The IPCC Special Report on Global Warming of 1.5°C – and a bit more

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ENVIRONMENT IRELAND CONFERENCE
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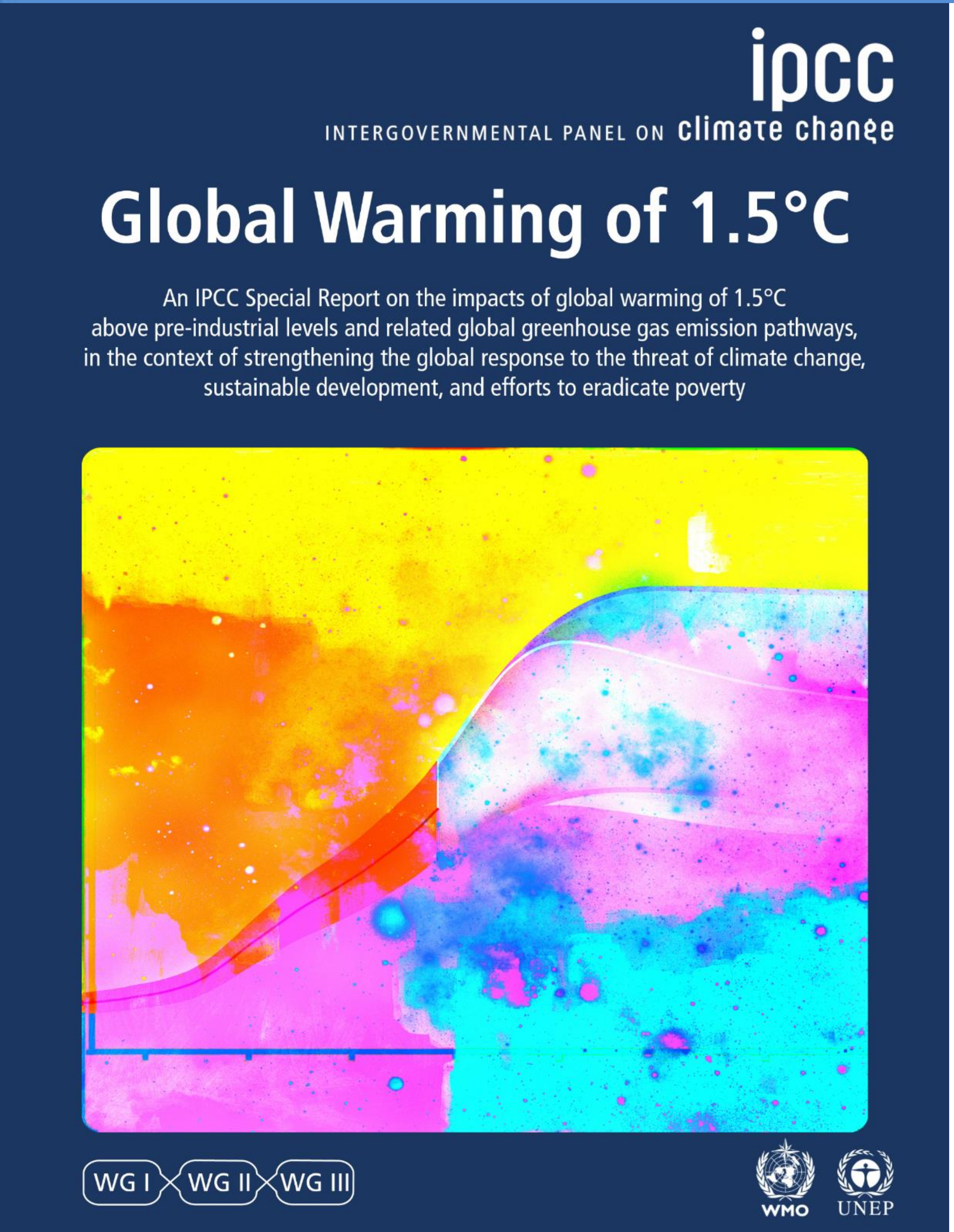

The Conference of the Parties *invites* the Intergovernmental Panel on Climate Change to provide a special report in 2018 on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways

