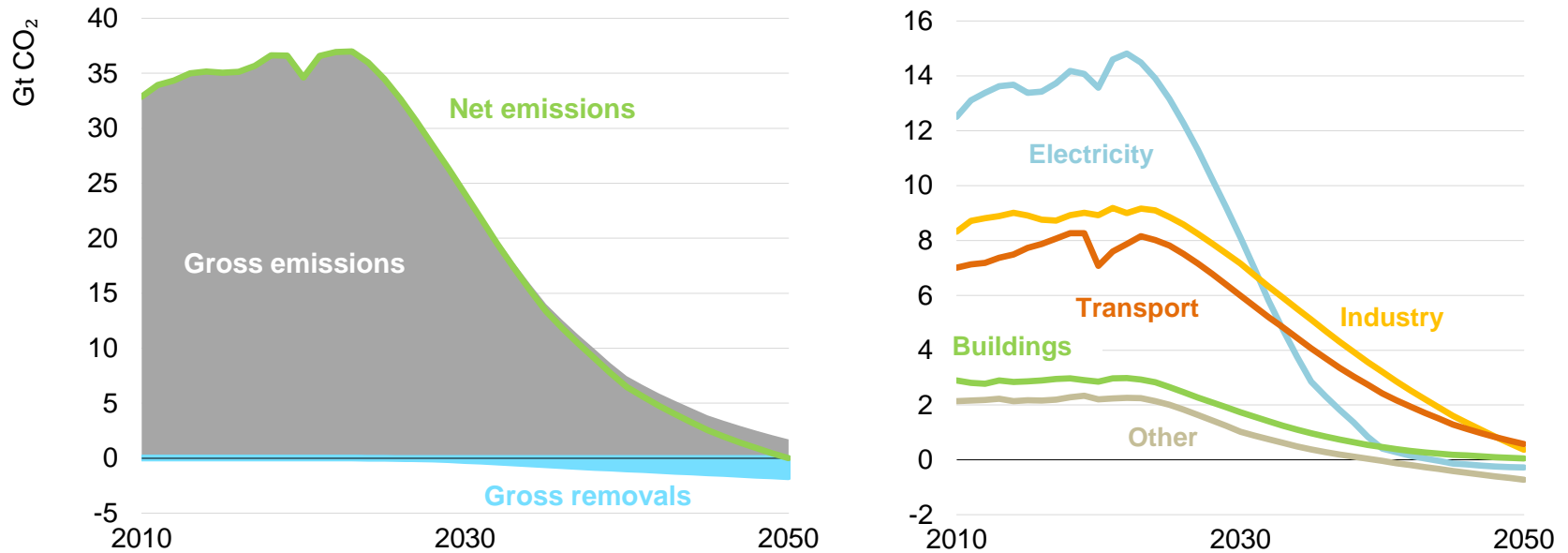
Today's policy settings are now sufficiently strong that they produce a distinct peak in fossil fuel use before 2030

