

Climate and deep decarbonisation risks in a post-COVID world

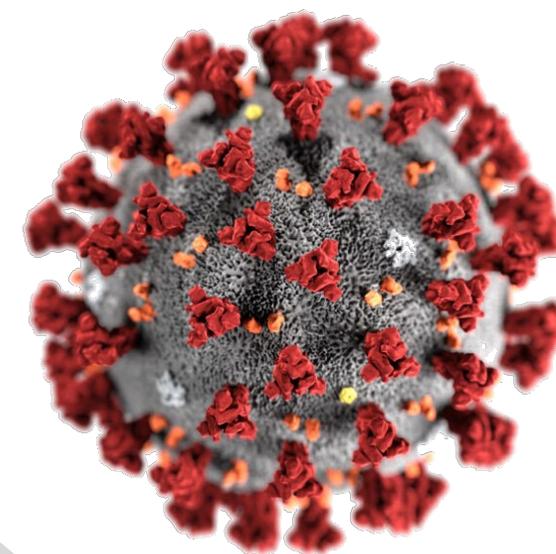
Dr. Joeri ROGELJ

2nd EU–JRC Summer School on Sustainable Finance
September 1-3, 2020

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Climate and deep decarbonisation risks in a post-COVID world

- State of knowledge
 - IPCC
 - Climate risks
 - Transition risks
- COVID impact
- Post-COVID outlook





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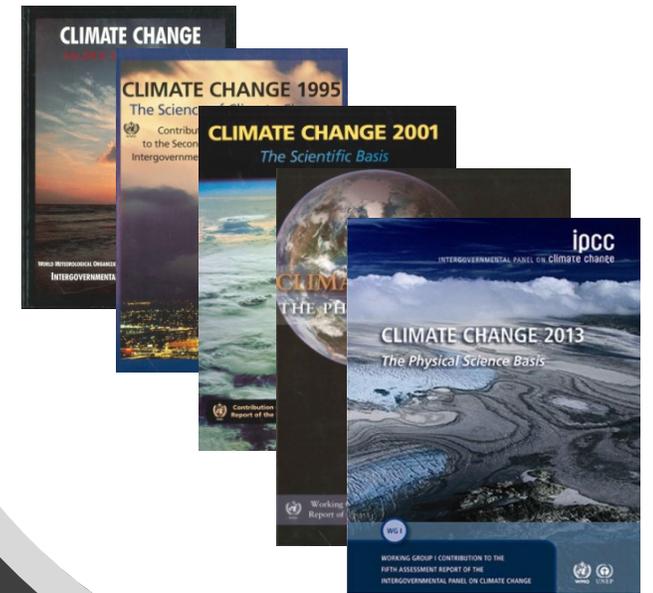


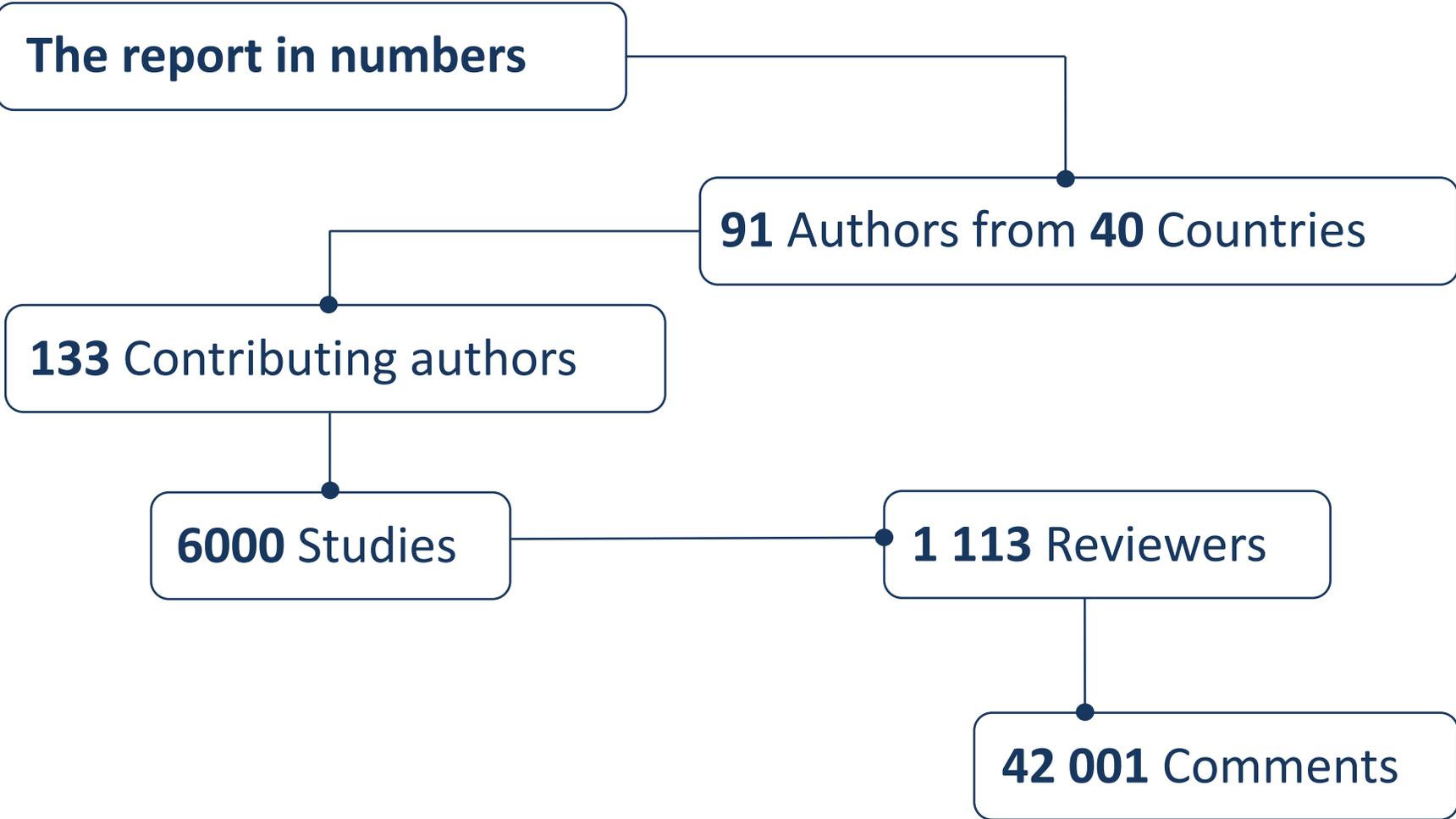
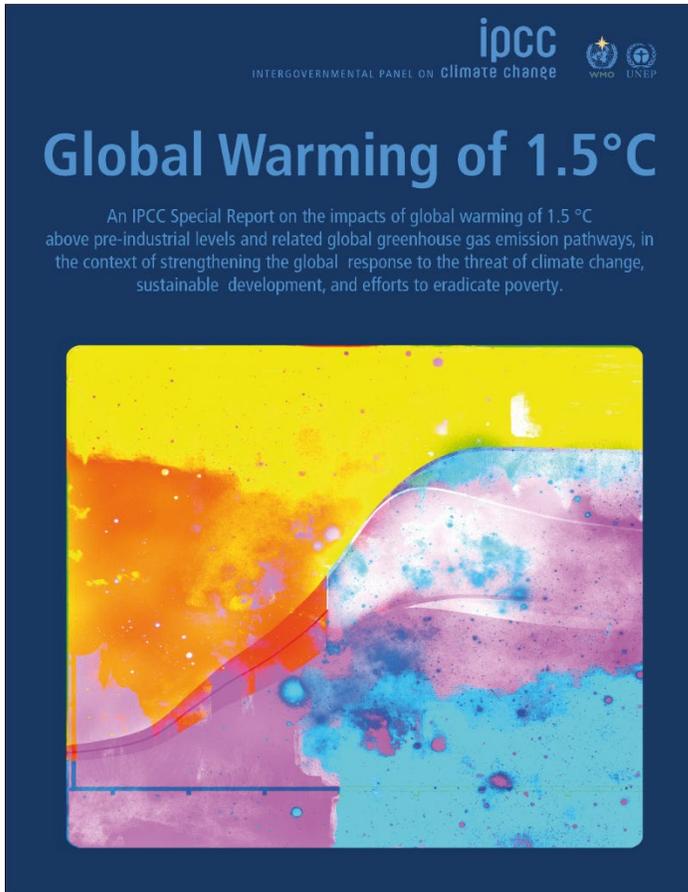
What is the IPCC?

- Intergovernmental organization, est. in 1988 by WMO and UNEP
- Representatives of 195 member countries
- Provide the most comprehensive assessment of our current knowledge of climate science
- 3 Working Groups + 1 Task Force
 - WG1: Physical science basis
 - WG2: Impacts, adaptation & vulnerability
 - WG3: Mitigation of climate change
 - TF on national greenhouse gas inventories

Key principles governing IPCC work

- Assessments – no new research
- Comprehensive, objective, open and transparent process
- Common understanding of scientific basis of risk of climate change
- Policy-neutral yet policy-relevant
- Report are prepared by leading scientific experts from all world regions



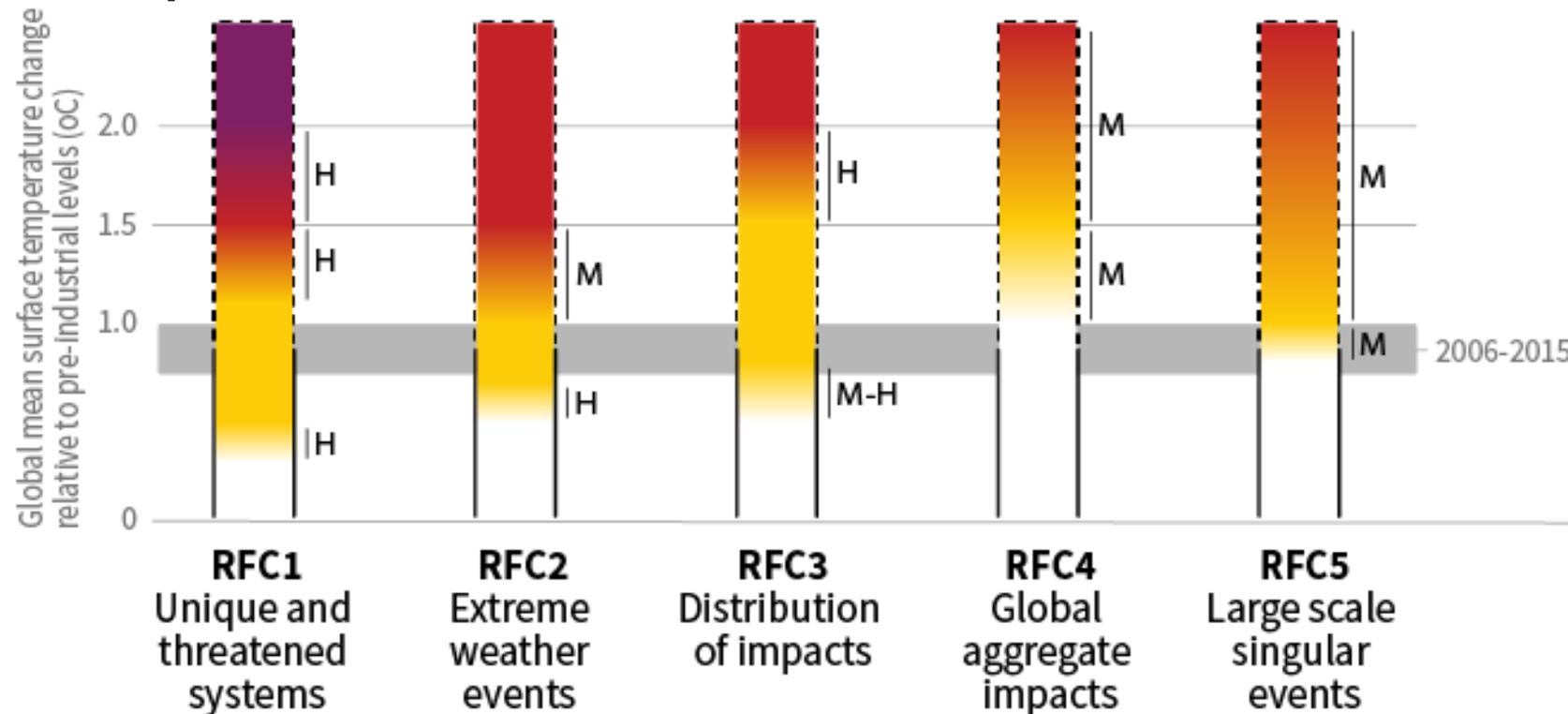




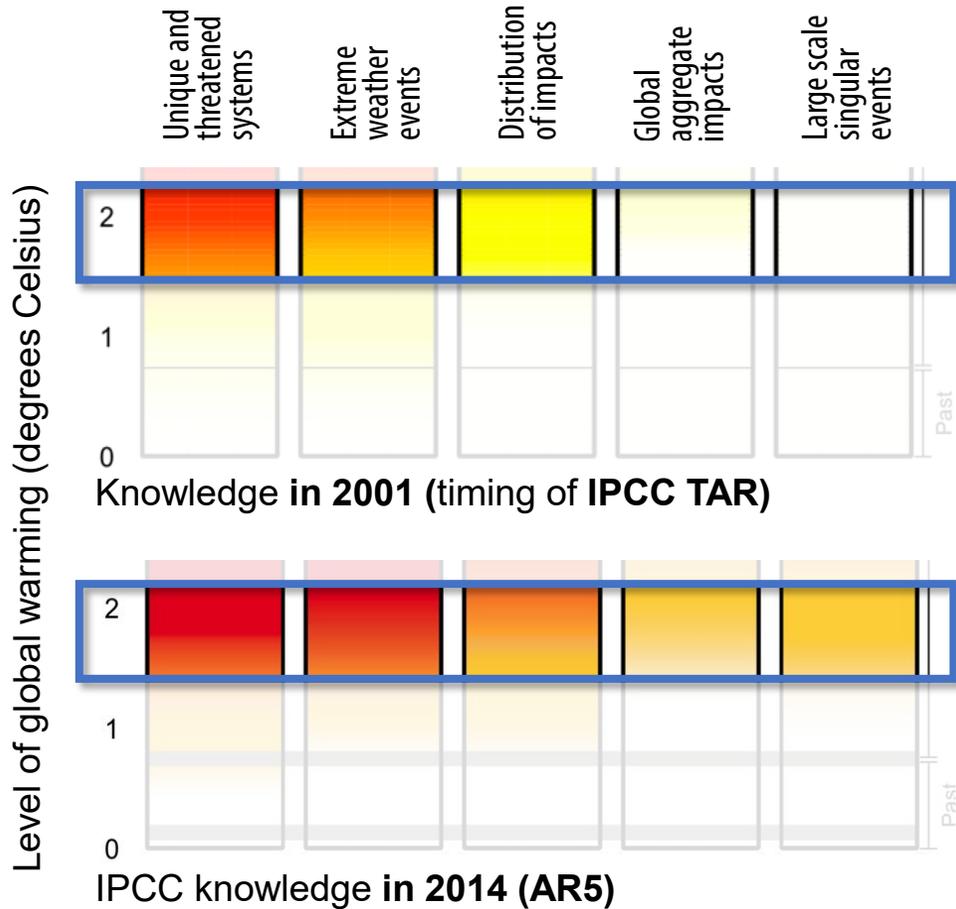
IPCC plenary room in Incheon, Korea
Image: ENB