Paris Agreement

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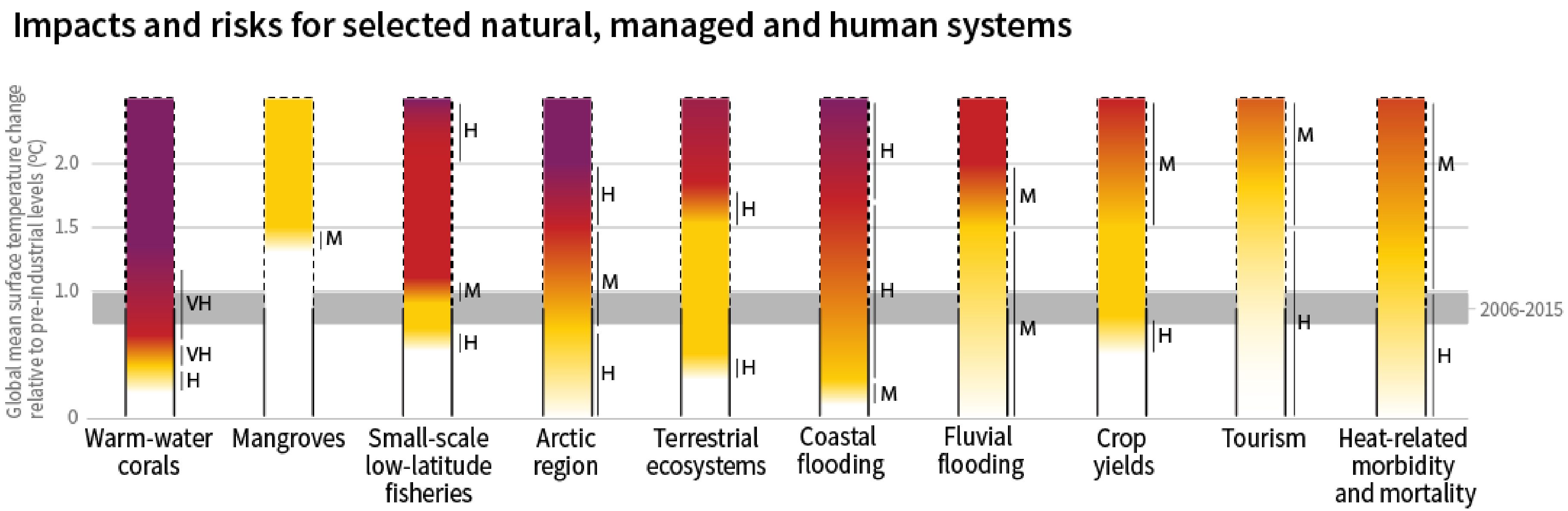
Impacts of Global Warming of 1.5°C

How the level of global warming affects impacts and/or risks associated with the Reasons for Concern (RFCs) and selected natural, managed and human systems