Keeping the door open to net zero emissions by 2050



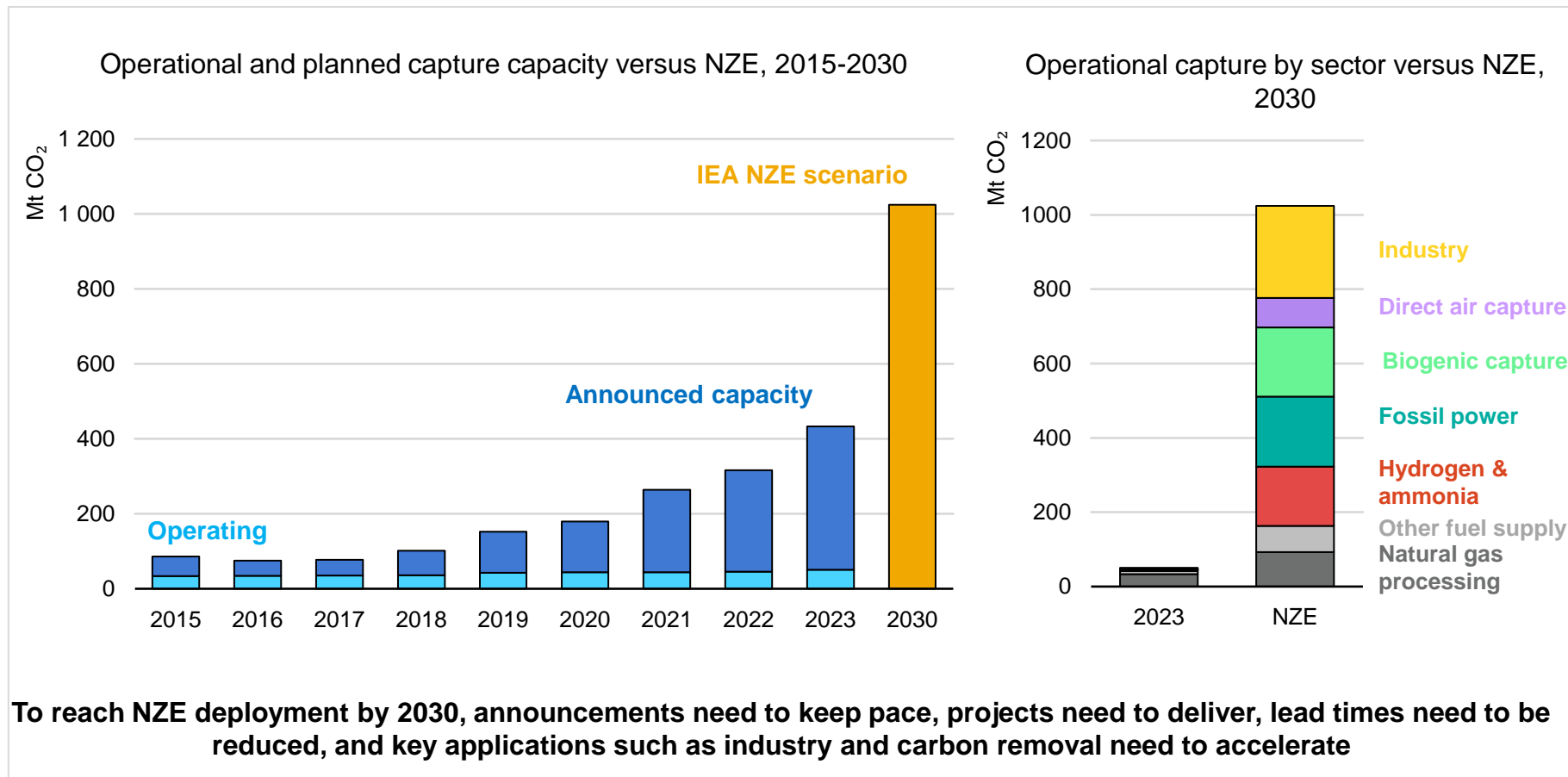
A roadmap to net zero by 2050

Energy sector gross emissions and removals, total net CO₂ emissions, and net emissions by sector in the NZE Scenario, 2010-2050



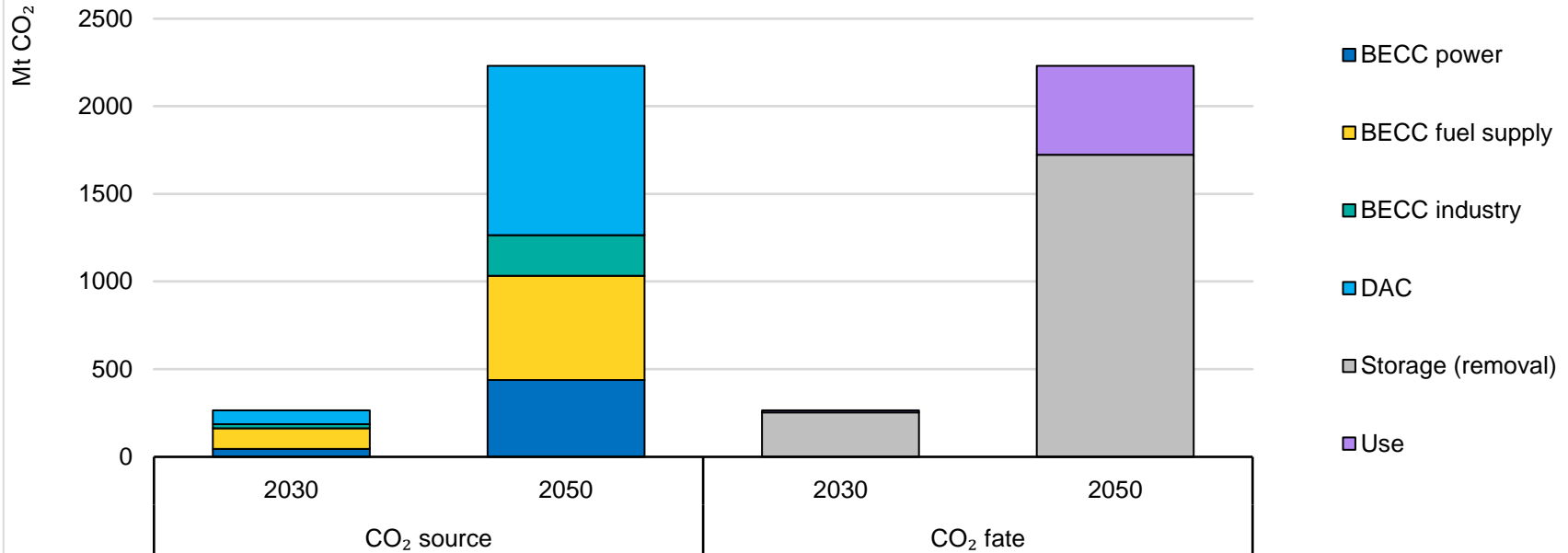
Energy sector CO₂ emissions are reduced 65% by 2035 and reach net zero by 2050, with residual emissions of 1.7 Gt balanced by atmospheric removals of the same magnitude