Climate risks at 1.5°C and 2°C of global warming

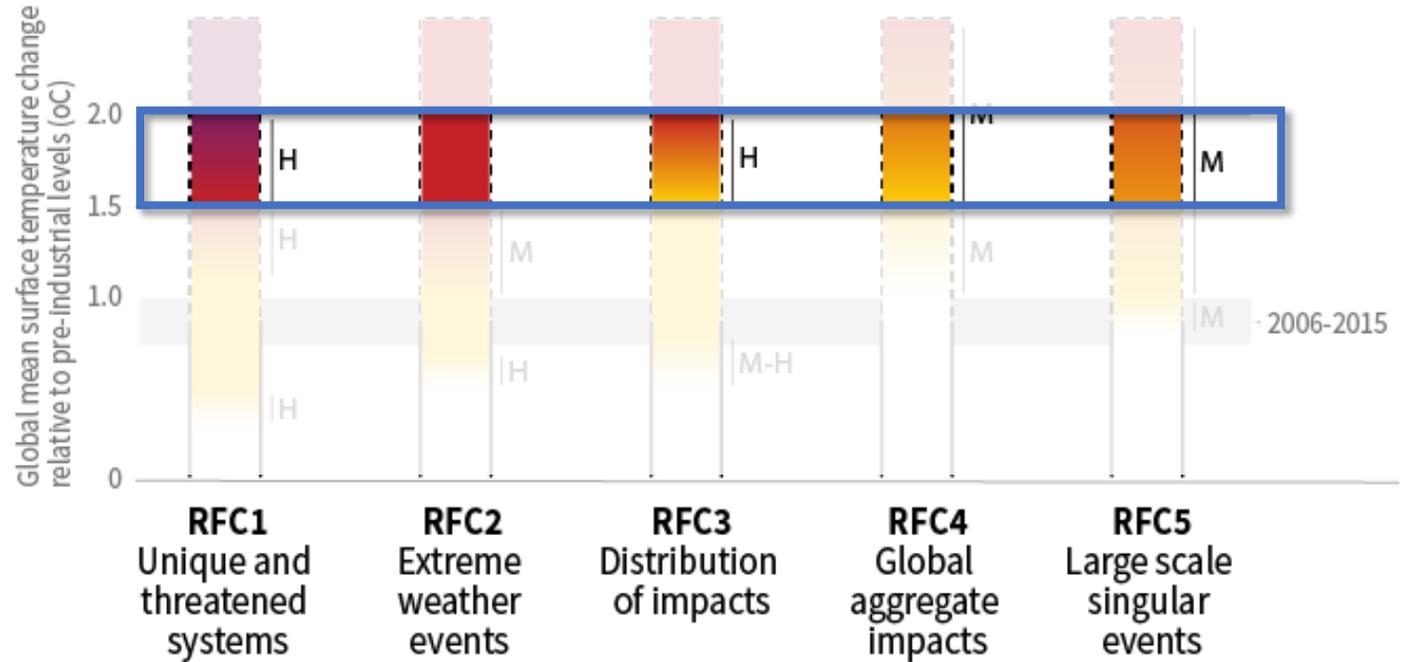
Five impact areas or “Reasons for concern” (RFC)



The more we learn, the worse the outlook



IPCC knowledge in 2018 (IPCC SR1.5)



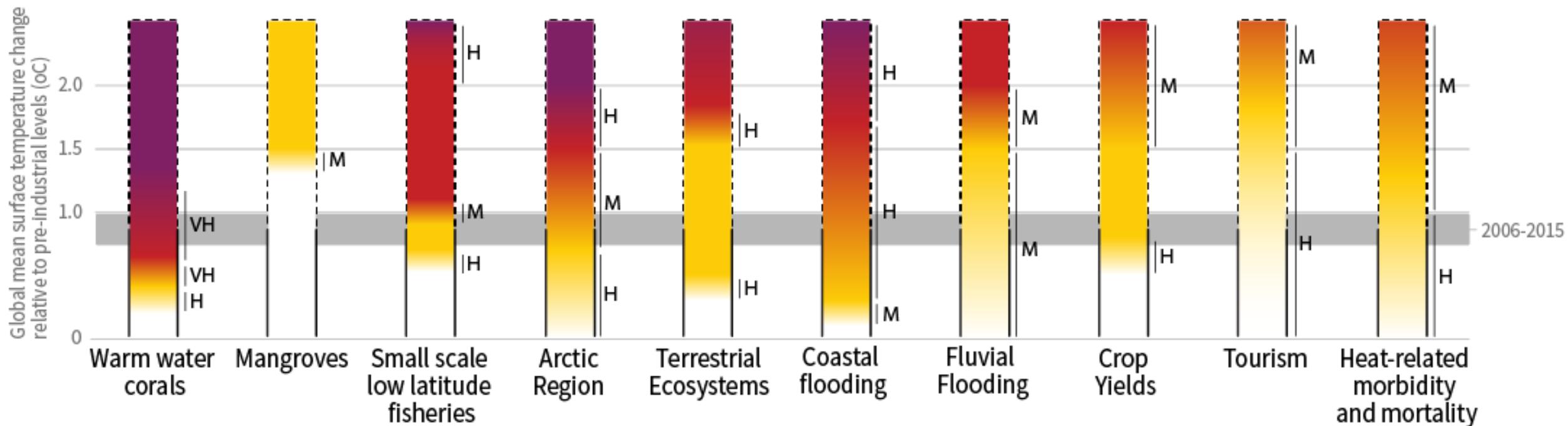
Risk colour scale: white=undetectable, yellow=moderate, red=high, purple=very high

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

Joeri Rogelj – 2 September 2020 | Source: Smith et al (PNAS, 2009), IPCC AR5 WG2 (2014), IPCC SR1.5 (2018)

Climate risks at 1.5°C and 2°C of global warming

Impacts and risks for selected natural, managed and human systems

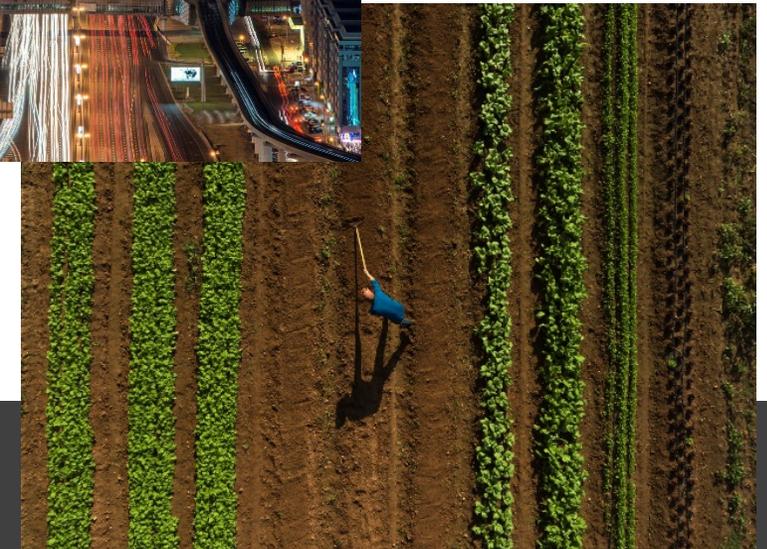
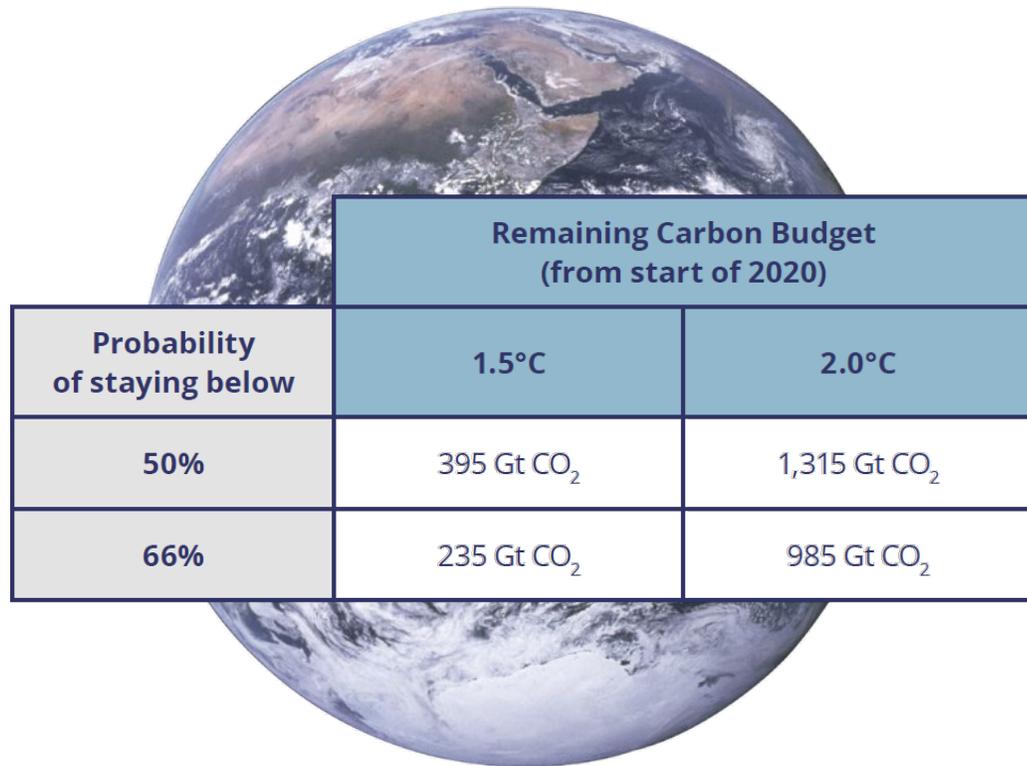


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Joeri Rogelj – 2 September 2020 | Source: IPCC SR1.5 (2018)

Halting climate change needs zero emissions

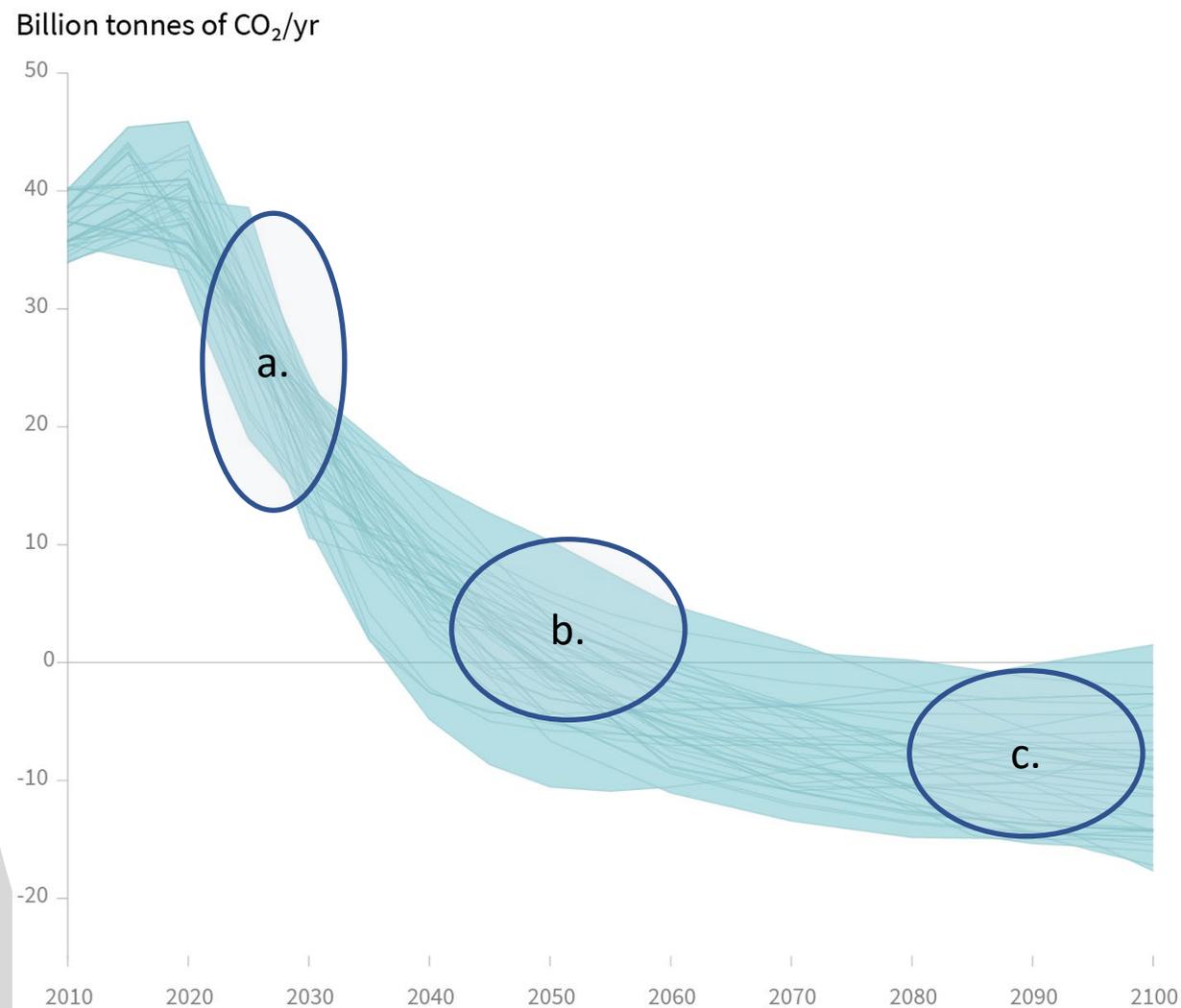


Achieving 1.5°C compatible reductions?

