

Global Warming of 1.5°C

An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.

System Transformations for Global Warming of 1.5°C

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Emissions: Where are we now?

- Global emissions outcome of current nationally stated mitigation ambitions as submitted under the Paris Agreement would lead to global greenhouse gas emissions in **2030 of 52–58 GtCO₂eq yr⁻¹**.
- Pathways reflecting these ambitions would not limit global warming to 1.5°C, even if supplemented by very challenging increases in the scale and ambition of emissions reductions after 2030.

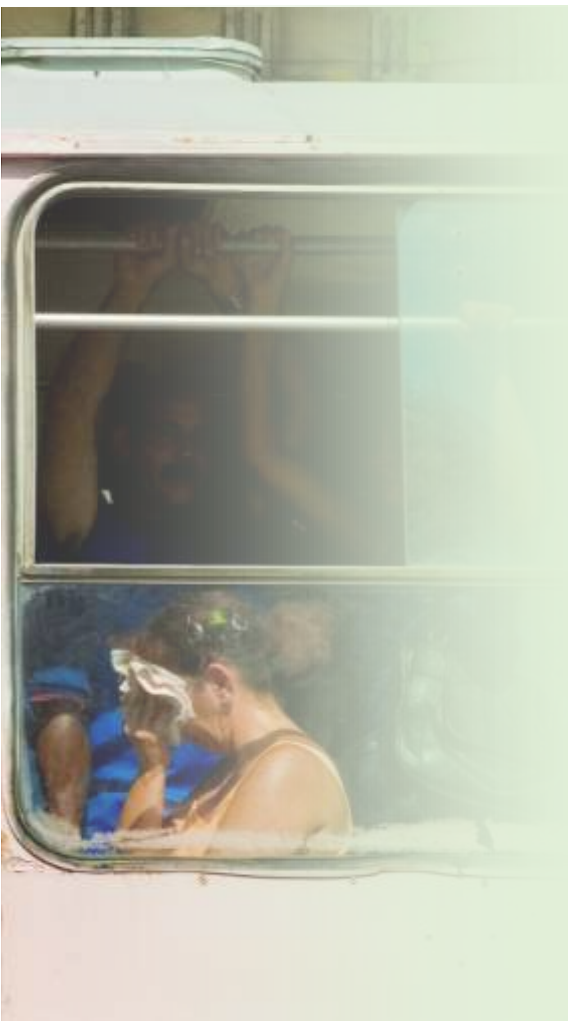
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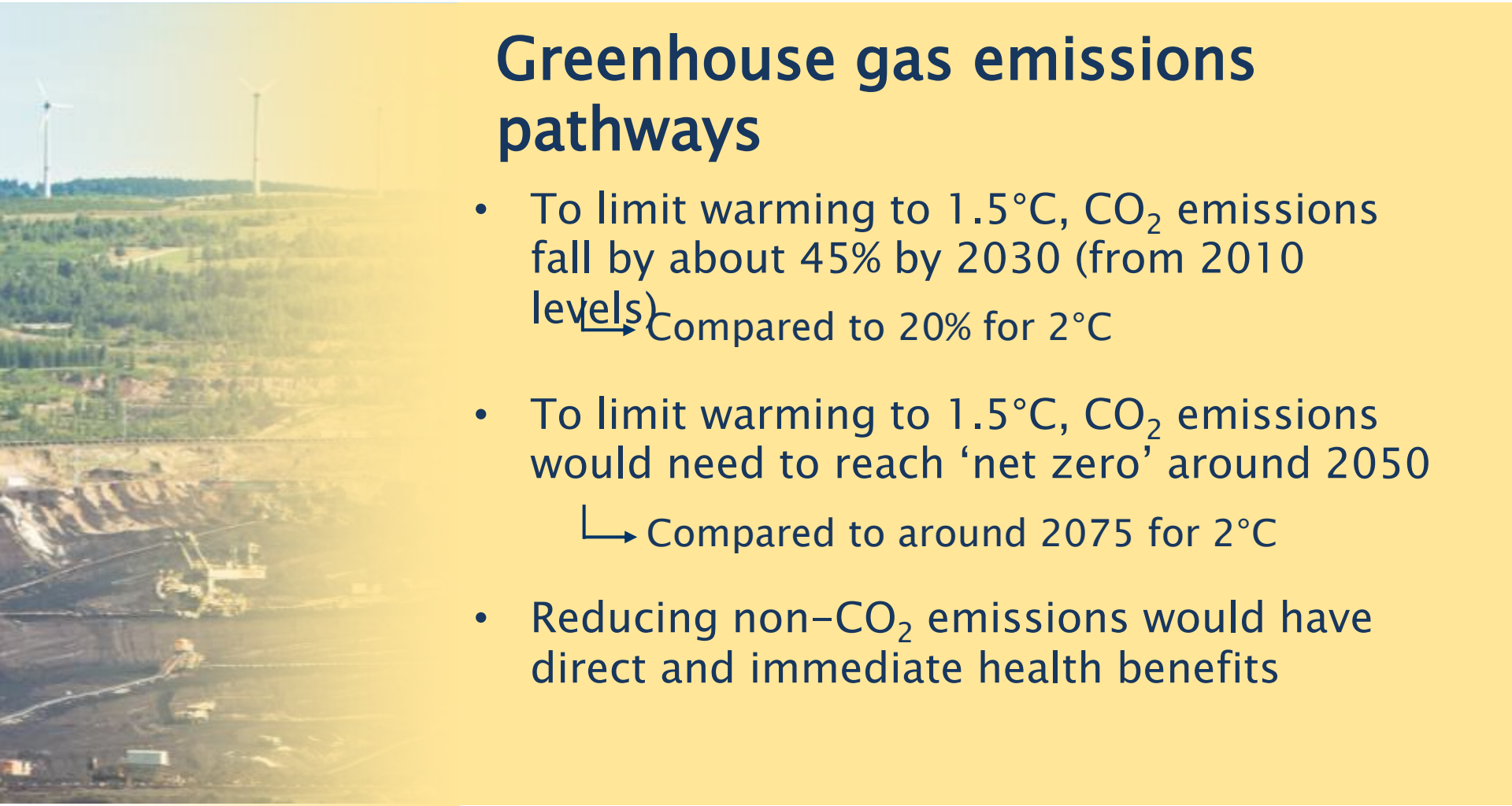
Impacts of global warming 1.5°C

