



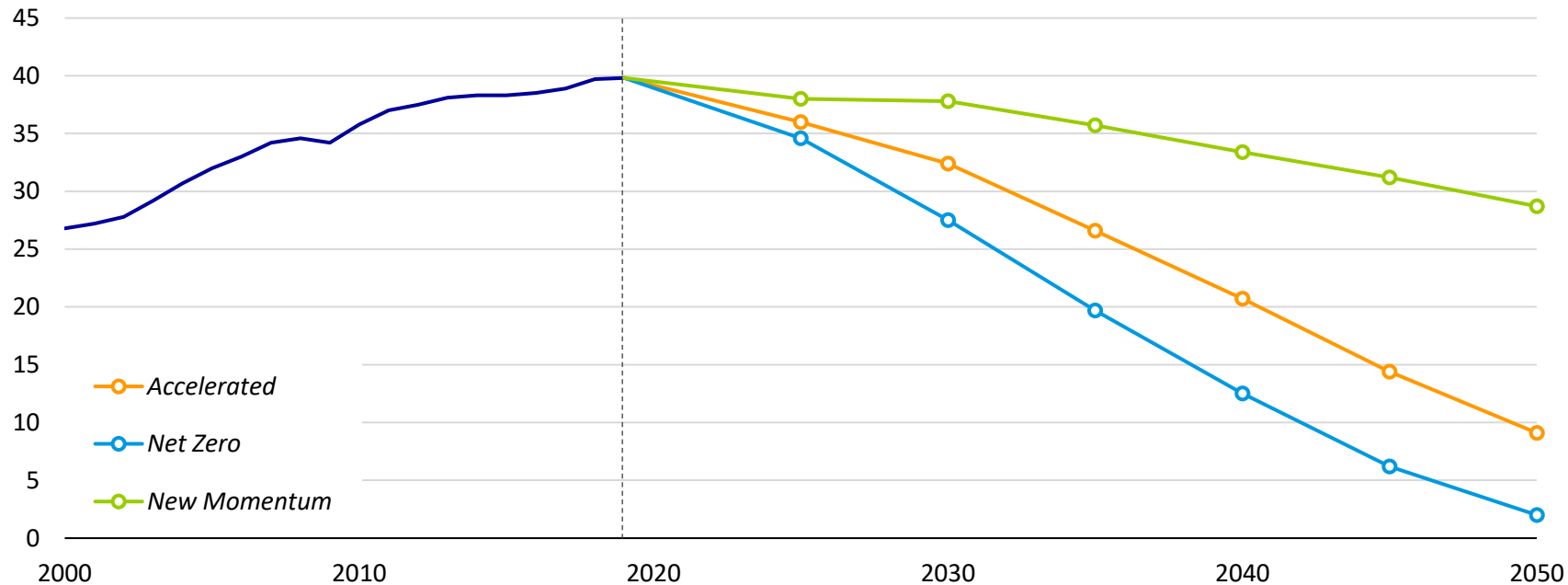
bp Energy Outlook
2023 edition

Gareth Ramsay
Head of the Energy Transition
and System Analysis

Three scenarios to explore the energy transition

Global carbon emissions