Global CO₂ characteristics

*Pathways limiting warming to 1.5°C
with no or limited overshoot (less than 0.1°C):*

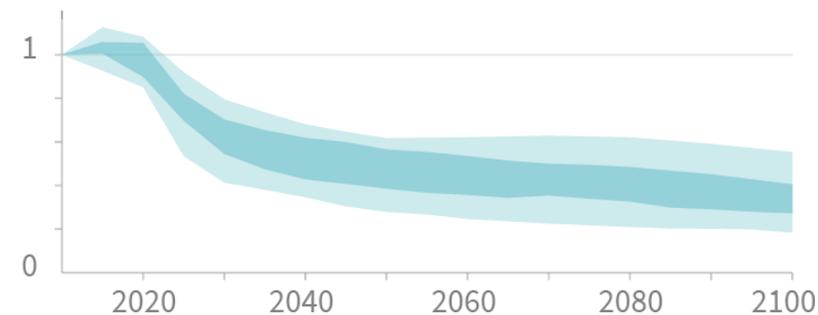
- a. Robust declining trend in next decade
45% (range 40-60%) below 2010 levels by 2030
- b. Reach net-zero CO₂ around mid-century
Net zero greenhouse gases ca. 2 decades later!
- c. Varying levels of net carbon-dioxide removal



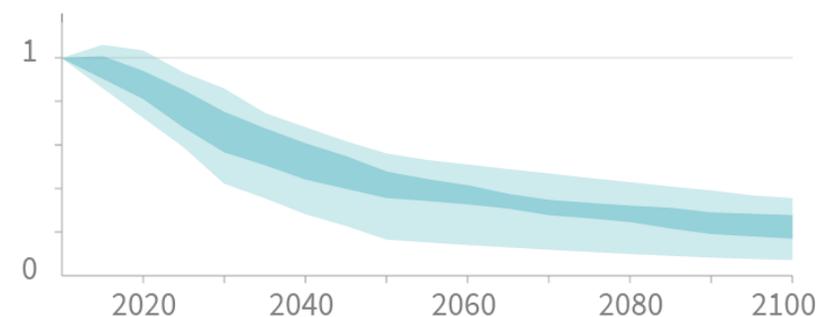
Achieving 1.5°C compatible reductions?



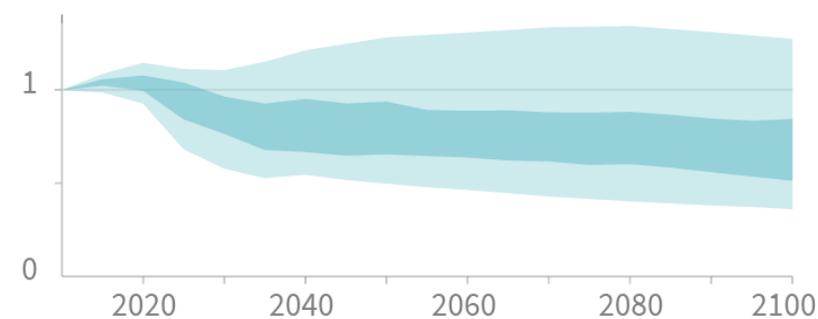
Methane emissions



Black carbon emissions



Nitrous oxide emissions



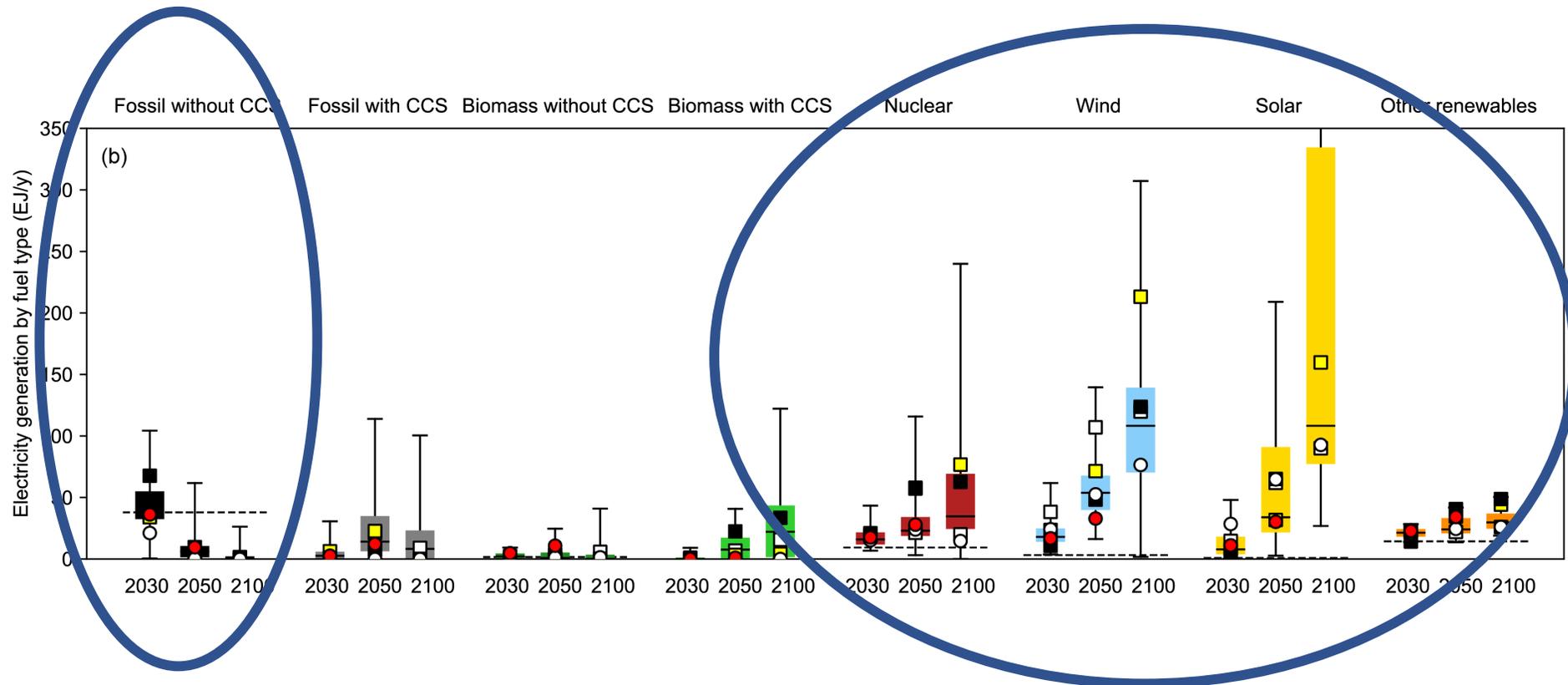
Halting climate change needs zero emissions



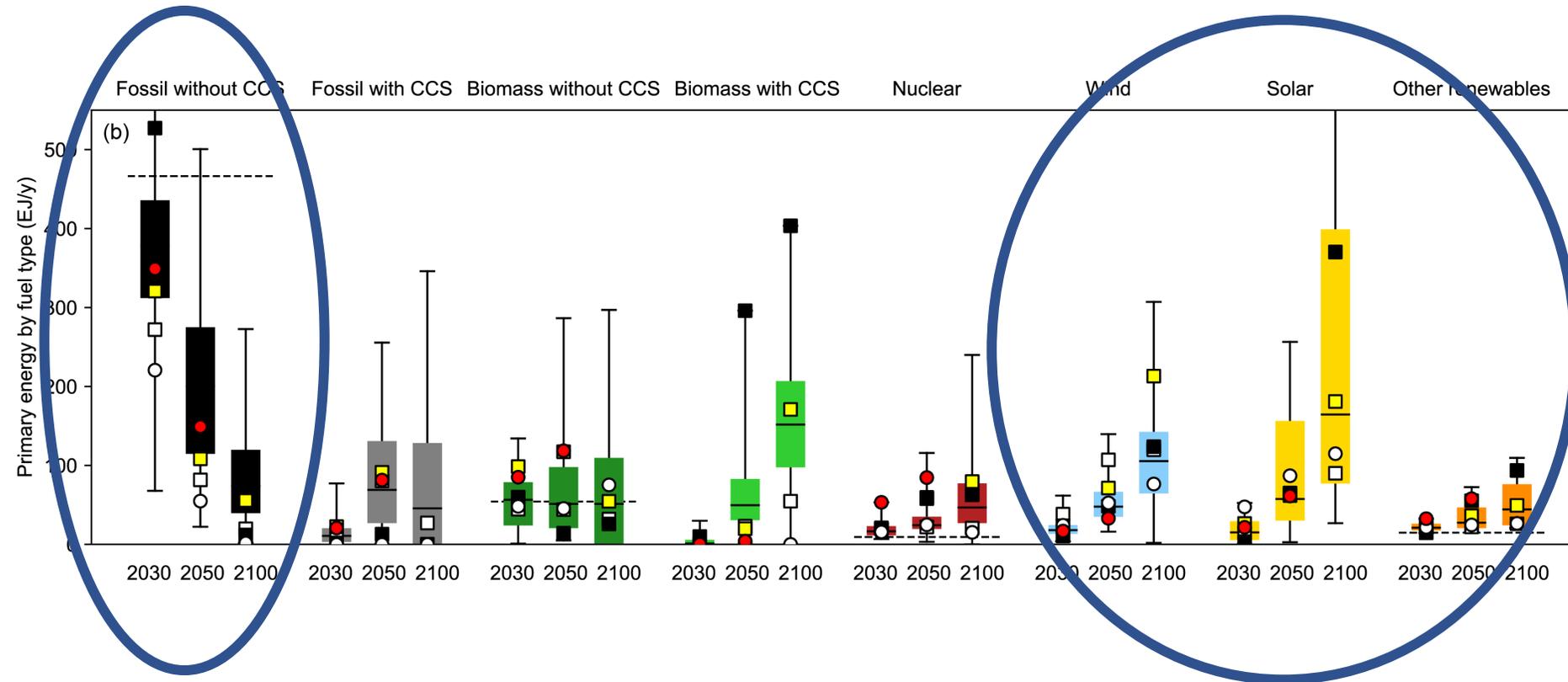
Limiting warming to **1.5°C** would require **rapid, far-reaching** changes on an **unprecedented scale**

1. In the next decade
2. In all systems
 - Energy
 - Land
 - Urban and infrastructure
 - Industrial
3. Stringent action everywhere

Transition risk I: Global and sectoral pathways (power sector)



Transition risk I: Global and sectoral pathways (primary energy)



Transition risk I: Global and sectoral pathways



Global primary energy in 1.5°C pathways

Renewables scale up

meeting about 15% of primary energy in 2020

meeting 25-35% of primary energy in 2030

meeting 50-65% of primary energy in 2050

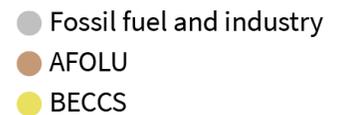
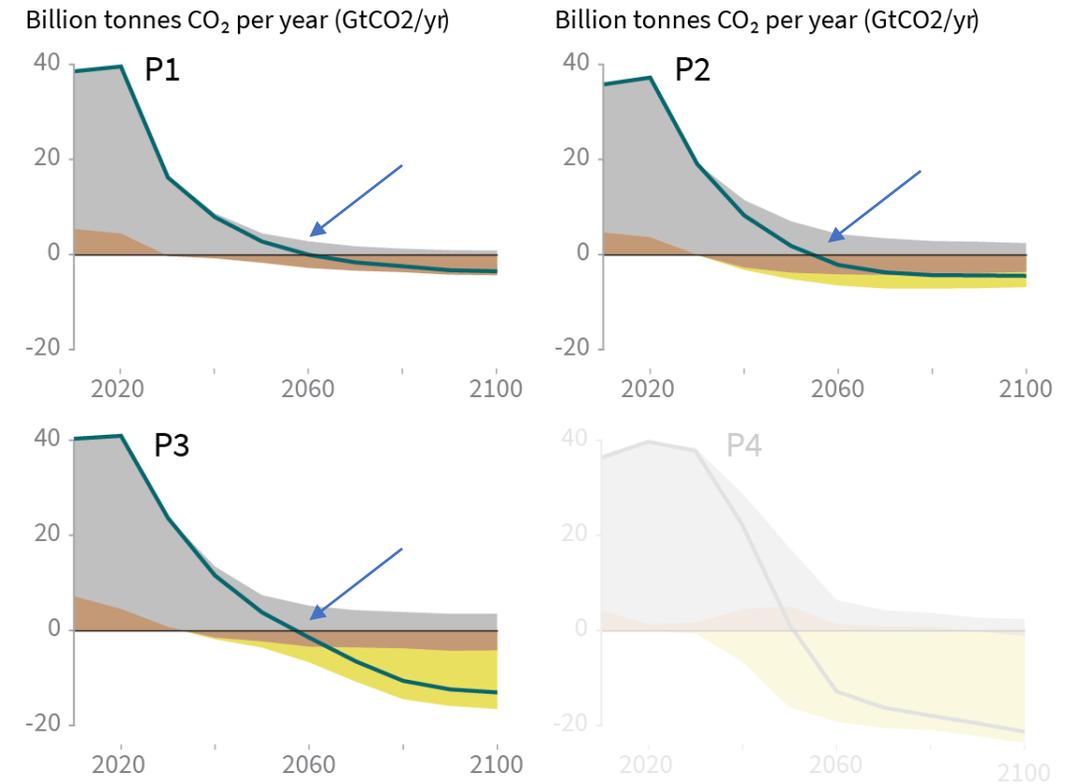
Fossil fuels as a groups show a clear decline,
but with important variations until mid-century

- **Coal:** strong decline in all pathways
- **Oil:** also declines but to a lesser degree
- **Gas:** use varies from strong reductions to increases from today's levels, depending on capture technologies (CCS)

Transition risk II: Not all pathways are created equal



Similar cumulative CO₂ until net zero, but different strategies



Transition risk III: Mitigation choices matter for sustainable development



Synergies: health (SDG3), clean energy (SDG7), sustainable cities (SDG11), responsible production and consumption (SDG12), life below water (SDG14)

Potential trade-offs: no poverty (SDG1), no hunger (SDG2), clean water (SDG6), energy access (SDG7)

Demand-side measures: (reducing energy, materials, and land use) allow to **maximize synergies**

Strategic choices determine whether mitigation strategies support or counteract sustainable development