Confidence level for transition: L=Low, M=Medium, H=High and VH=Very high

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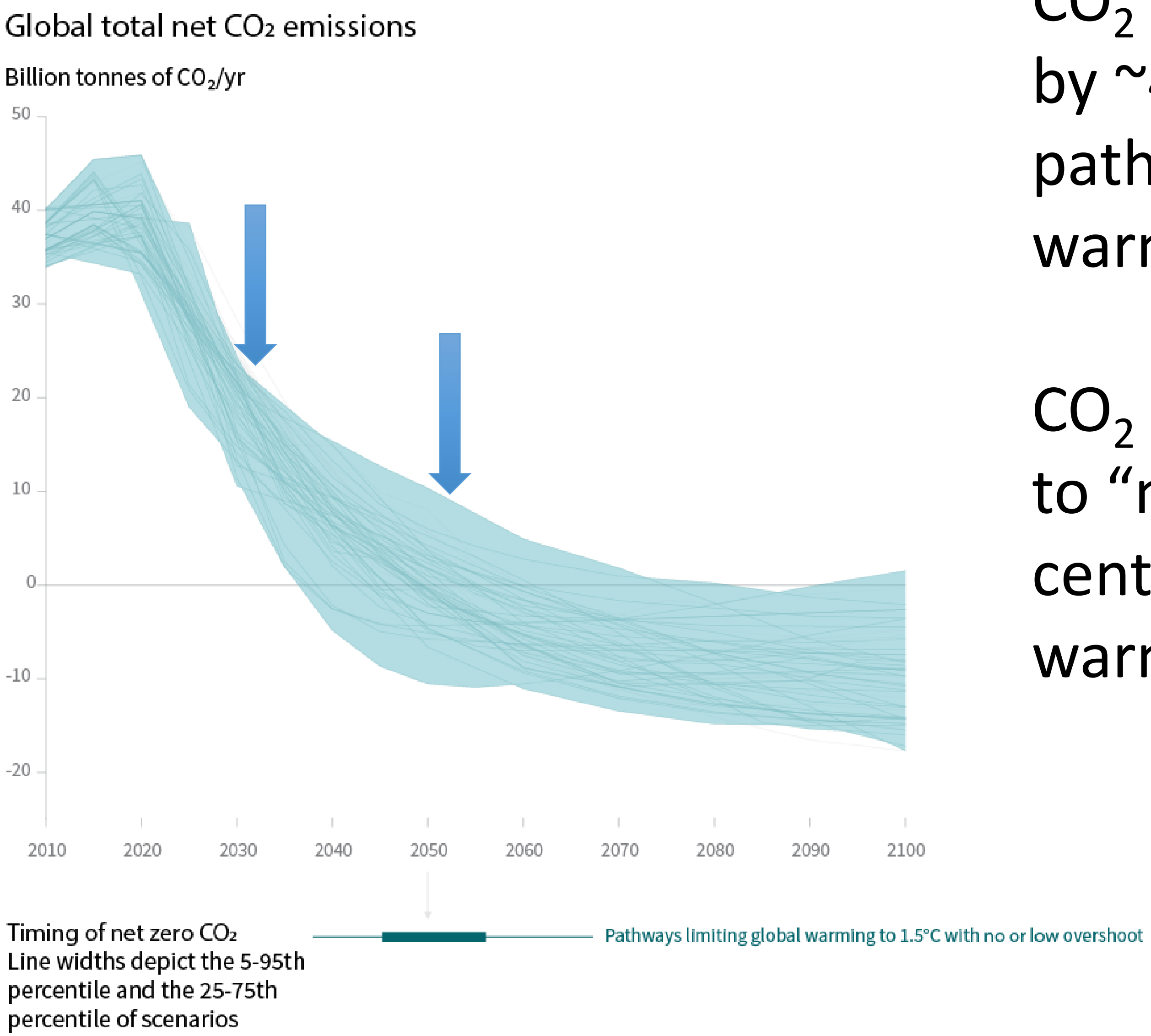
Emission Pathways and System Transitions Consistent with 1.5°C Global Warming



CO_2 emissions need to fall by ~45% by 2030 on the path to limiting global warming by 1.5 °C;

CO_2 emissions need to fall to “net zero” by mid-century to limit global warming to 1.5 °C

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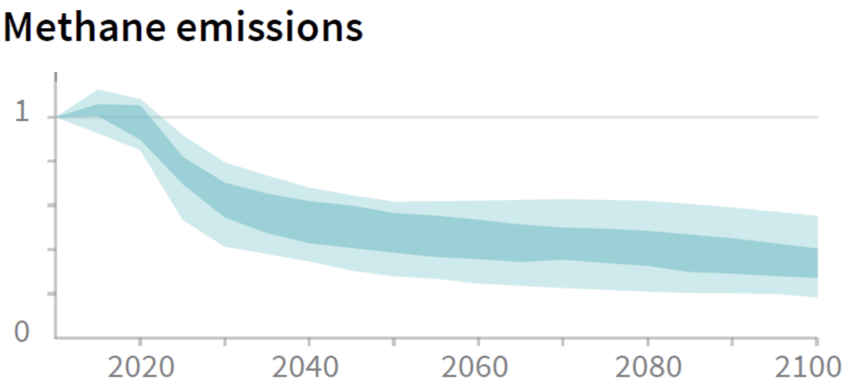
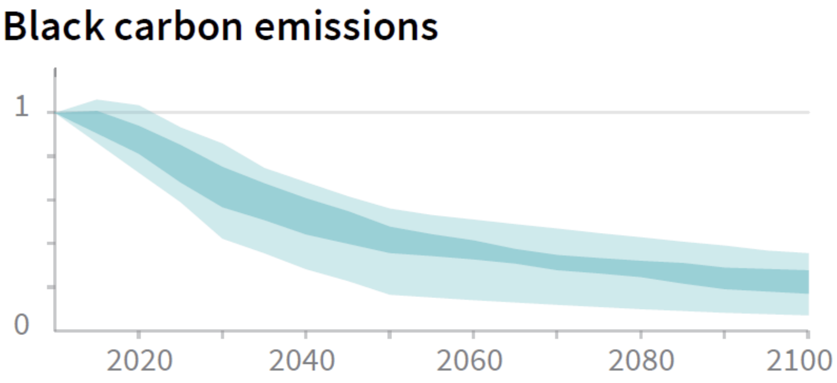
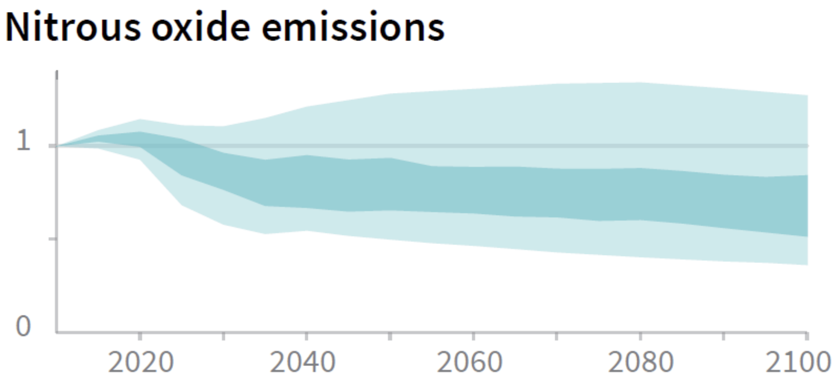
Emissions of other climate forcers also need to fall, but not to zero