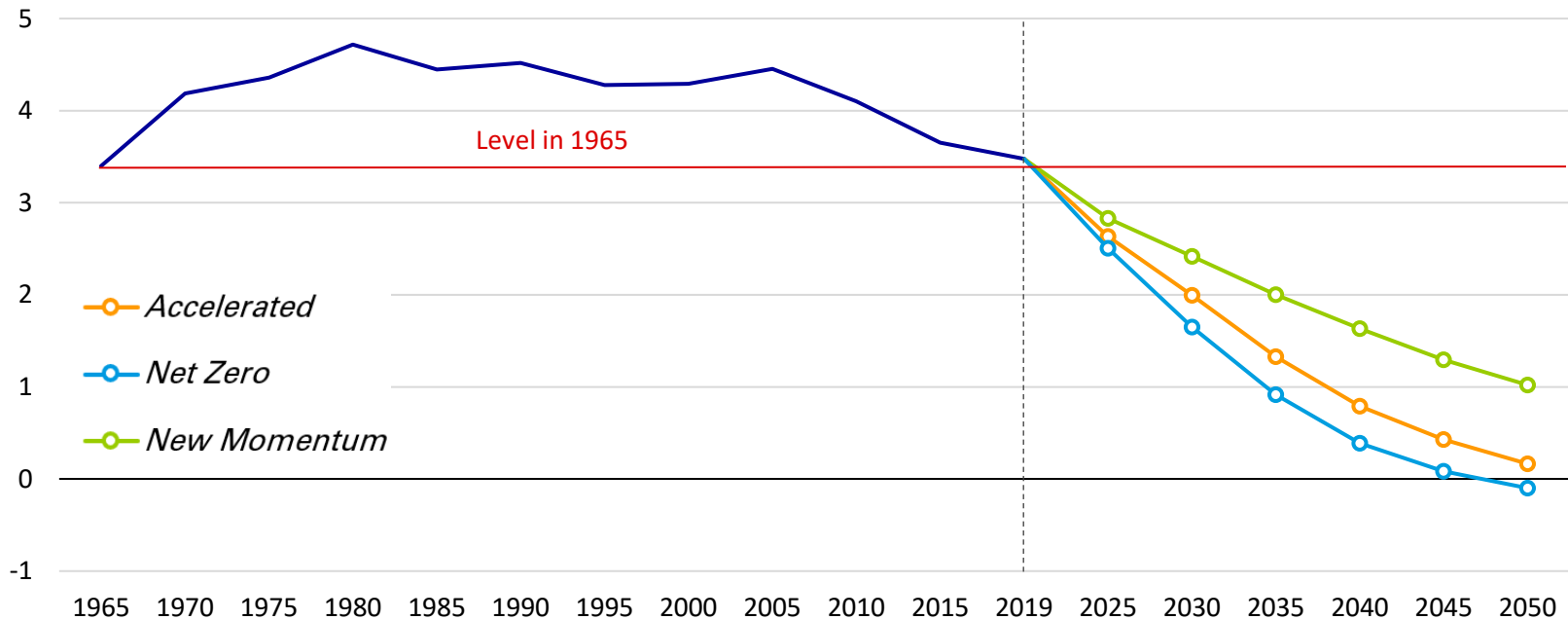
Gt of CO₂e



Three scenarios to explore the energy transition in Europe

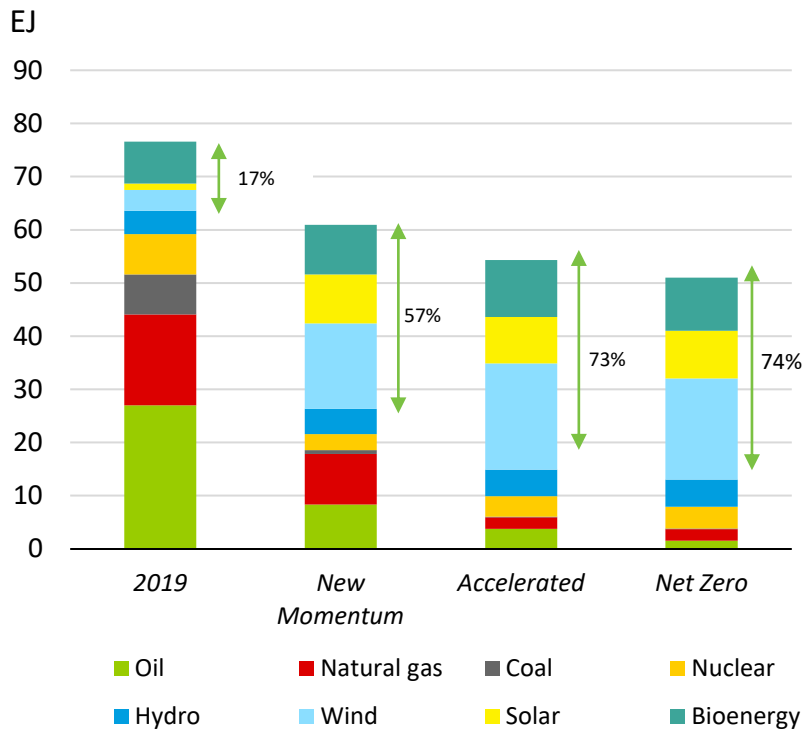
European carbon emissions

Gt of CO₂e