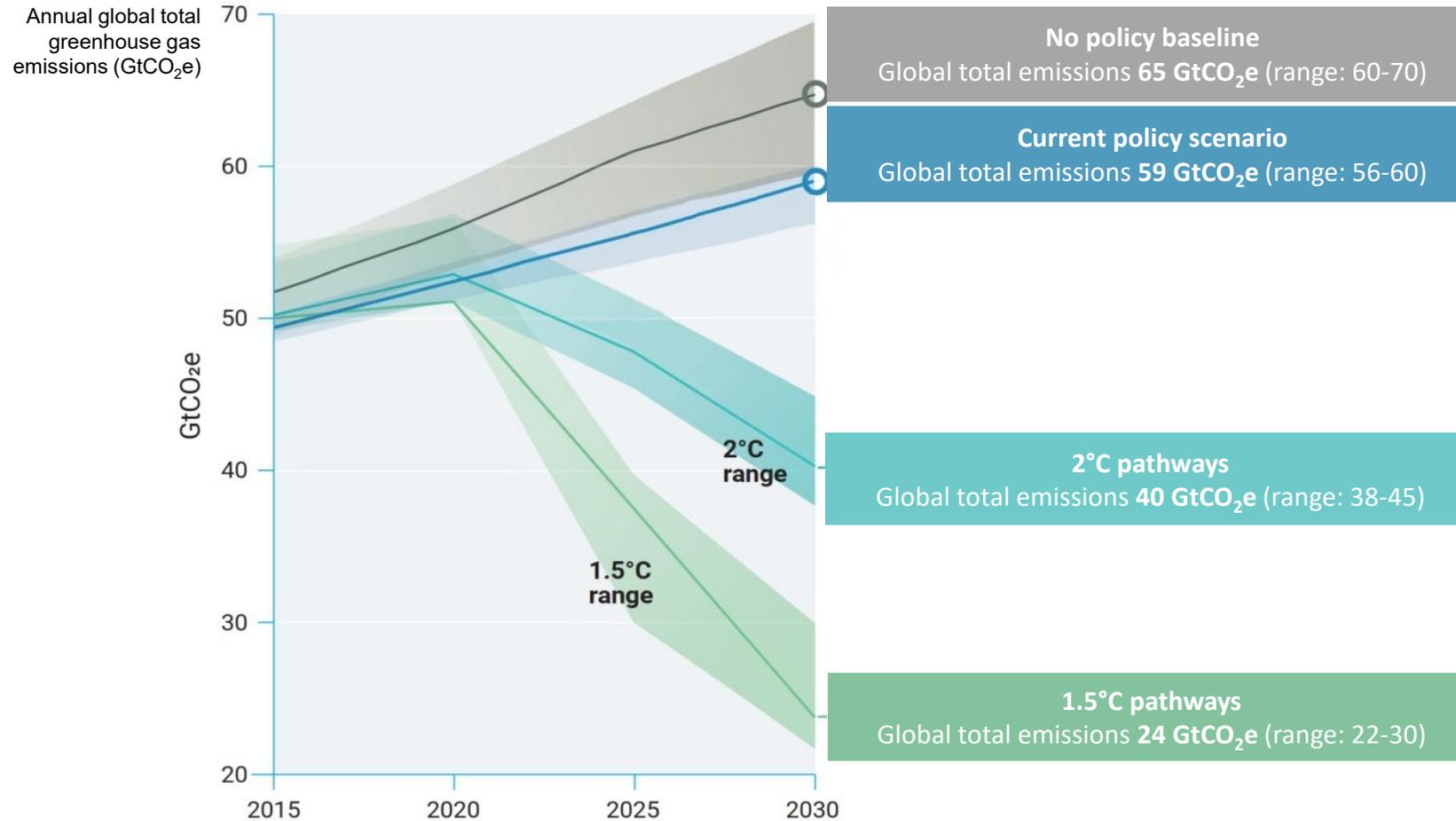
Emissions Gap Report

2019

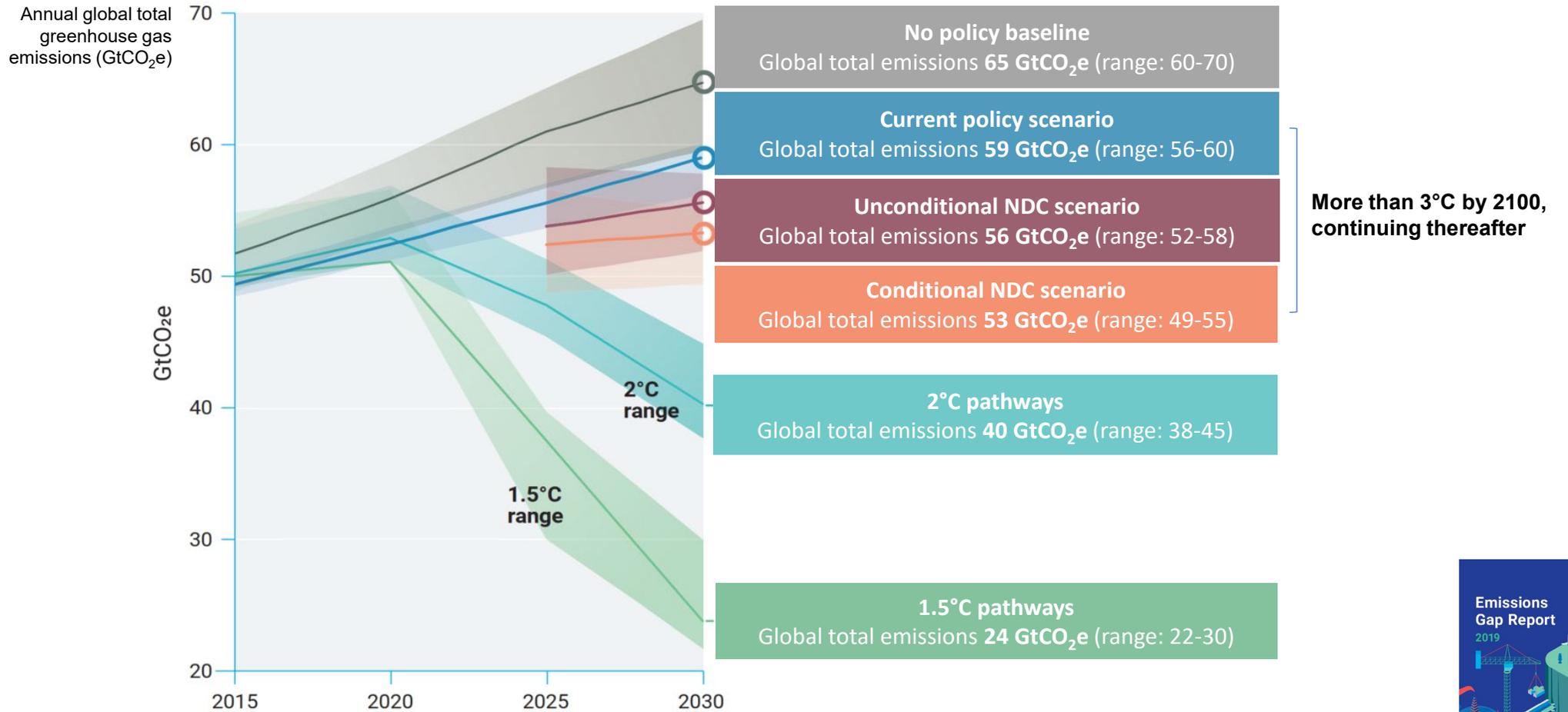


Reality check

Reality check – we're not on track

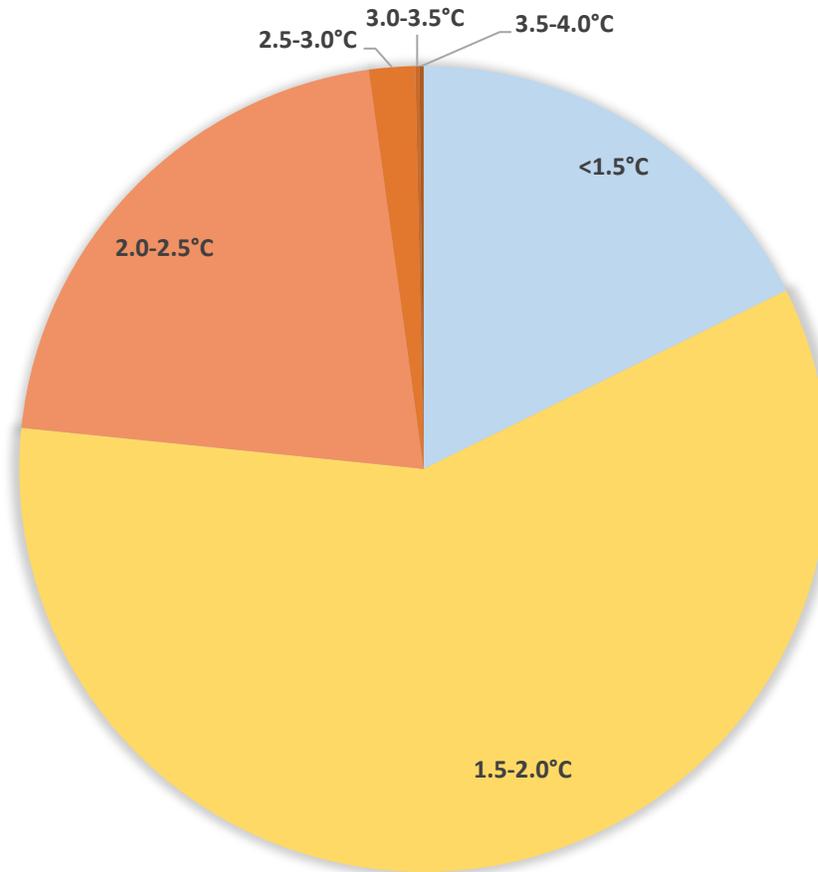


Reality check – we're not on track



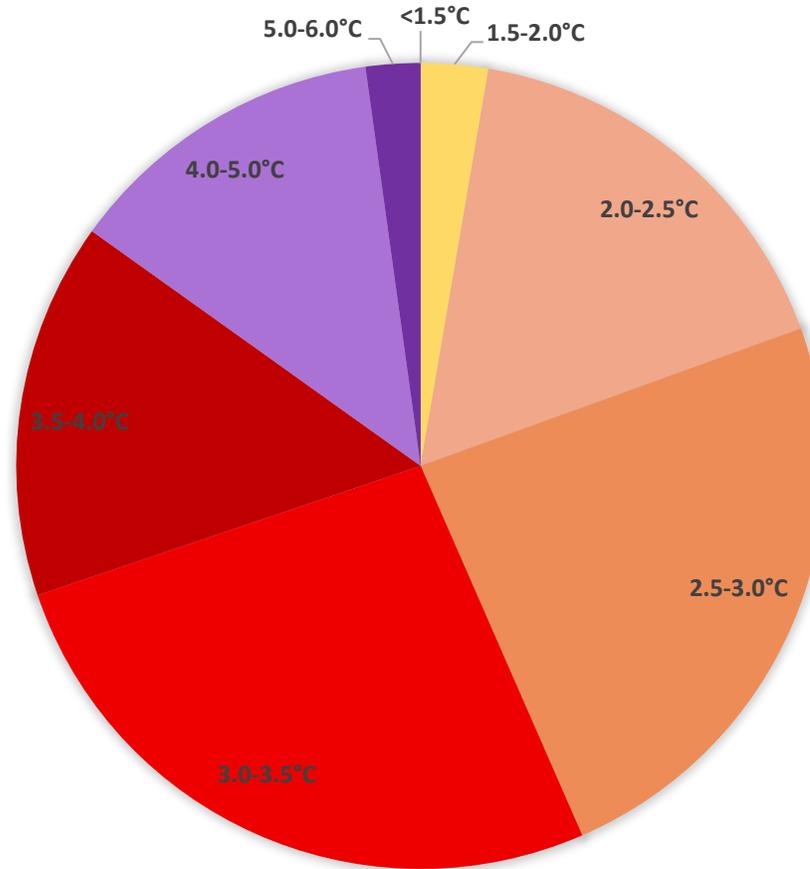
Climate risk: our loaded dice of climate inaction