At 1.5°C compared to 2°C:

- Less extreme weather where people live, including extreme heat and rainfall
- Lower impact on biodiversity and species
- By 2100, global mean sea level rise will be around 10 cm lower but may continue to rise for centuries
- Global population exposed to increased water shortages is up to 50% less




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Greenhouse gas emissions pathways

- To limit warming to 1.5°C, CO₂ emissions fall by about 45% by 2030 (from 2010 levels)
 - ↳ Compared to 20% for 2°C
- To limit warming to 1.5°C, CO₂ emissions would need to reach 'net zero' around 2050
 - ↳ Compared to around 2075 for 2°C
- Reducing non-CO₂ emissions would have direct and immediate health benefits



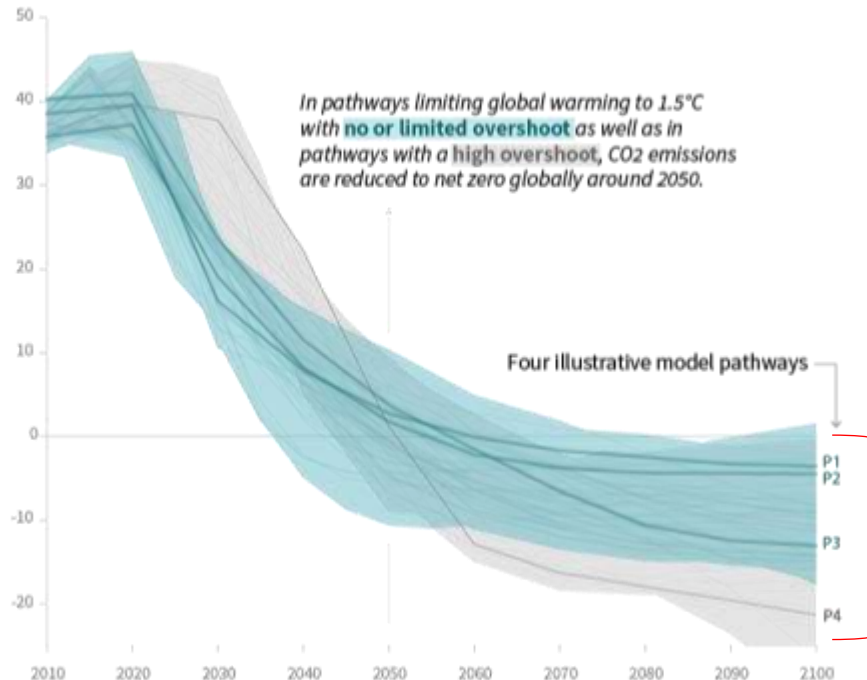
Greenhouse gas emissions pathways

- Limiting warming to 1.5°C would require changes on an unprecedented scale
 - Deep emissions cuts in all sectors
 - A range of technologies (e.g. Renewables)
 - Behavioural changes
 - Increased investment in low carbon options

SPM3a | Global emissions pathway characteristics

Global total net CO₂ emissions

Billion tonnes of CO₂/yr



Timing of net zero CO₂

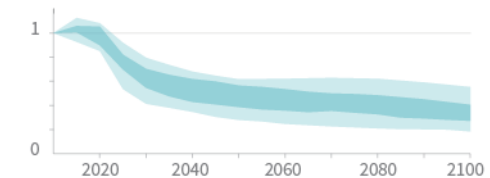
Line widths depict the 5-95th percentile and the 25-75th percentile of scenarios