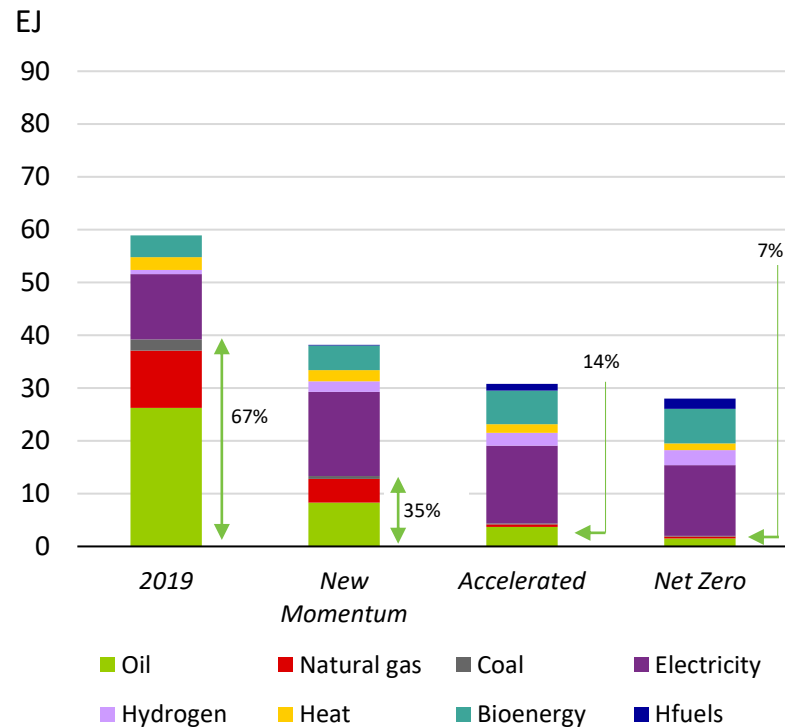


Shift towards a very different mix in primary energy and final demand

Primary energy by source in 2050



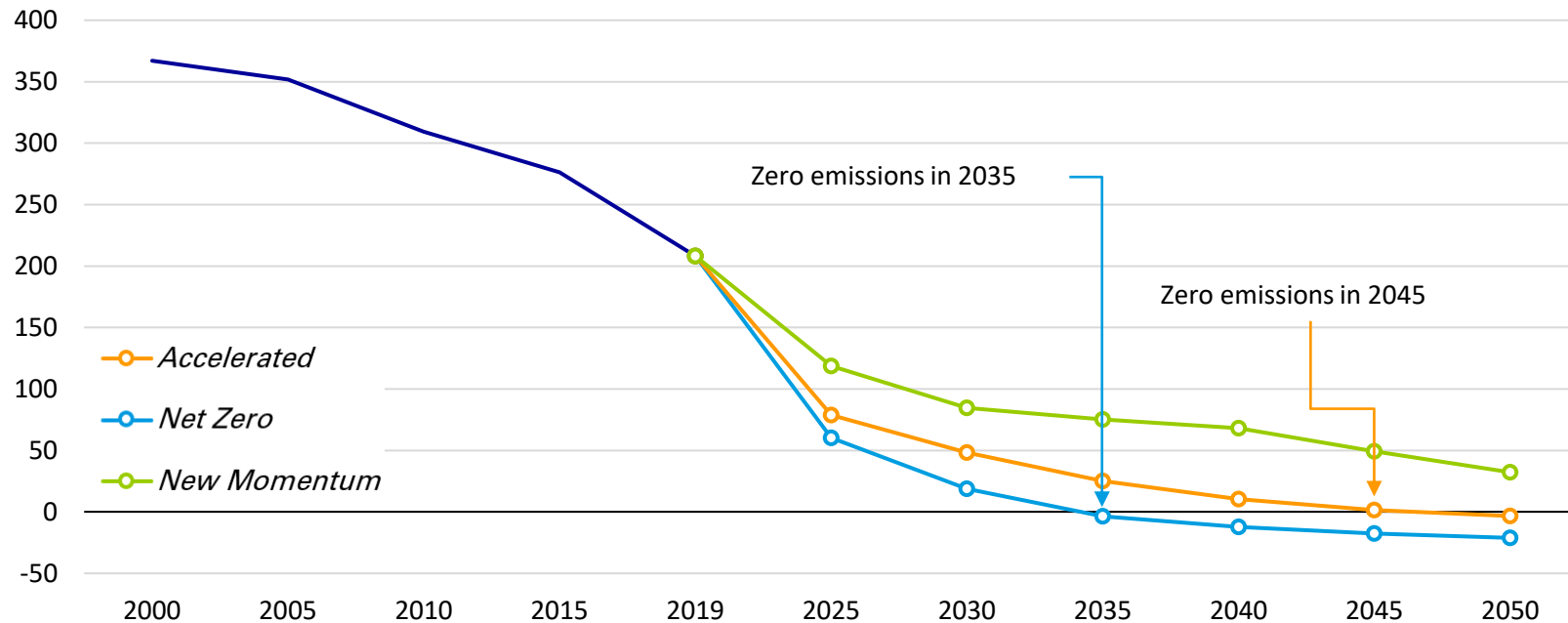
Total final consumption by source in 2050