GLOBAL WARMING IN 2050 UNDER CURRENT PLEDGES

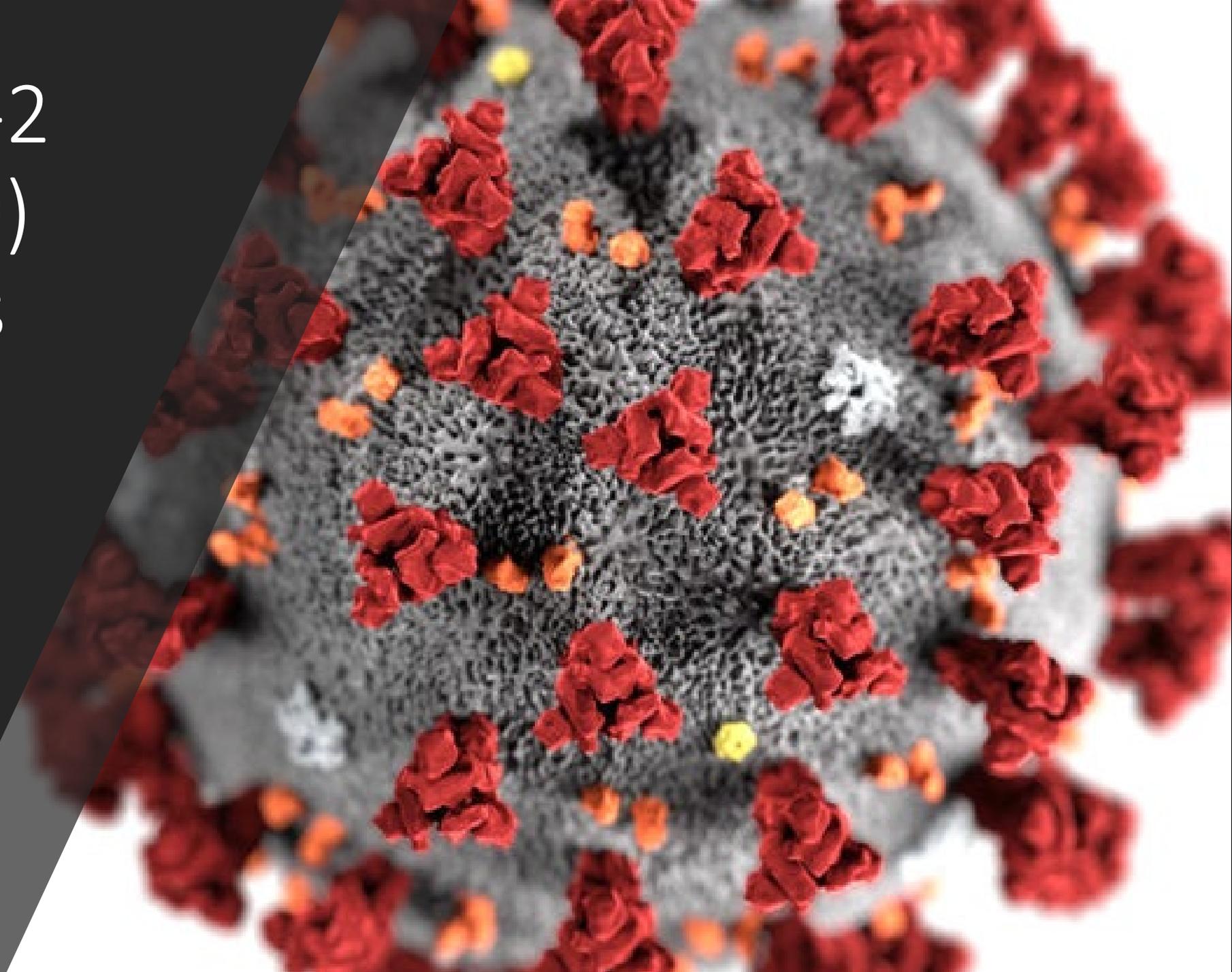


Climate risk: our loaded dice of climate inaction

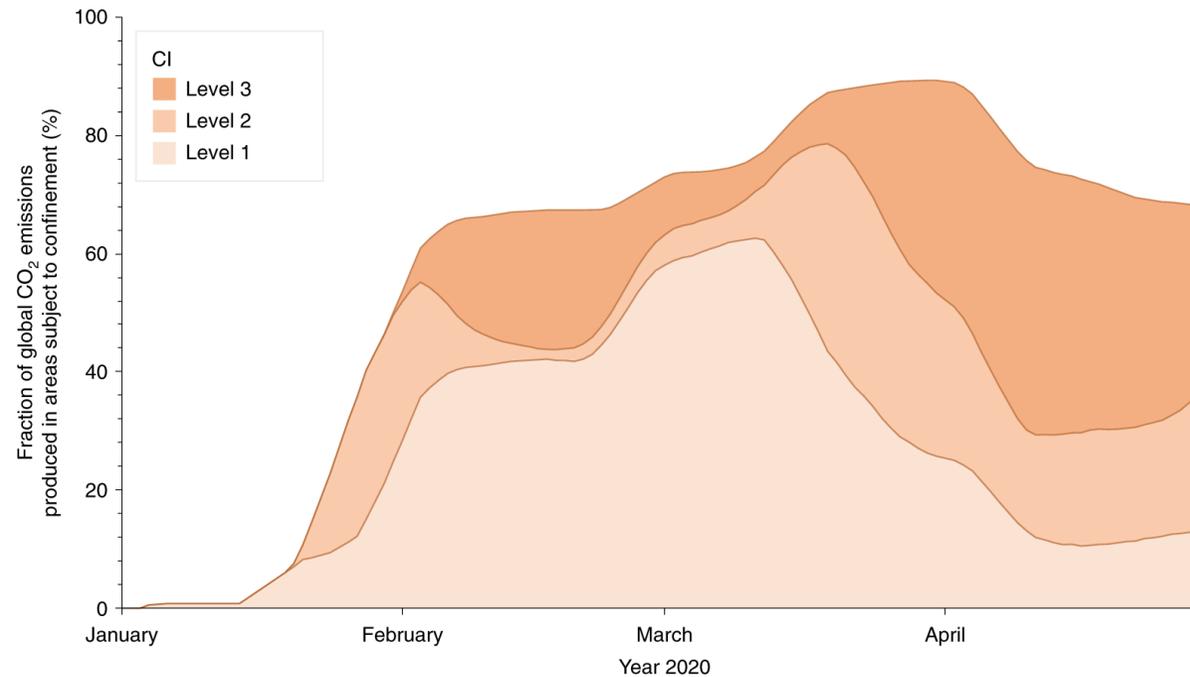
GLOBAL WARMING IN 2100 UNDER CURRENT PLEDGES



CoV-SARS-2
(COVID-19)
lockdowns

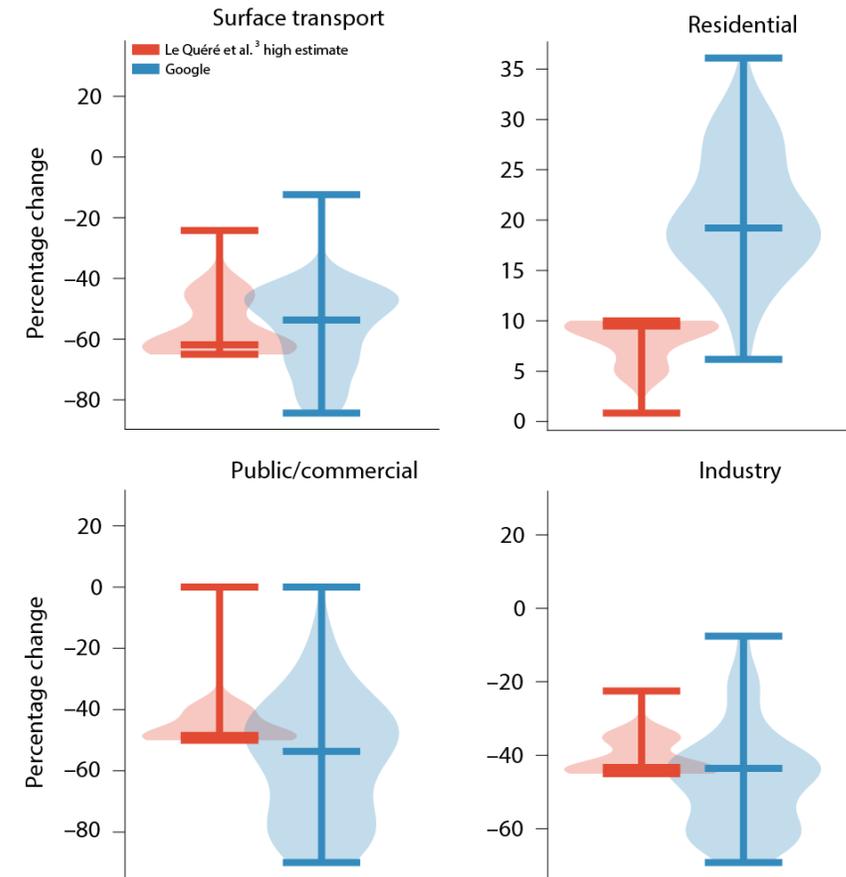


COVID-19 is (temporarily) disrupting society

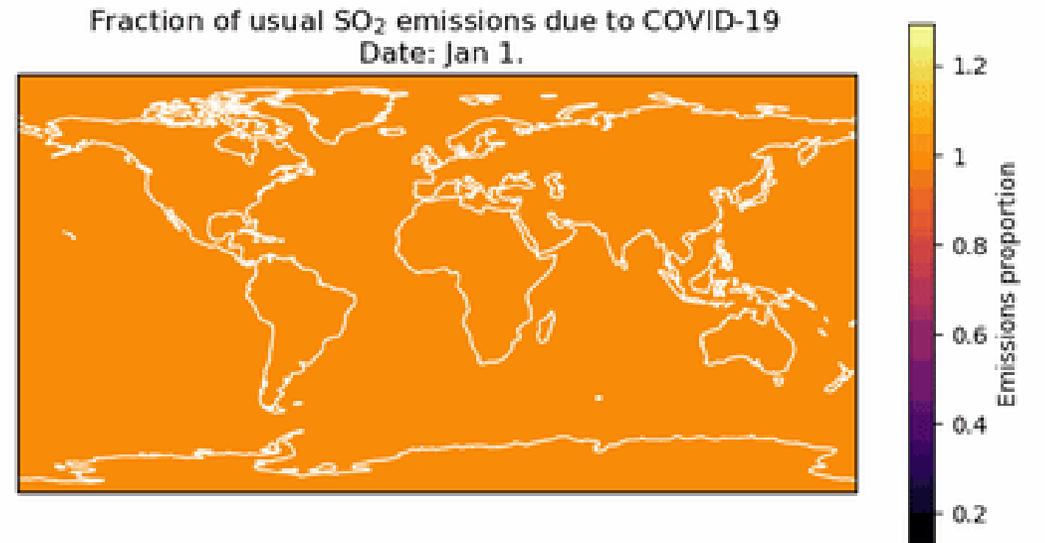
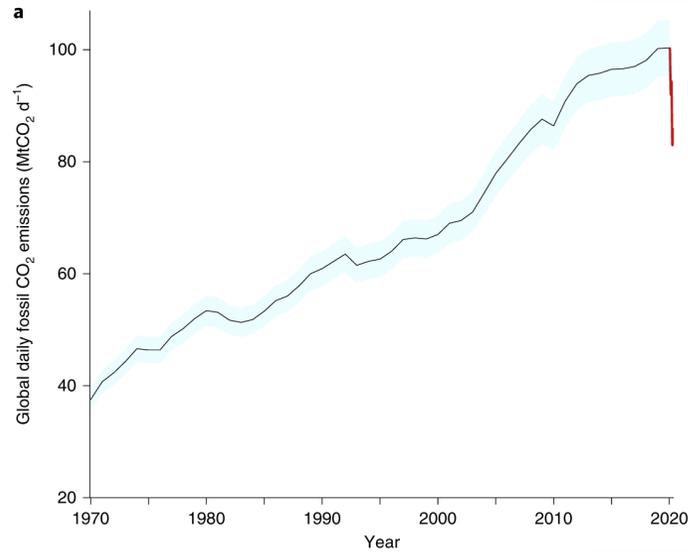


Level	Description
0	No restrictions
1	Policies targeted at long distance travel or groups of individuals where outbreak first nucleates
2	Regional policies that restrict an entire city, region or ~50% of society from normal daily routines
3	National policies that substantially restrict the daily routine of all but key workers

COVID-19 is (temporarily) disrupting our activities



COVID-19 is (temporarily) reducing emissions



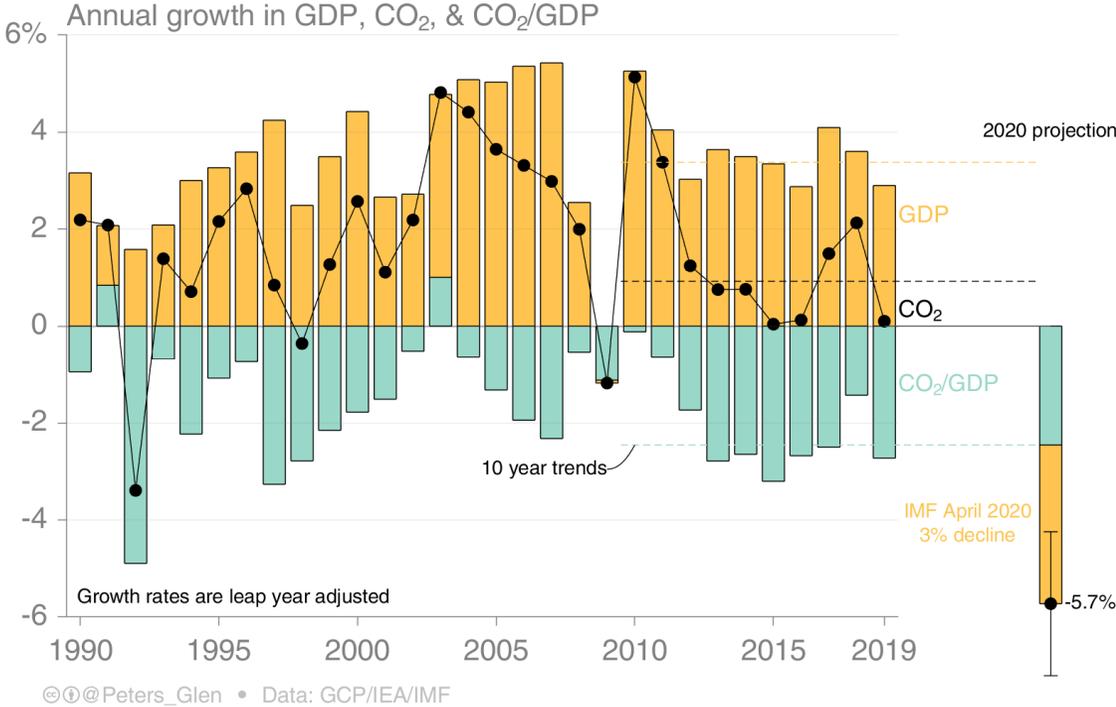
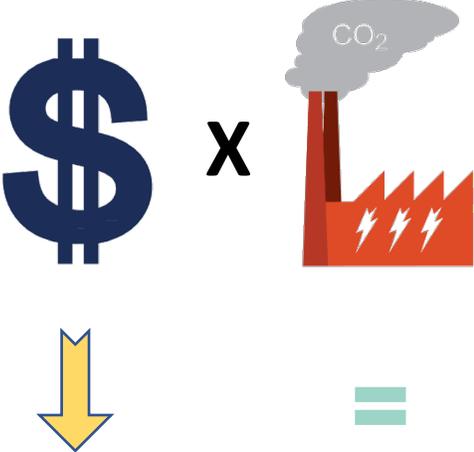
COVID-19 lockdowns imply no structural change

CO₂ EMISSIONS =

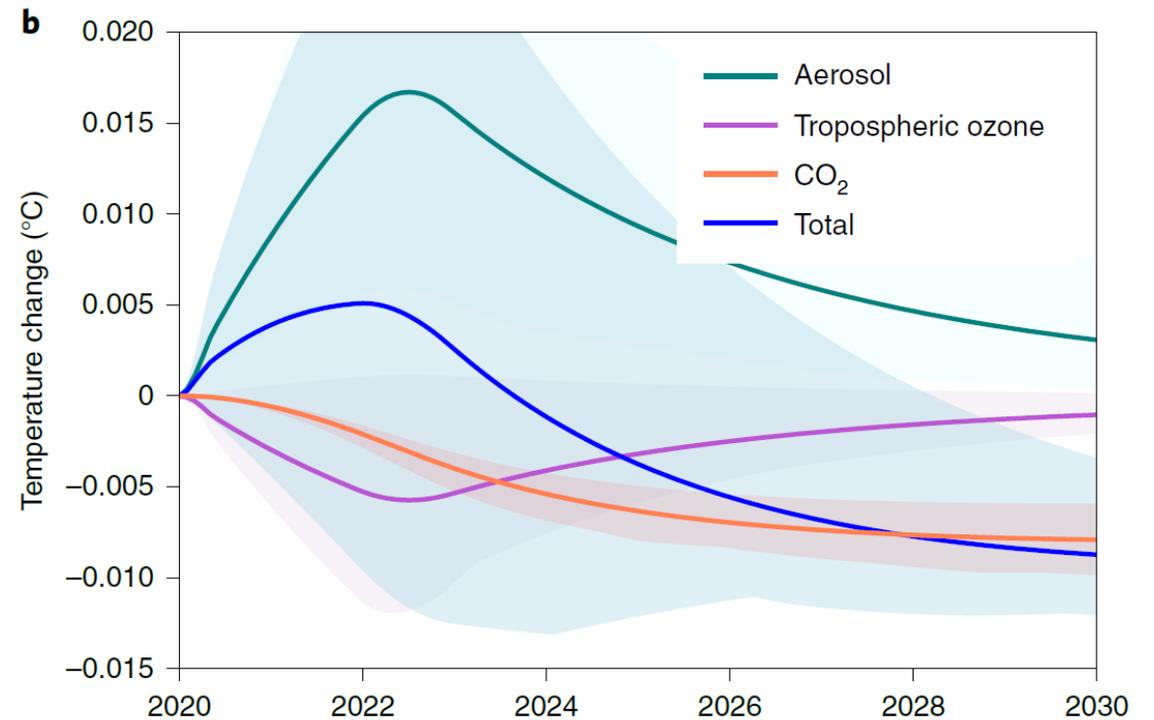
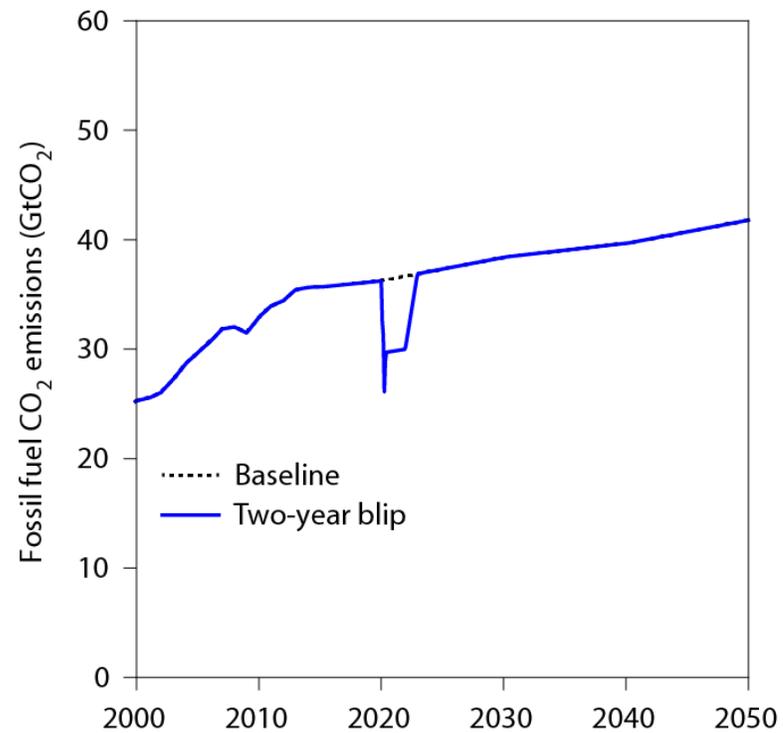