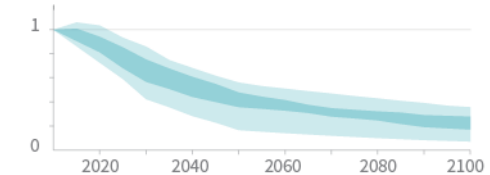
Non-CO₂ emissions relative to 2010

Emissions of non-CO₂ forcers are also reduced or limited in pathways limiting global warming to 1.5°C with **no or limited overshoot**, but they do not reach zero globally.

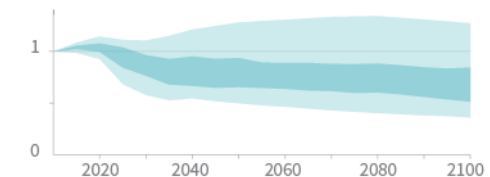
Methane emissions



Black carbon emissions



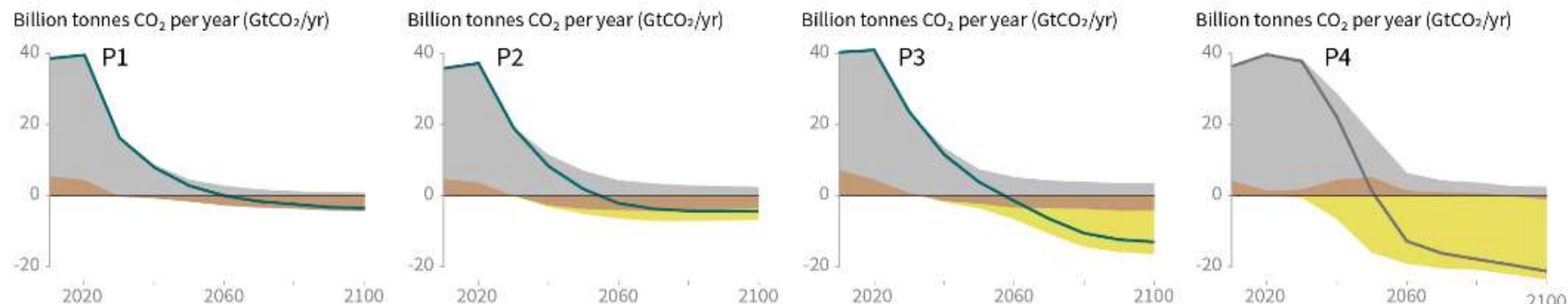
Nitrous oxide emissions



SPM3b | Characteristics of four illustrative model pathways

Breakdown of contributions to global net CO₂ emissions in four illustrative model pathways

● Fossil fuel and industry ● AFOLU ● BECCS



P1: A scenario in which social, business and technological innovations result in lower energy demand up to 2050 while living standards rise, especially in the global South. A downsized energy system enables rapid decarbonization of energy supply. Afforestation is the only CDR option considered; neither fossil fuels with CCS nor BECCS are used.

P2: A scenario with a broad focus on sustainability including energy intensity, human development, economic convergence and international cooperation, as well as shifts towards sustainable and healthy consumption patterns, low-carbon technology innovation, and well-managed land systems with limited societal acceptability for BECCS.

P3: A middle-of-the-road scenario in which societal as well as technological development follows historical patterns. Emissions reductions are mainly achieved by changing the way in which energy and products are produced, and to a lesser degree by reductions in demand.

P4: A resource- and energy-intensive scenario in which economic growth and globalization lead to widespread adoption of greenhouse-gas-intensive lifestyles, including high demand for transportation fuels and livestock products. Emissions reductions are mainly achieved through technological means, making strong use of CDR through the deployment of BECCS.



System transitions consistent with 1.5°C warming


“Rapid, far-reaching and unprecedented changes in all systems....”

- A range of technologies and behavioural changes
- Deep emissions cuts in transport and buildings
- Transitions in global and regional land use
- Urban and infrastructure system transitions imply changes in land and urban planning practices
- All pathways that limit global warming to 1.5°C with limited or no overshoot use Carbon Dioxide Removal (CDR)

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Climate change and people

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- Close links to United Nations Sustainable Development Goals (SDGs)
 - Mix of measures to adapt to climate change and reduce emissions can have benefits for SDGs
 - National and sub-national authorities, civil society, the private sector, indigenous peoples and local communities can support ambitious action
 - International cooperation is a critical part of limiting warming to 1.5°C

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THANK YOU FOR YOUR ATTENTION!

For more information:

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INTERGOVERNMENTAL PANEL ON climate change