Flat deployment but a growing momentum in CCUS



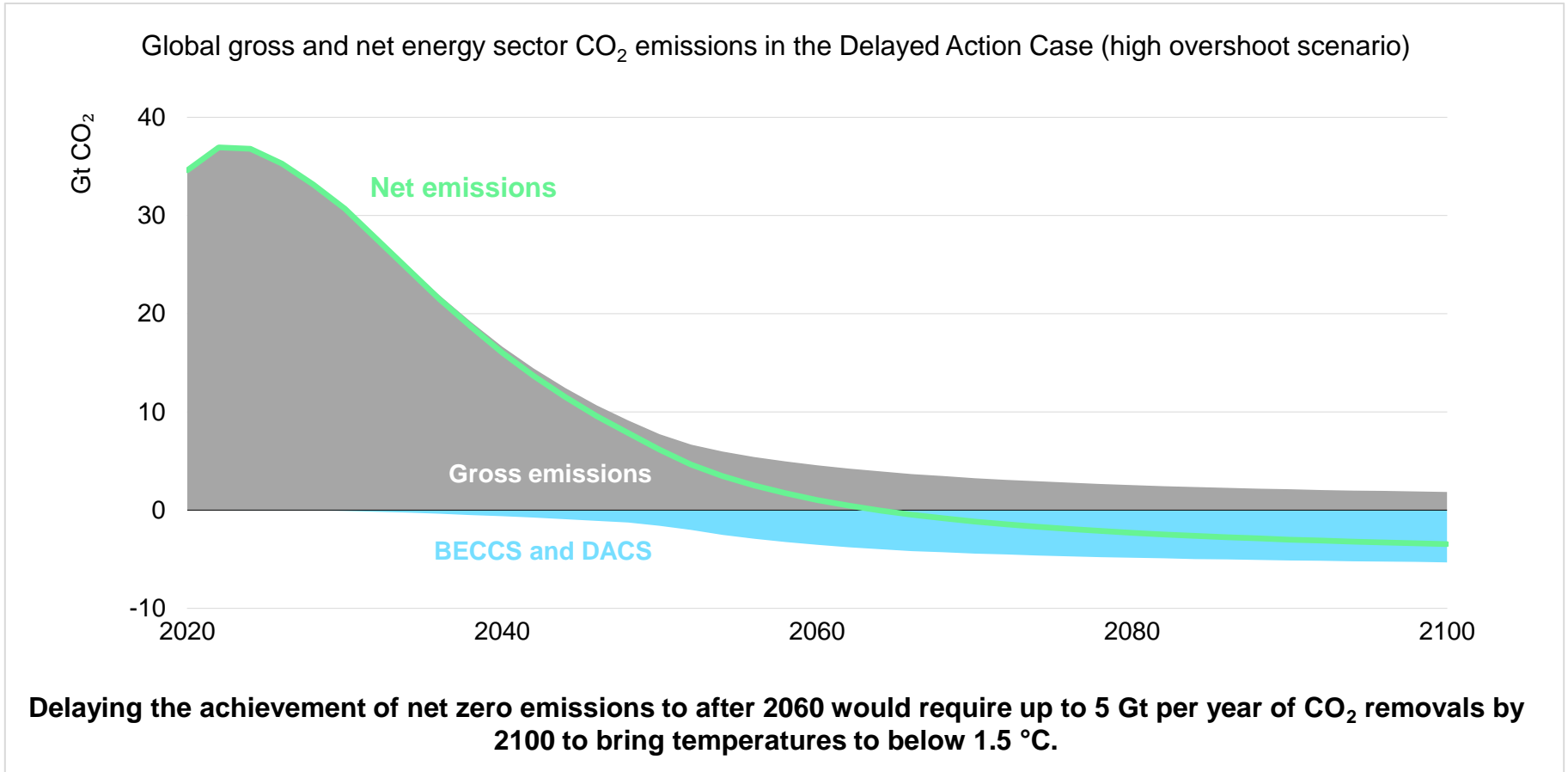
The role of CO₂ removal

Source and fate of CO₂ captured from biogenic applications and from the air in the NZE, 2050



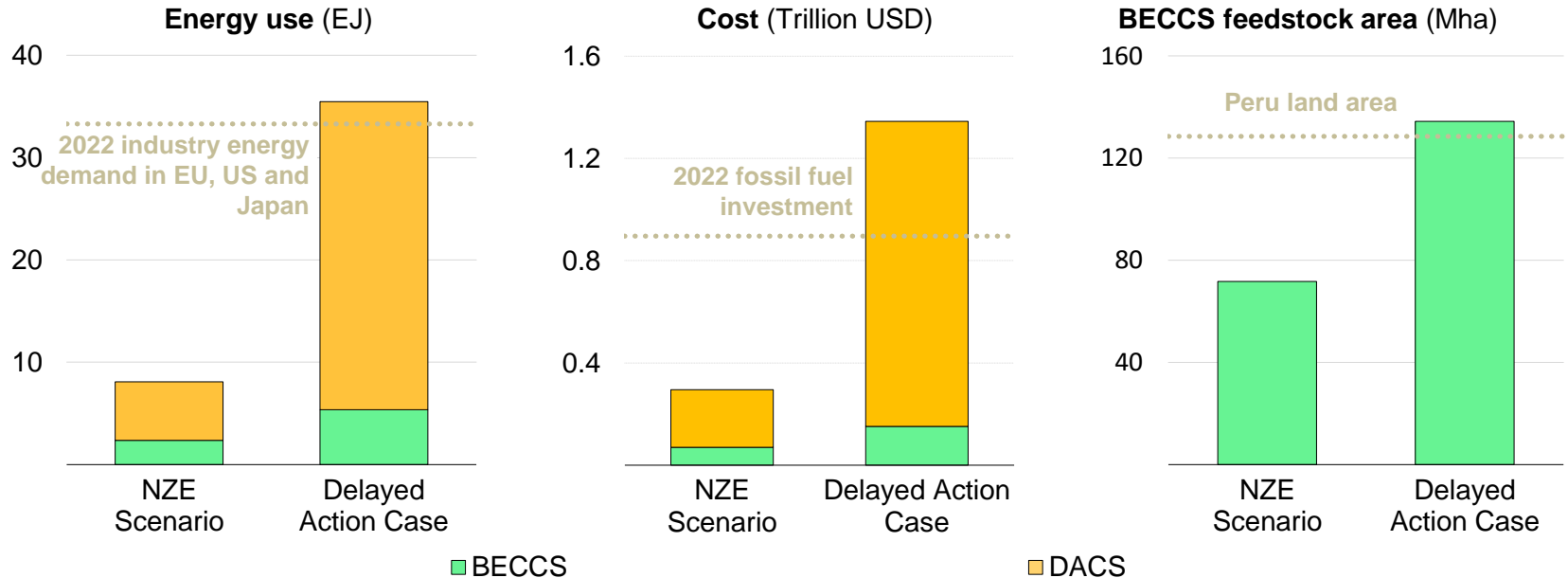
By 2050, 2.2 Gt CO₂ is captured from biogenic sources and from the air by 2050. Around 75% is permanently stored to provide removal (1.7 Gt), and the remainder is used as carbon-neutral feedstock for low-emission synthetic fuels.

What happens if mitigation is delayed?



What happens if mitigation is delayed?

Global annual energy use, annual carbon removal costs and land requirements for carbon removal technologies in the Delayed Action Case, 2100



Heavier reliance on Carbon Dioxide Removal in the Delayed Action Case would have important implications for energy use, economic costs and resource use

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