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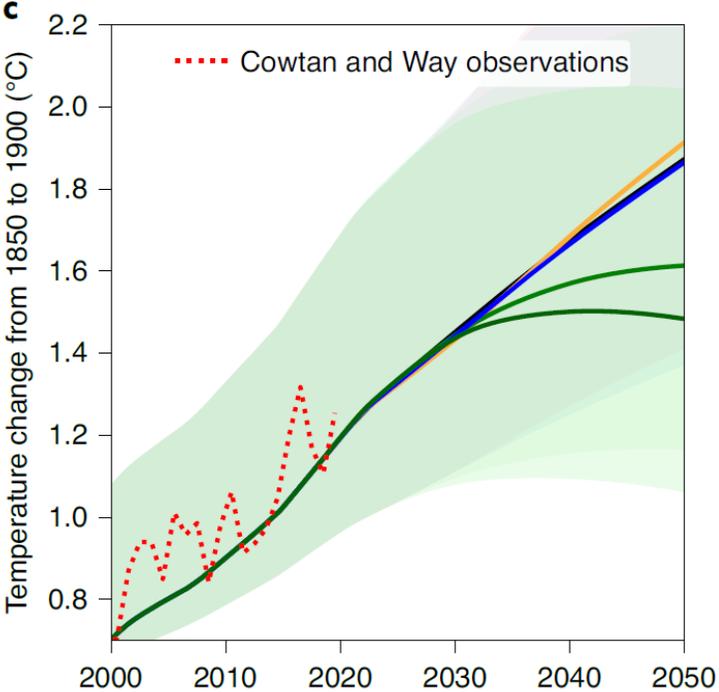
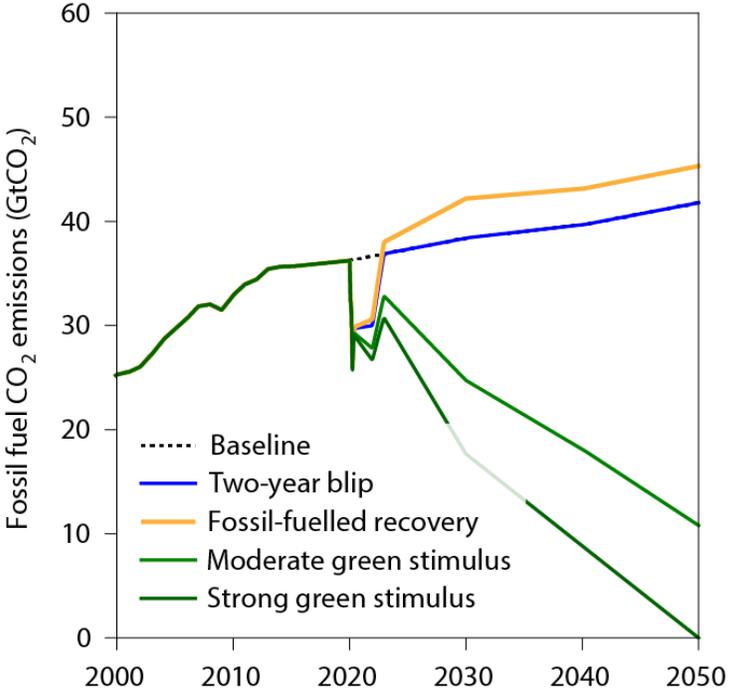
CO₂ EMISSIONS =



COVID-19 is (barely) reducing temperatures

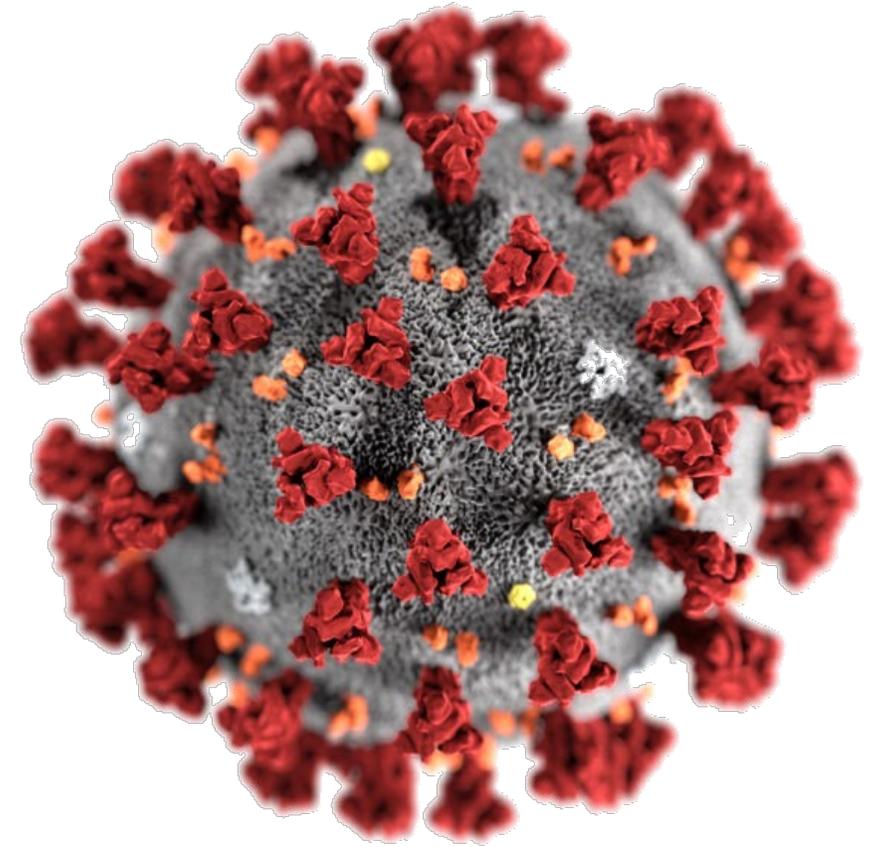


COVID-19 response will determine climate change



Climate and deep decarbonisation risks in a post-COVID world

- Unchanged climate risks, but increased vulnerability
- Exacerbated transition risks through:
 - Global recession
 - Risk of short-term, reactive thinking on stimulus
- Re-emphasized importance of broad range of societal concerns
- Post-COVID-19 response will determine climate change legacy

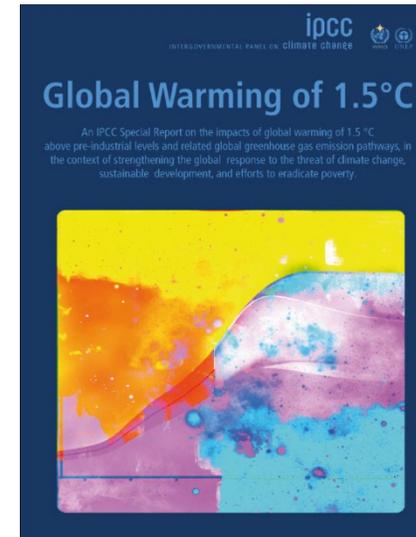


Thank you

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ARTICLES

<https://doi.org/10.1038/s41558-020-0883-0>

 Check for updates

Current and future global climate impacts resulting from COVID-19

Piers M. Forster ¹✉, Harriet I. Forster², Mat J. Evans ^{3,4}, Matthew J. Gidden^{5,6}, Chris D. Jones ⁷, Christoph A. Keller^{8,9}, Robin D. Lamboll ¹⁰, Corinne Le Quéré ^{11,12}, Joeri Rogelj ^{6,10}, Deborah Rosen¹, Carl-Friedrich Schleussner ^{5,13}, Thomas B. Richardson¹, Christopher J. Smith ^{1,6} and Steven T. Turnock ^{1,7}

Dominant scenario framework results in 'unfair and risky' scenarios

- **Current situation:**

Shared Socioeconomic Pathways (SSP) & Representative Concentration Pathways (RCPs):
Focus on **end-of-century (2100) forcing outcome**

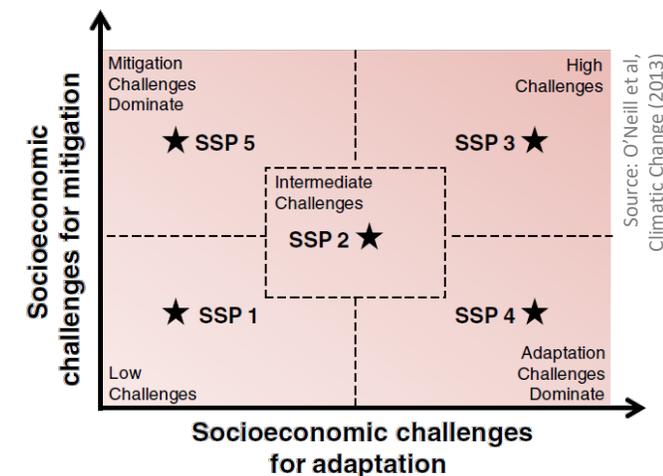
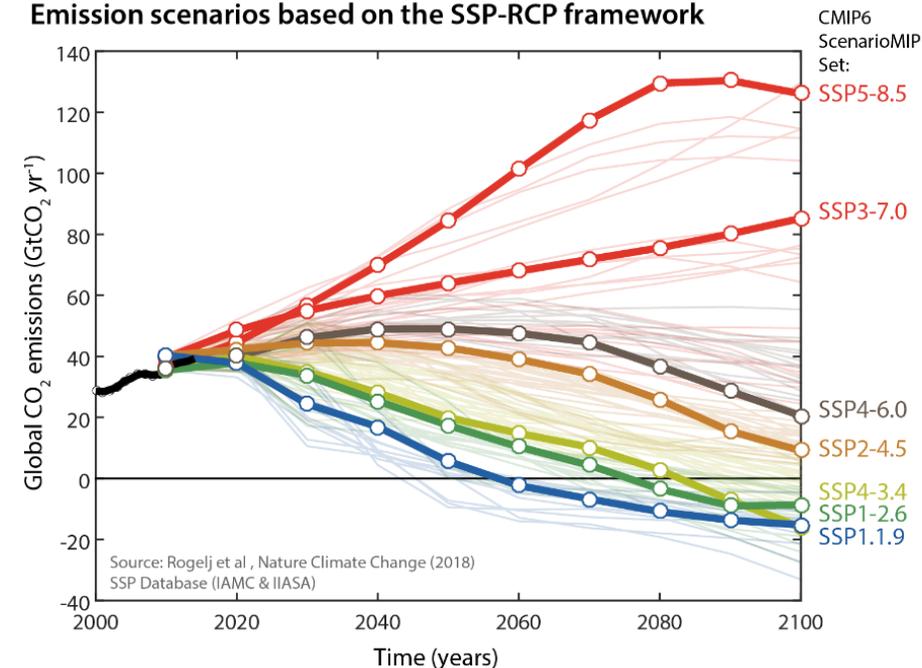
- **Consequences:**

- Climate policy inconsistency & cognitive dissonance (overshooting)
- Intergenerational equity and carbon-dioxide removal (CDR)
- **Not directly compatible** with Paris Agreement
- Imprecise economic recommendations