Power sector decarbonizes rapidly in all scenarios

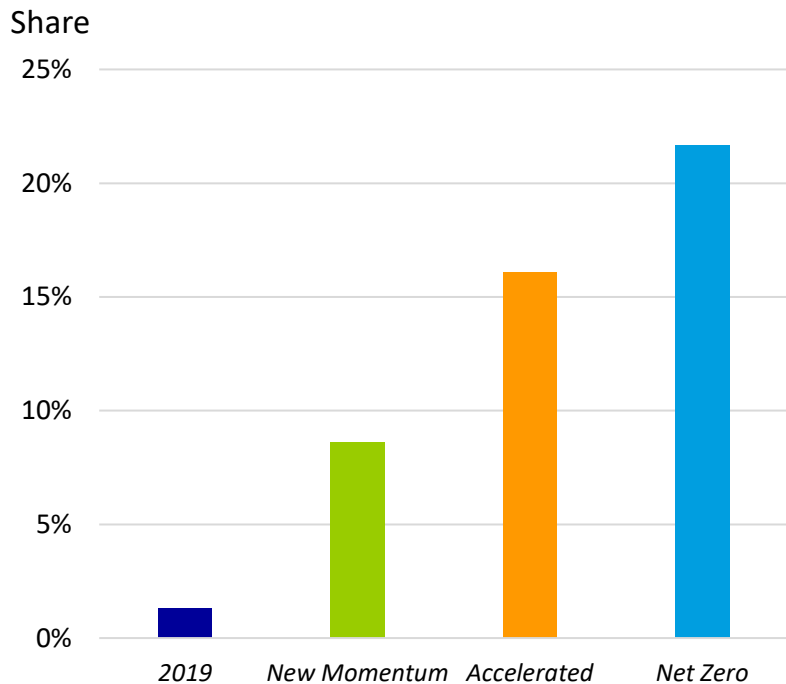
Emissions from the power sector

Gr/kWh

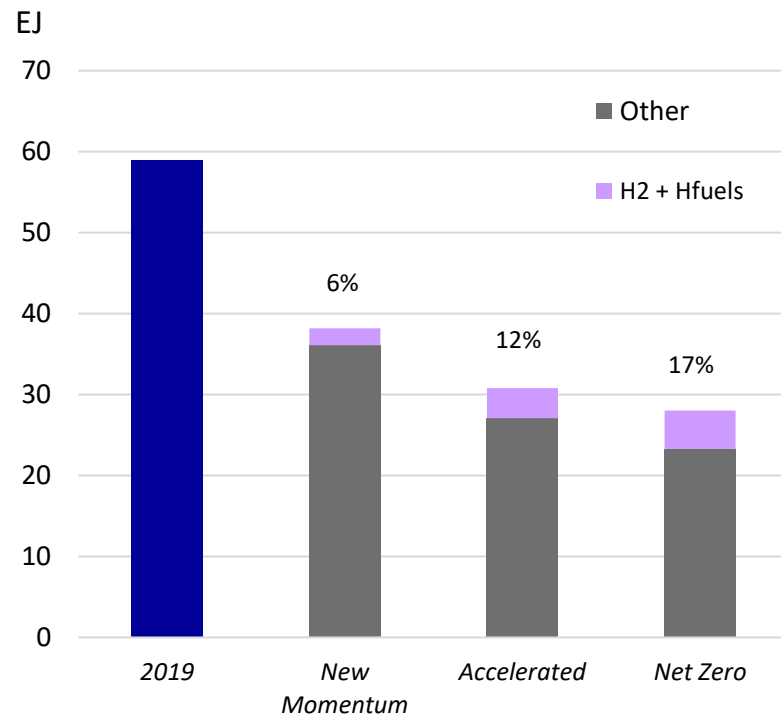


Low carbon hydrogen grows rapidly

Primary energy devoted to hydrogen production in 2050



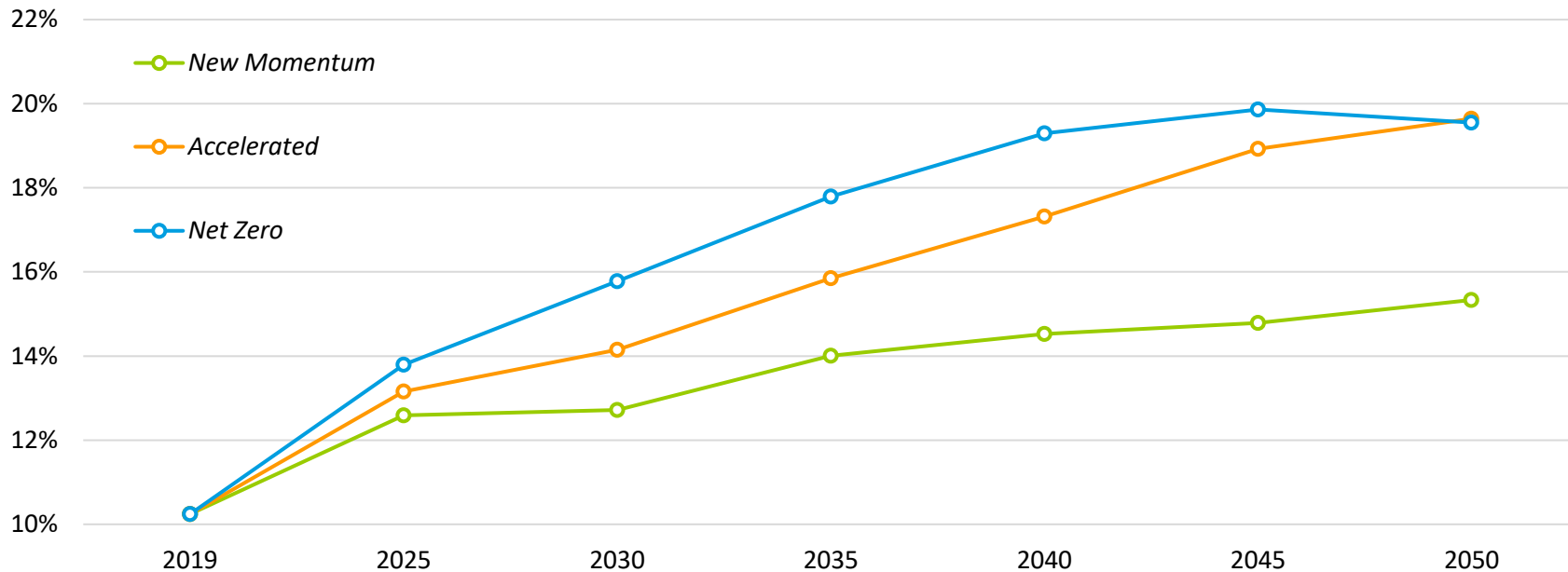