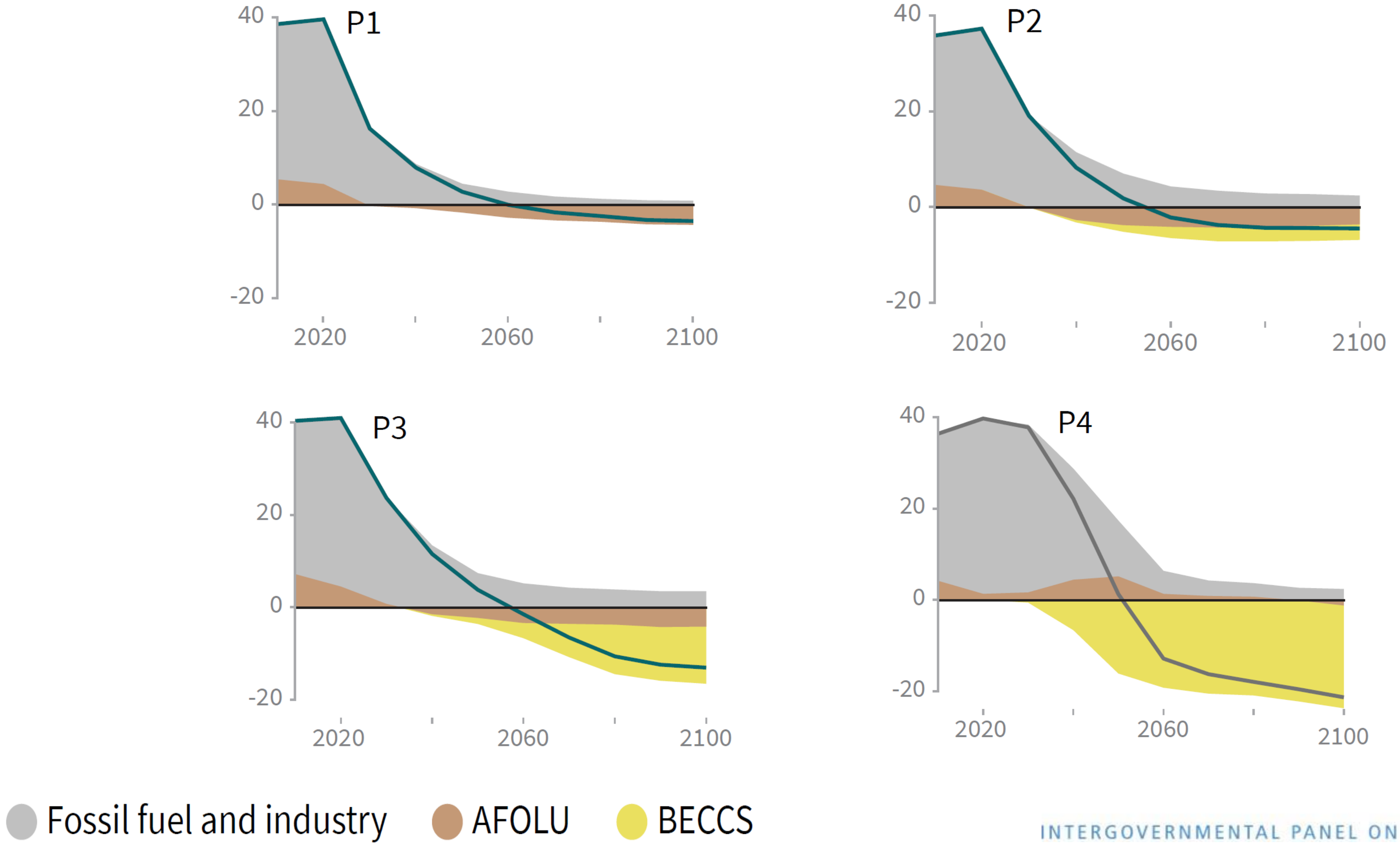
Emissions of non-CO_2 forcers are also reduced or limited in pathways limiting global warming to 1.5°C with **no or limited overshoot**, but they do not reach zero globally.