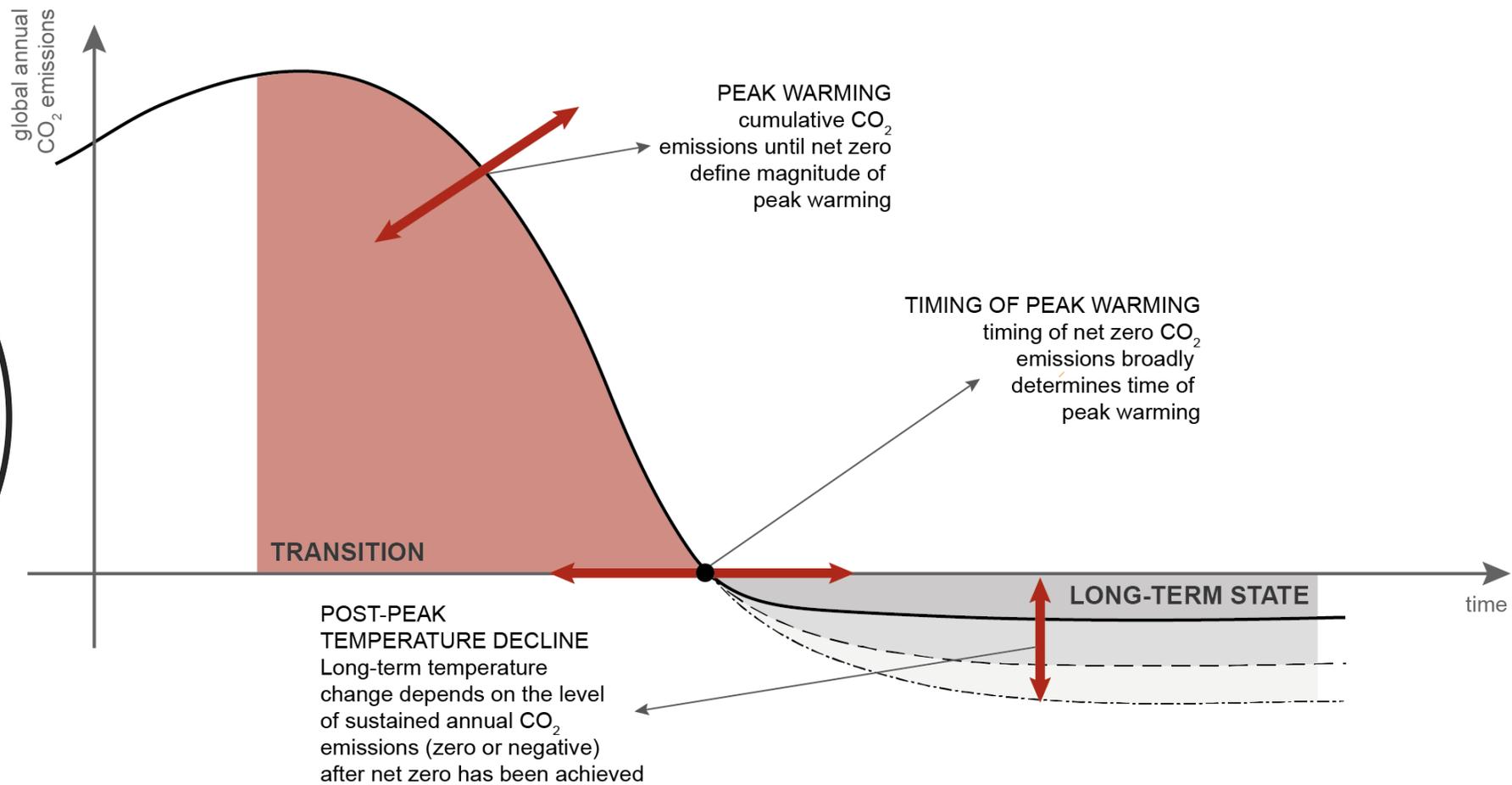
- **SOLUTION: New scenario logic to resolve these issues**

- capping global warming at a specific maximum level
- either temperature stabilization or reversal thereafter

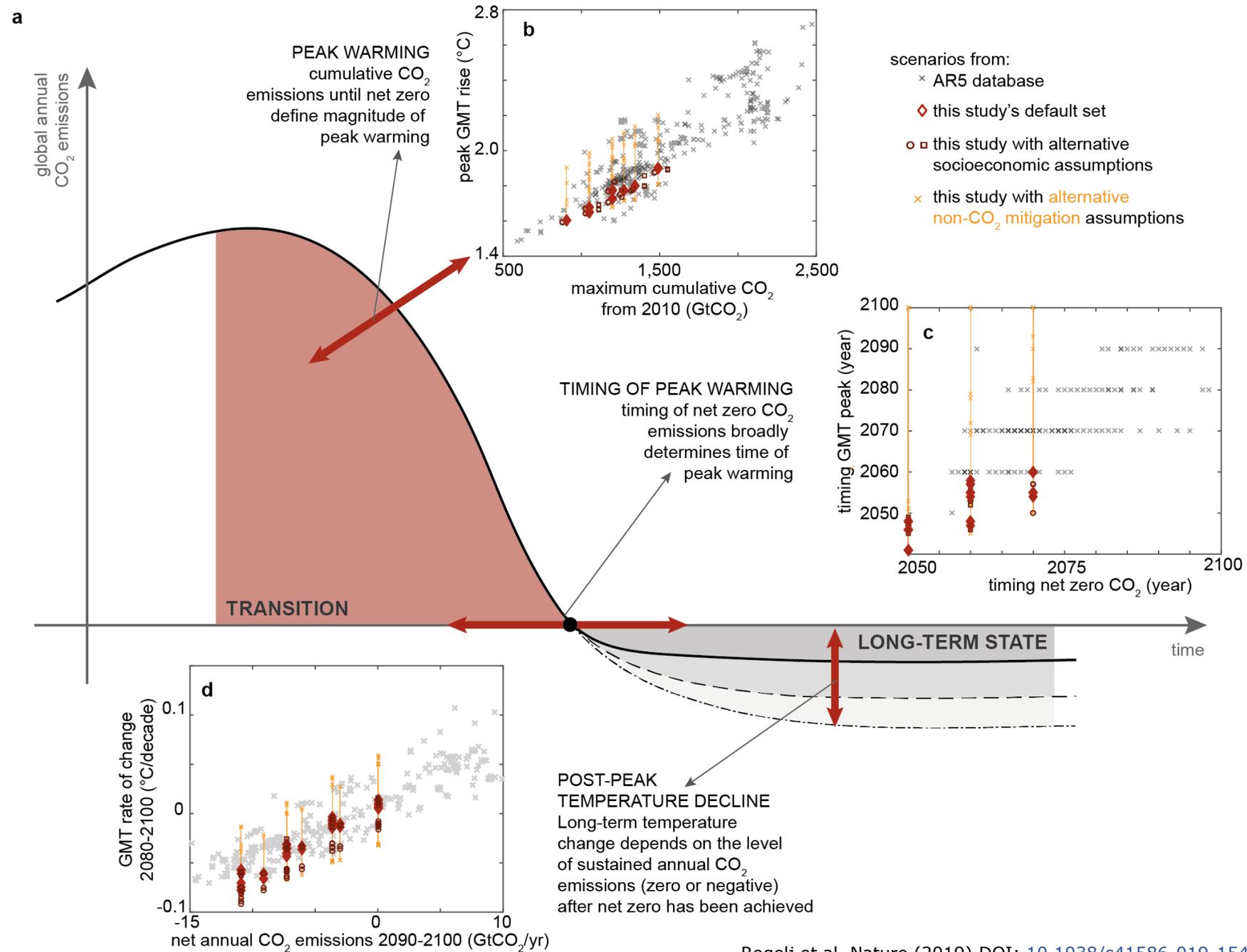
Emission scenarios based on the SSP-RCP framework



A new scenario logic for the Paris Agreement long-term temperature goal

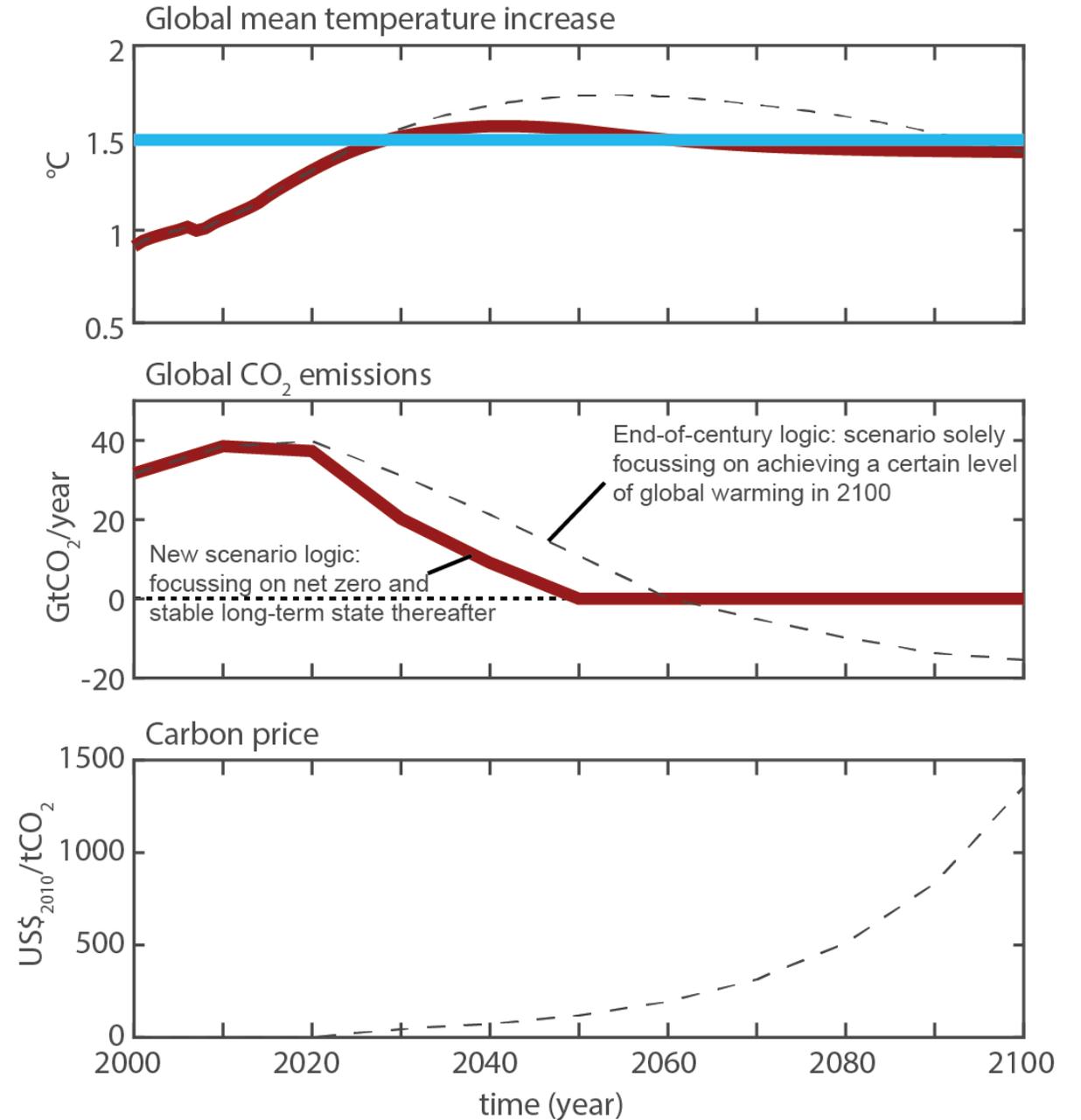


A new scenario logic for the Paris Agreement long-term temperature goal



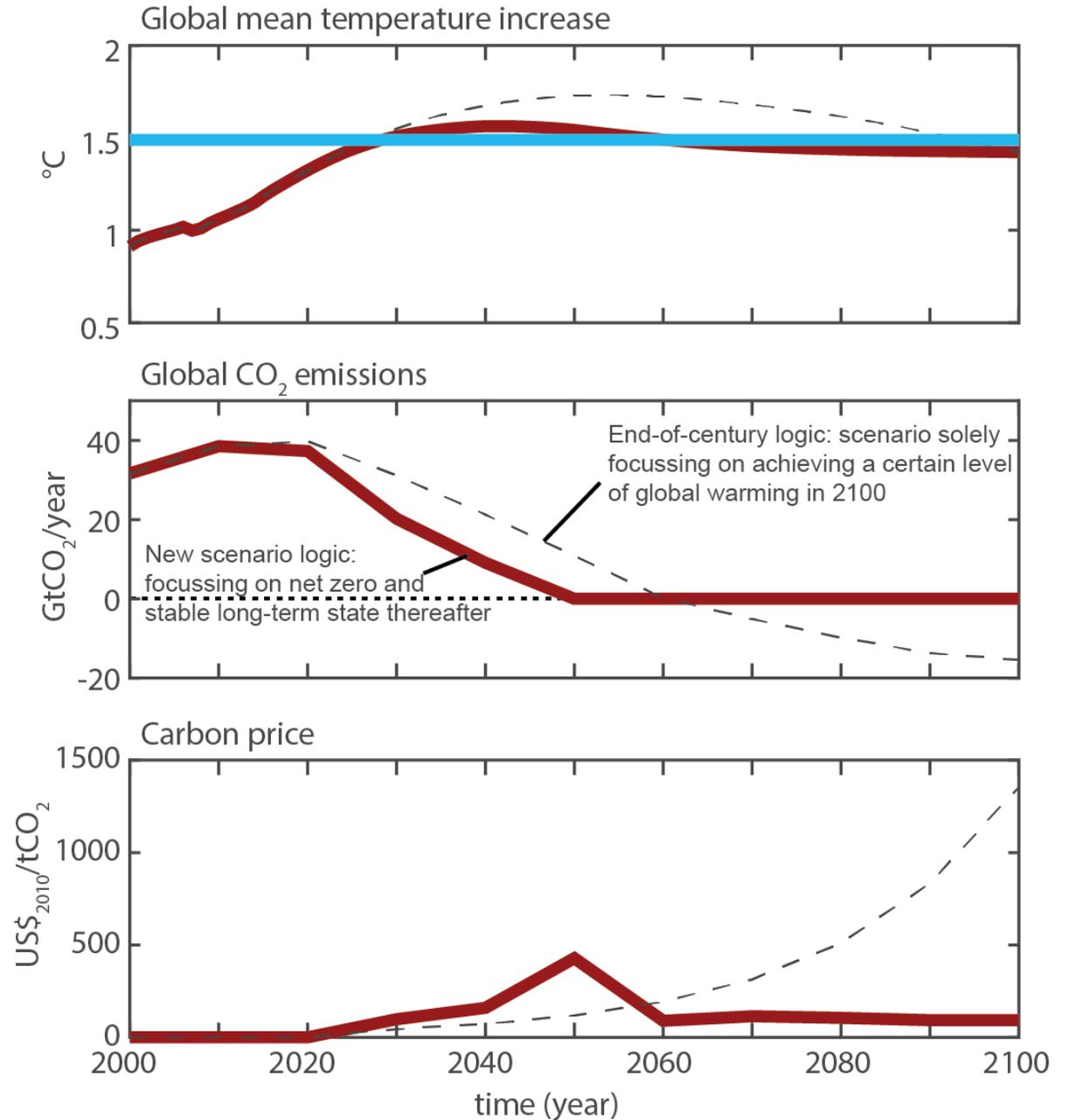
Implications and insights of our new scenario logic

- Timing of cost-effective climate action for Paris Agreement becomes discount-rate independent