Total final energy consumption in 2050



Bioenergy grows in all three scenarios

Penetration of bioenergy demand

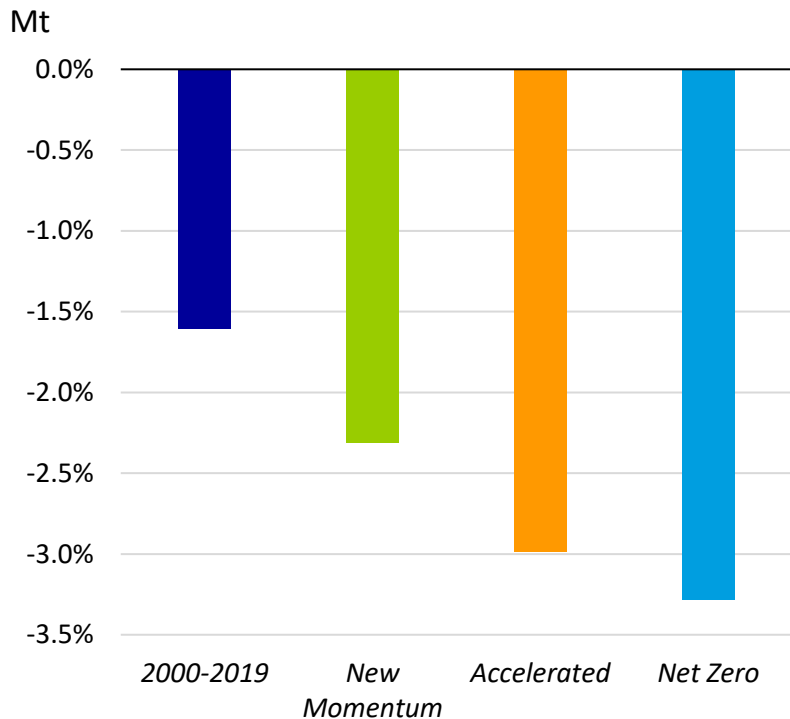
Share of total primary energy



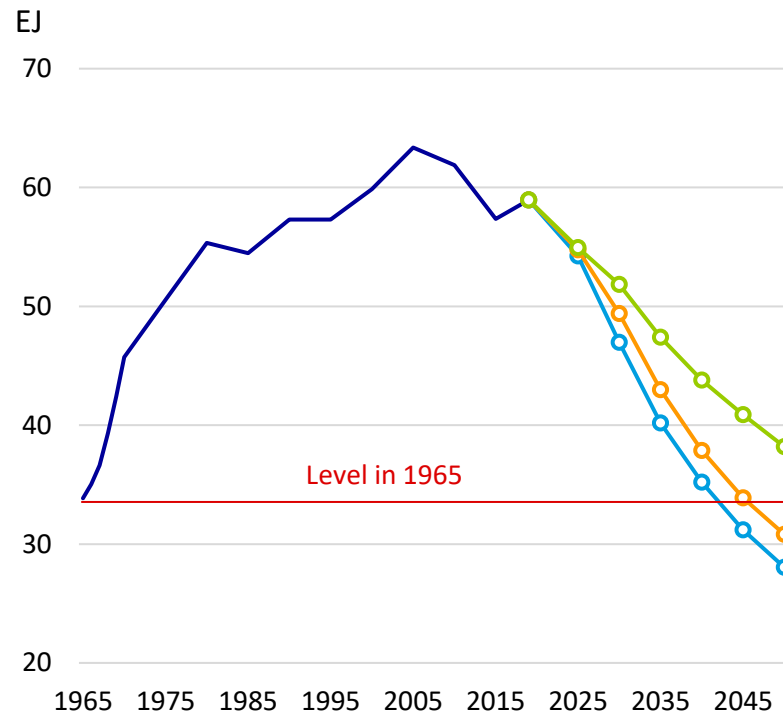


Energy efficiency accelerates

Average annual change in energy intensity