Different pathways and mitigation strategies could limit global warming to 1.5°C



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Strengthening the Global Response in the Context of Sustainable Development and Efforts to Eradicate Poverty

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Limiting warming to 1.5°C

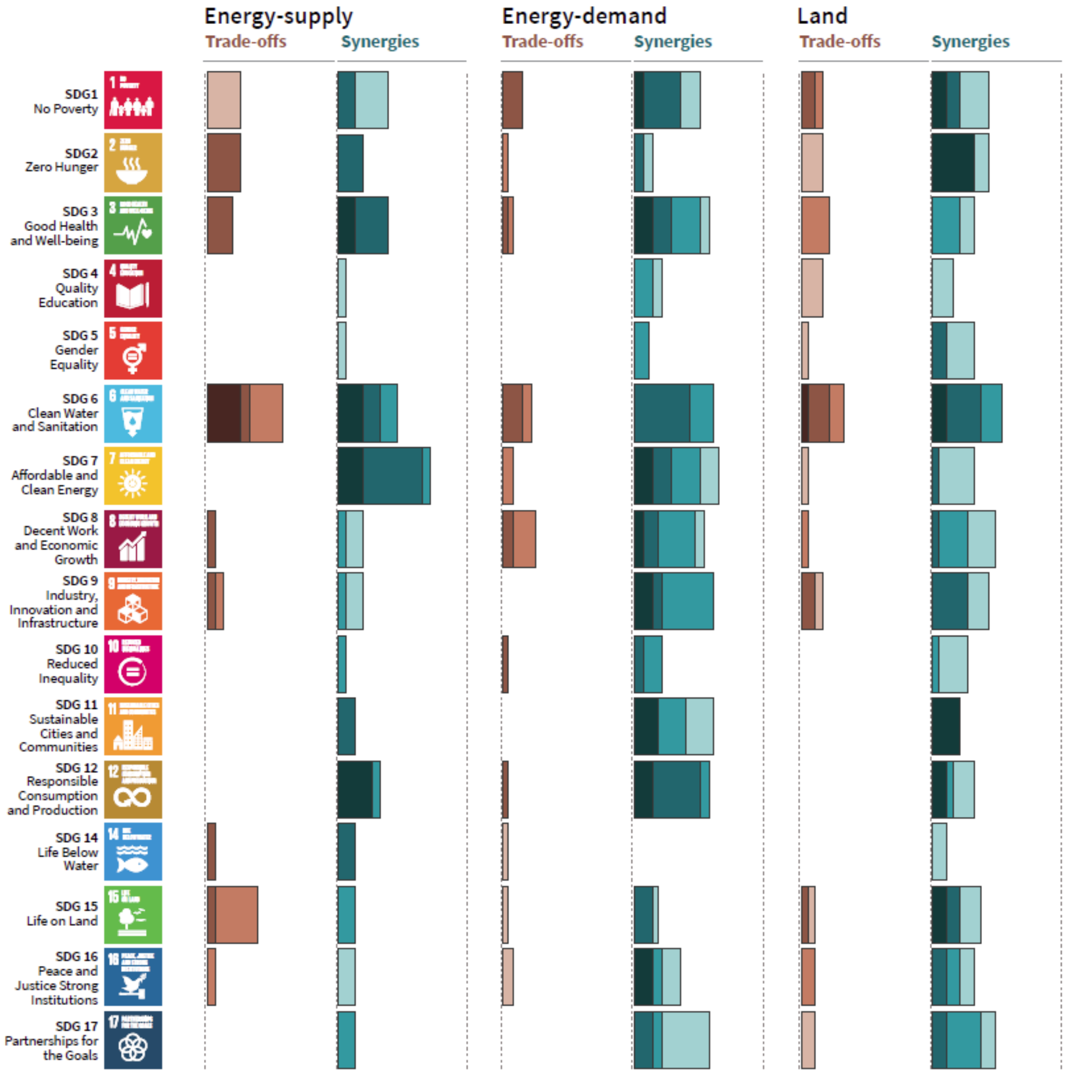
Would require rapid, far-reaching and unprecedented changes in all systems