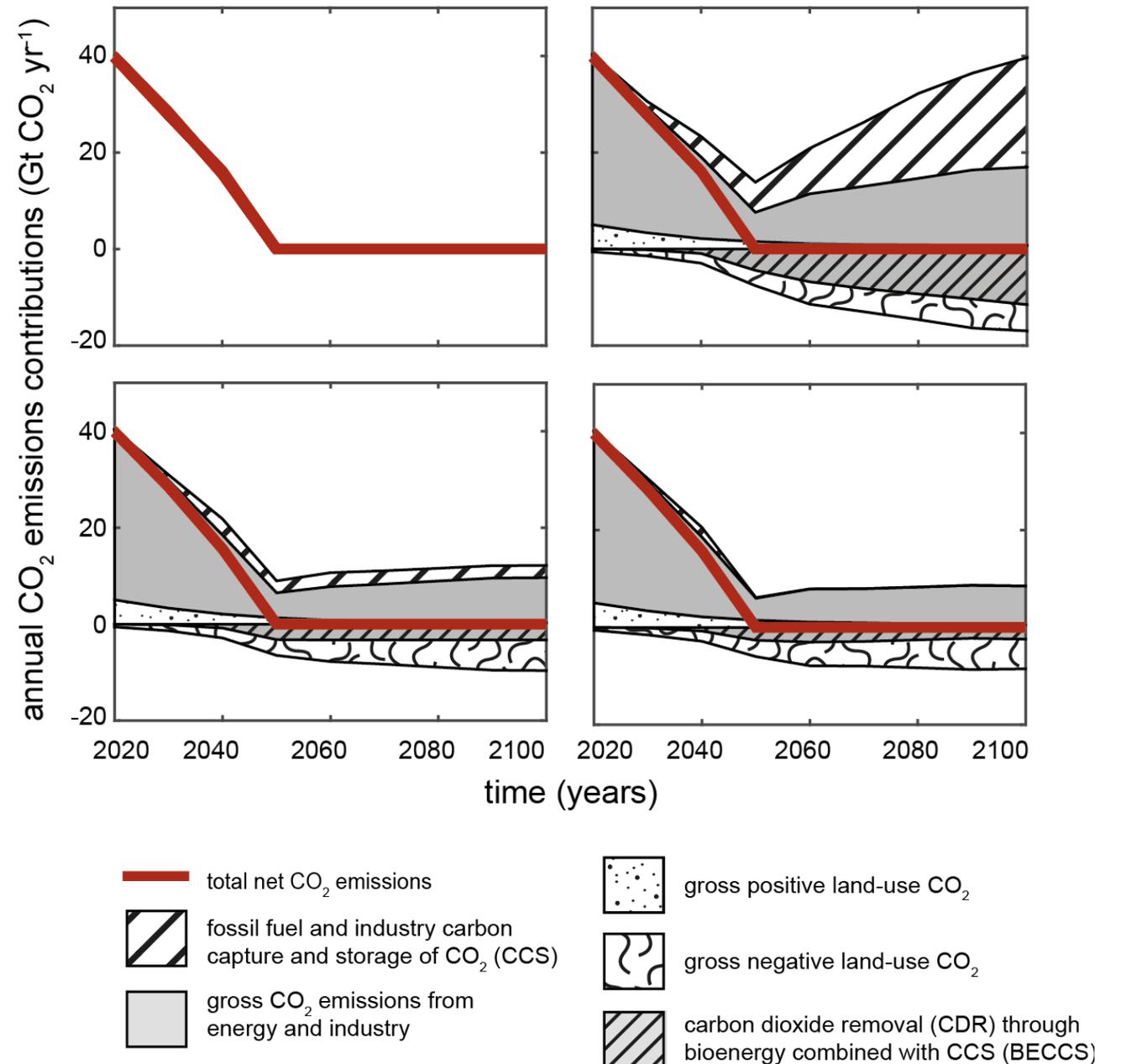
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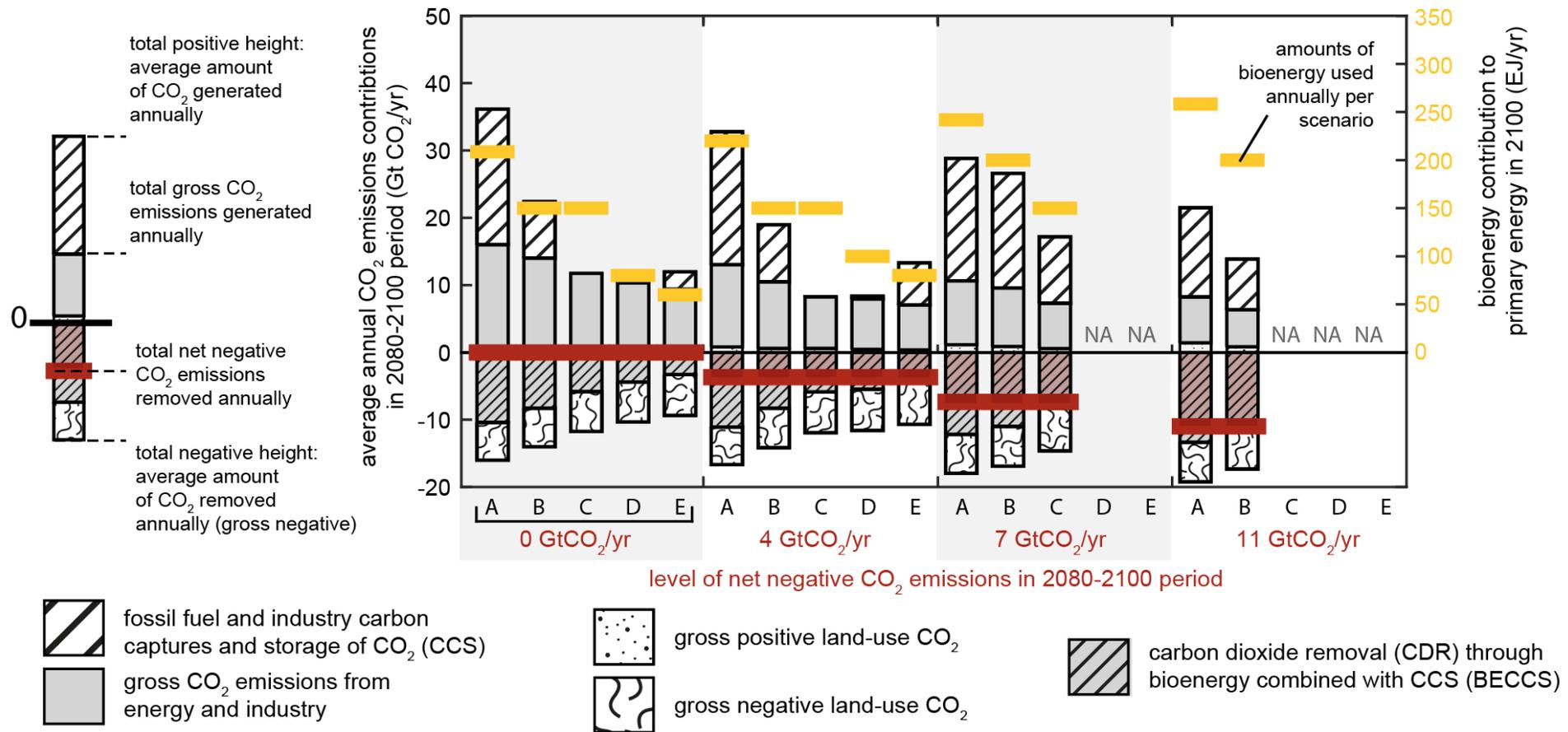
Implications and insights of our new scenario logic

- Timing of cost-effective climate action for Paris Agreement becomes discount-rate independent
- Fundamental shift in perception of cost of climate change mitigation over time
- Exploration of sustainable development implications without shifting climate ambition goal posts



BACKGROUND: A new scenario logic for the Paris Agreement long-term temperature goal

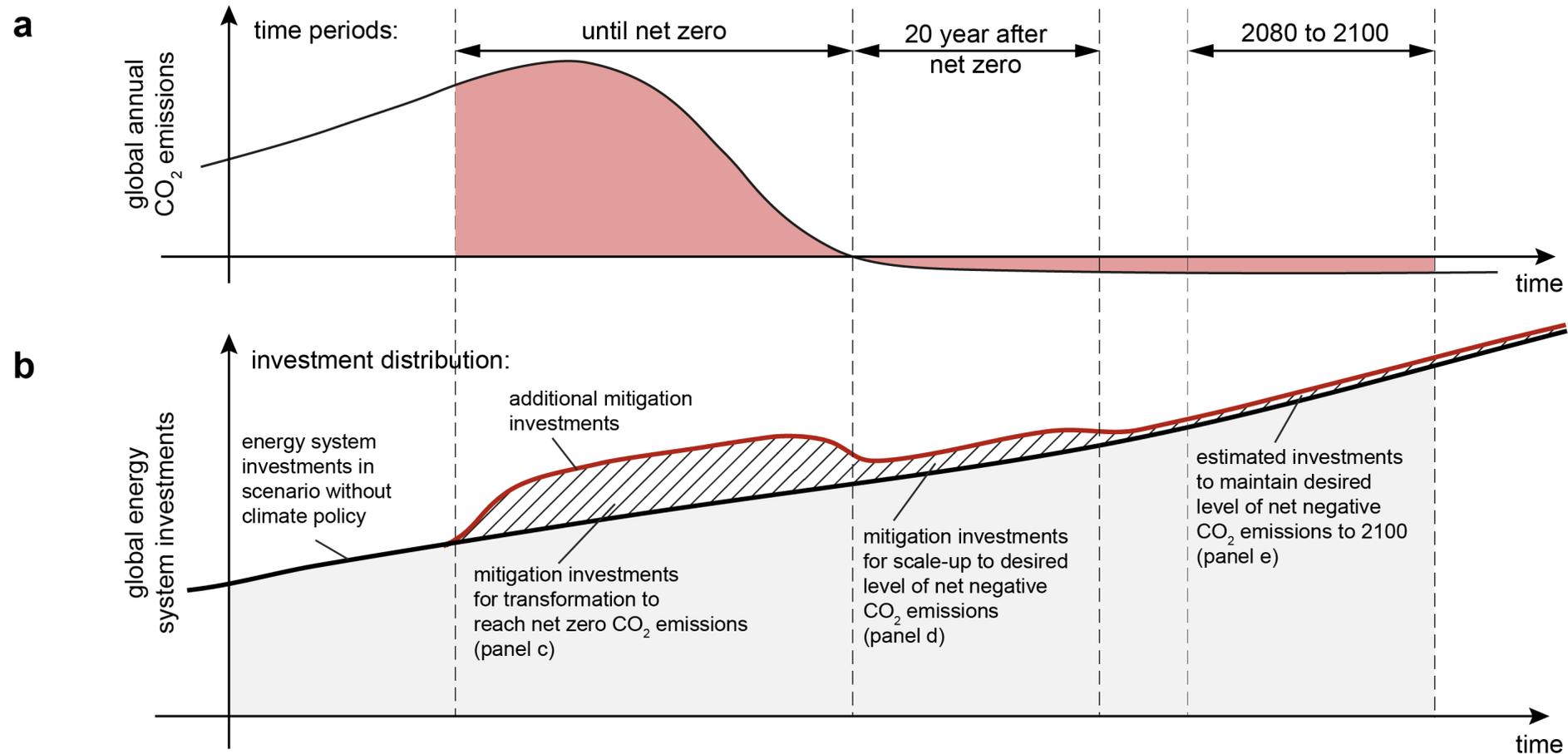
Different ways of achieving net zero and net negative global CO₂ emissions



BACKGROUND: A new scenario logic for the Paris Agreement long-term temperature goal

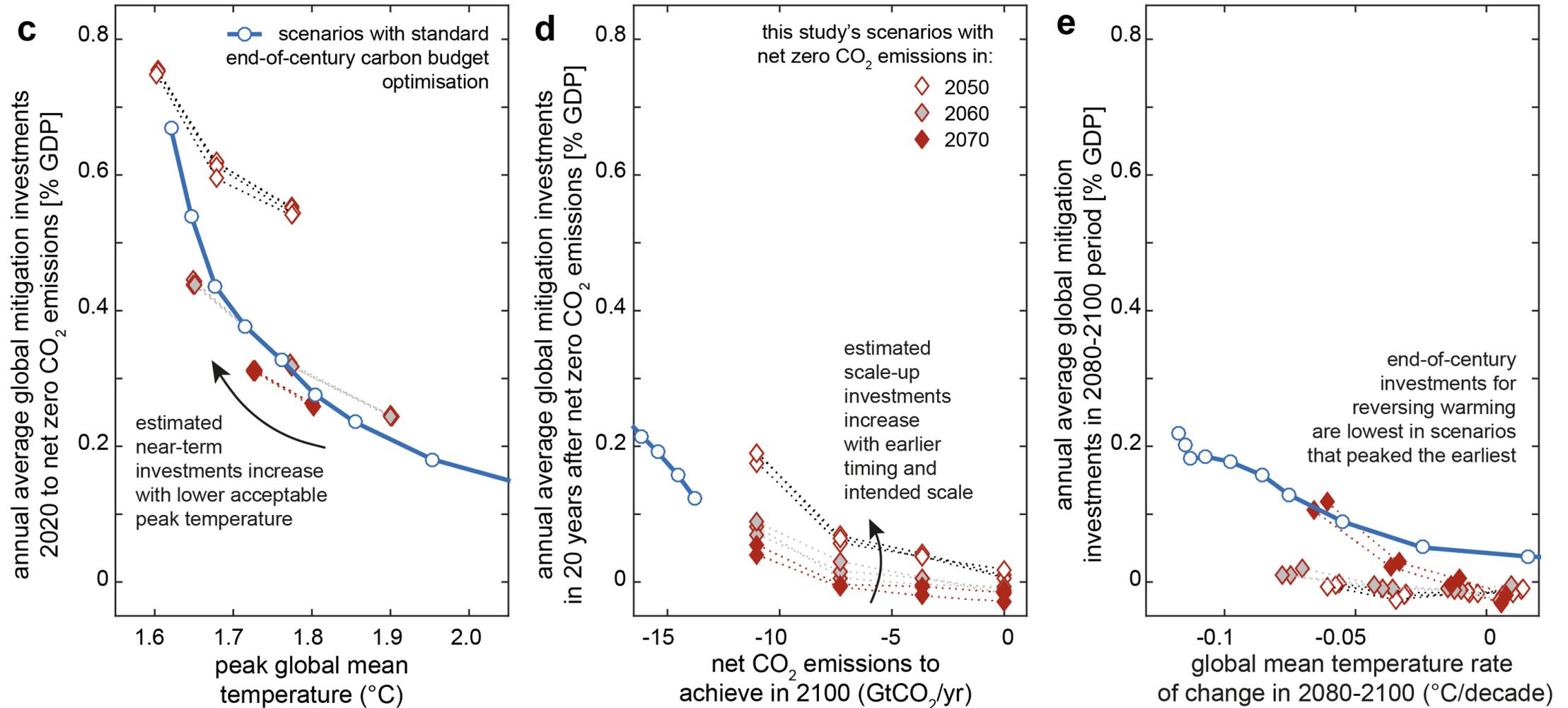
Climate change investment implications of new scenario logic

schematic:



BACKGROUND: A new scenario logic for the Paris Agreement long-term temperature goal

Climate change investment implications of new scenario logic



Thank you

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A new scenario logic for the Paris Agreement long-term temperature goal

Joeri Rogelj , Daniel Huppmann, Volker Krey, Keywan Riahi, Leon Clarke, Matthew Gidden, Zebedee Nicholls & Malte Meinshausen

Nature **573**, 357–363(2019) | [Cite this article](#)

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A new generation of emissions scenarios should cover blind spots in the carbon budget space

Shinichiro Fujimori , Joeri Rogelj, Volker Krey & Keywan Riahi

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