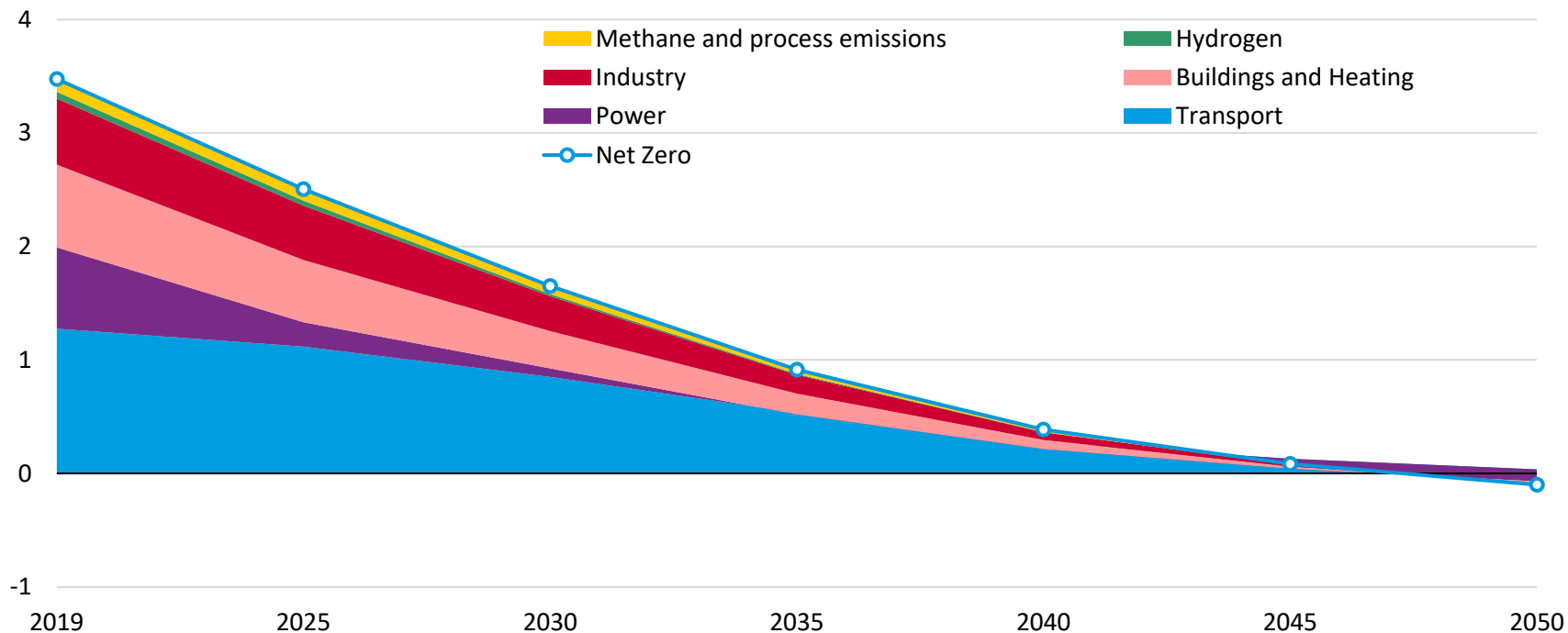
Total final consumption



Roadmap to *Net Zero* carbon emissions

European carbon emissions

Gt of CO₂e



A large graphic element on the left side of the slide, shaped like a stylized 'C' or a partial circle. It is composed of four distinct aerial photographs: the top-left shows a solar farm with rows of panels; the top-right shows an offshore oil rig in the blue ocean; the bottom-left shows a green agricultural field with a tractor; and the bottom-right shows a large cargo ship sailing on the water.

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