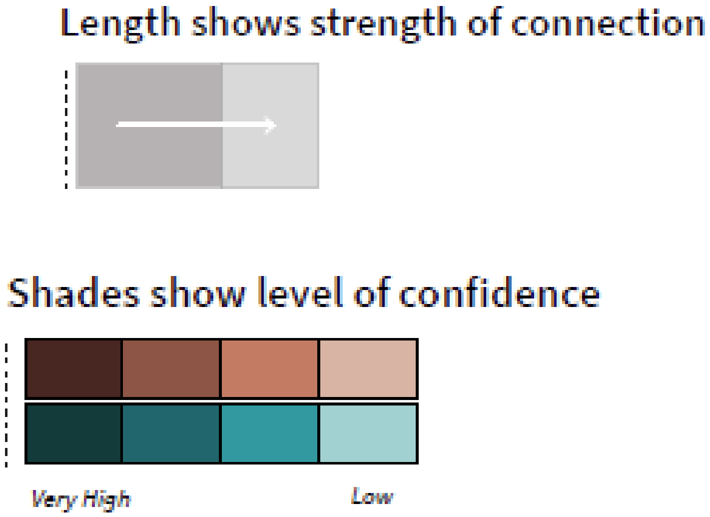
- A range of technologies and behavioural changes
- Scale up in annual investment in low carbon energy and energy efficiency by factor of five by 2050
- Renewables supply 70-85% of electricity in 2050
- Coal declines steeply, ~zero in electricity by 2050
- Oil and especially gas persist longer – gas use rises by 2050 in some pathways
- Deep emissions cuts in transport and buildings
- Changes in land use and urban planning

Carbon Dioxide Removal (CDR)

- All pathways that limit global warming to 1.5 °C with limited or no overshoot use CDR
- Used to compensate for residual emissions and in most cases achieve 'net negative' emissions
- The larger and longer the overshoot, the greater the reliance on CDR later in the century
- BECCS (bioenergy with carbon capture and storage) features in most scenarios but is avoided in a few
- Implications for land, food and water security, ecosystems and biodiversity

Synergies and trade-offs with the UN Sustainable Development Goals





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CLIMATE CHANGE AND LAND

An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems.

REPORT COVER IMAGE:
Agricultural landscape between Ankara and Hattusha, Anatolia, Turkey (40°00' N – 33°35' E)
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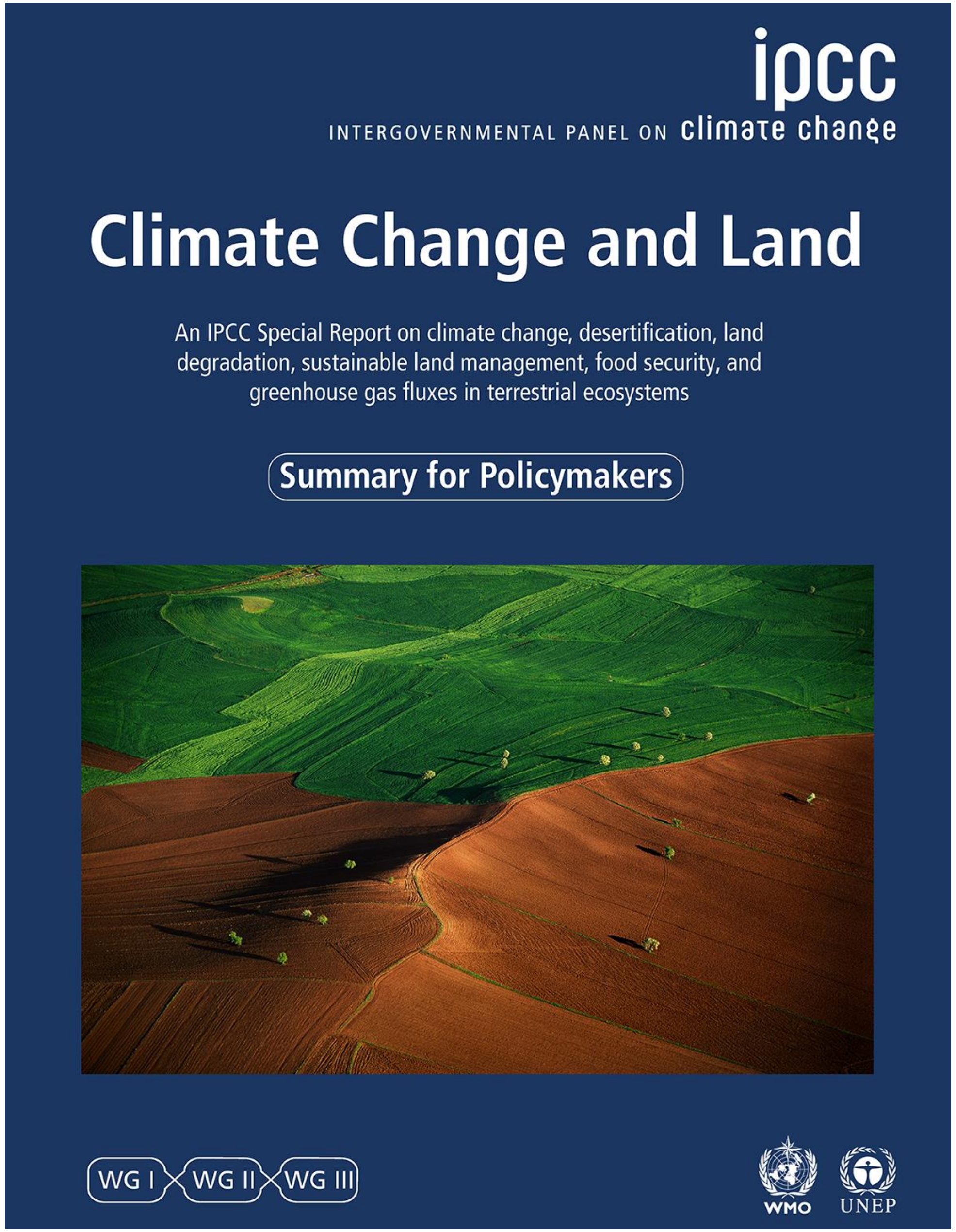

Land and the climate

- Gross emissions from agriculture, forestry and land use (AFOLU) make up **1/3 of total global emissions**.
- Land accounts for **44% of net anthropogenic methane** emissions.
- Grazing lands are responsible for more than one-third of total anthropogenic nitrous oxide emissions and one-half of agricultural emissions.
- Changes in land conditions from human use or climate change **in turn affect regional and global climate**.
- Changes in land conditions modulate the likelihood, intensity and duration of many extreme events.

“ **Better land management can play its part** in tackling climate change, but it can’t do it all.

What is sustainable land management?

> "the stewardship and use of land resources, including soils, water, animals and plants, to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions"

Many of sustainable land management actions **make strong economic sense**.

We didn’t classify response options by mitigation/ adaptation: many options have multiple benefits

Responses by broad type

- Land management
- Value chain management
- Risk management

Responses by magnitude of impact (technical potential)

- > 3 Gt CO_2eq yr^{-1}
- 0.3 – 3 Gt CO_2eq yr^{-1}
- < 0.3 Gt CO_2eq yr^{-1}

Responses by impact on land competition

- No or limited competition for land
- Those that rely on additional land use change

Responses with no or limited land competition: many more co-benefits than adverse side effects

	Response options based on land management	Mitigation	Adaptation	Desertification	Land Degradation	Food Security	Cost
Agriculture	Increased food productivity	L	M	L	M	H	—
	Agro-forestry	M	M	M	M	L	●
	Improved cropland management	M	L	L	L	L	●●
	Improved livestock management	M	L	L	L	L	●●●
	Agricultural diversification	L	L	L	M	L	●
	Improved grazing land management	M	L	L	L	L	—
	Integrated water management	L	L	L	L	L	●●
	Reduced grassland conversion to cropland	L	—	L	L	- L	●
Forests	Forest management	M	L	L	L	L	●●
	Reduced deforestation and forest degradation	H	L	L	L	L	●●
Soils	Increased soil organic carbon content	H	L	M	M	L	●●
	Reduced soil erosion	↔ L	L	M	M	L	●●
	Reduced soil salinization	—	L	L	L	L	●●
	Reduced soil compaction	—	L	—	L	L	●
Other ecosystems	Fire management	M	M	M	M	L	●
	Reduced landslides and natural hazards	L	L	L	L	L	—
	Reduced pollution including acidification	↔ M	M	L	L	L	—
	Restoration & reduced conversion of coastal wetlands	M	L	M	M	↔ L	—
	Restoration & reduced conversion of peatlands	M	—	na	M	- L	●
	Response options based on value chain management						
Demand	Reduced post-harvest losses	H	M	L	L	H	—
	Dietary change	H	—	L	H	H	—
	Reduced food waste (consumer or retailer)	H	—	L	M	M	—
Supply	Sustainable sourcing	—	L	—	L	L	—
	Improved food processing and retailing	L	L	—	—	L	—
	Improved energy use in food systems	L	L	—	—	L	—
	Response options based on risk management						
Risk	Livelihood diversification	—	L	—	L	L	—
	Management of urban sprawl	—	L	L	M	L	—
	Risk sharing instruments	↔ L	L	—	↔ L	L	●●

The impacts of responses involving additional land use change depend on scale, implementation and governance

Bioenergy and BECCS

High level: Impacts on adaptation, desertification, land degradation and food security are maximum potential impacts, assuming carbon dioxide removal by BECCS at a scale of 11.3 $GtCO_2\ yr^{-1}$ in 2050, and noting that bioenergy without CCS can also achieve emissions reductions of up to several $GtCO_2\ yr^{-1}$ when it is a low carbon energy source {2.7.1.5; 6.4.1.1.5}. Studies linking bioenergy to food security estimate an increase in the population at risk of hunger to up to 150 million people at this level of implementation {6.4.5.1.5}. The red hatched cells for desertification and land degradation indicate that while up to 15 million km_2 of additional land is required in 2100 in 2°C scenarios which will increase pressure for desertification and land degradation, the actual area affected by this additional pressure is not easily quantified {6.4.3.1.5; 6.4.4.1.5}.

Best practice: The sign and magnitude of the effects of bioenergy and BECCS depends on the scale of deployment, the type of bioenergy feedstock, which other response options are included, and where bioenergy is grown (including prior land use and indirect land use change emissions). For example, limiting bioenergy production to marginal lands or abandoned cropland would have negligible effects on biodiversity, food security, and potentially co-benefits for land degradation; however, the benefits for mitigation could also be smaller. {Table 6.58}

The big picture

- The potential for mitigating climate can only be realised if **agricultural emissions** are **included in mainstream climate policy**.
- **Delayed action** will mean more of a **need to respond** to land challenges **but less potential for land-based responses** (due to climate change and other pressures).
- **Acting early** will avert or minimise risks, reduce losses and generate returns on investment but has **challenges** related to technology, upscaling and barriers. There is **enough knowledge to act now**.
- **Measuring progress towards goals** is important to decision-making, adaptive governance & policy success.
- Responses are interlinked:
  - Some have co-benefits or are more **effective when paired**.
  - Not all options increase competition for land. Some response options are **less feasible** than others.

Possible areas of advance in the Sixth Assessment Report

Unprecedented transdisciplinary efforts across IPCC Working Groups in AR6.

- Revision of estimates of climate sensitivity, with implications for classification of emission scenarios and remaining carbon budgets
- New literature that goes beyond “traditional” global modelling assumptions:
    - Attention to discounting of future costs
    - Adaptive adjustment to the long-term temperature goal
    - Implications for prompt versus delayed action and use of CO_2 removal
- Better integration of mitigation and adaptation in relation to cities and land management
- Approaches to land-based solutions including nature-based solutions

A single Glossary across Working Groups – sounds boring but has driven many cross-Working Group conversations!

FOR MORE INFORMATION:

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