POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH

The IPCC Special Report on Global Warming of 1.5°C – What it means for us

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Climate "How": How to Engage Society and Deploy Decarbonization – 5th International Symposium

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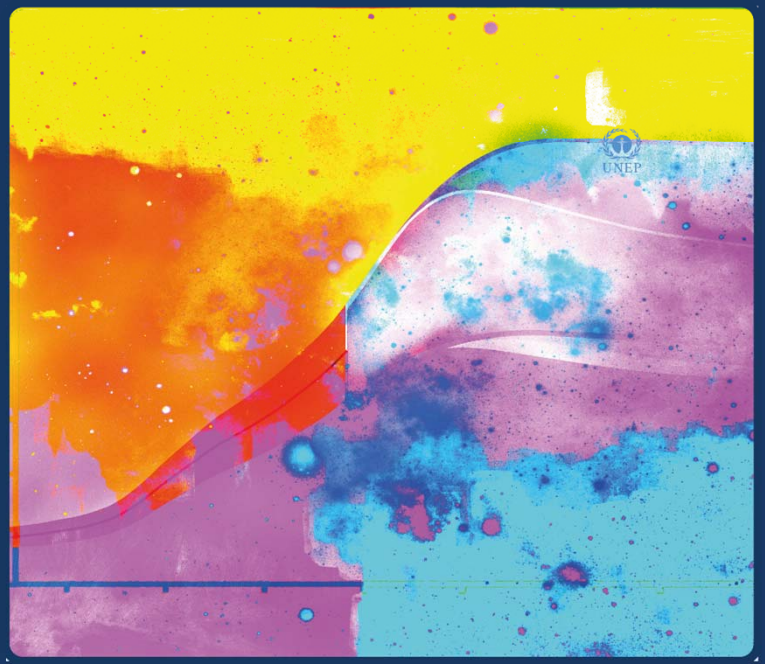
Global Warming of 1.5°C

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.

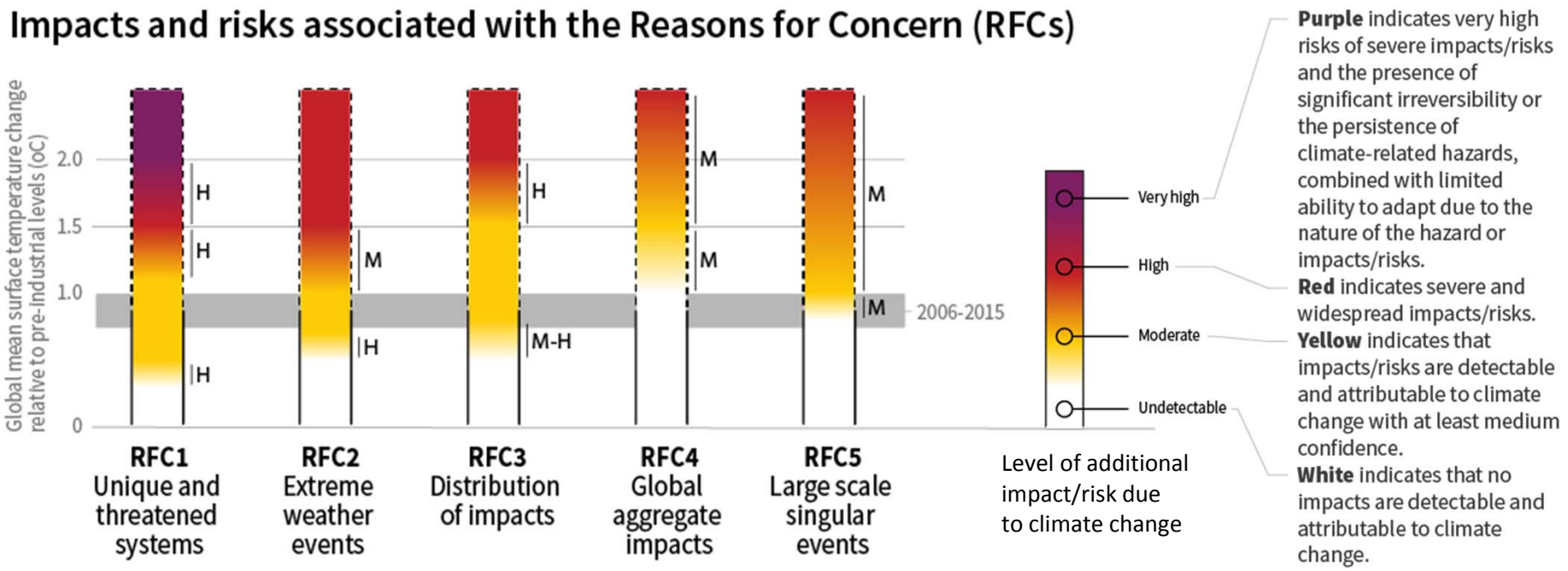


Projected Climate Change, Potential Impacts and Associated Risks

Impacts of global warming at 1.5°C are significantly lower than at 2°C

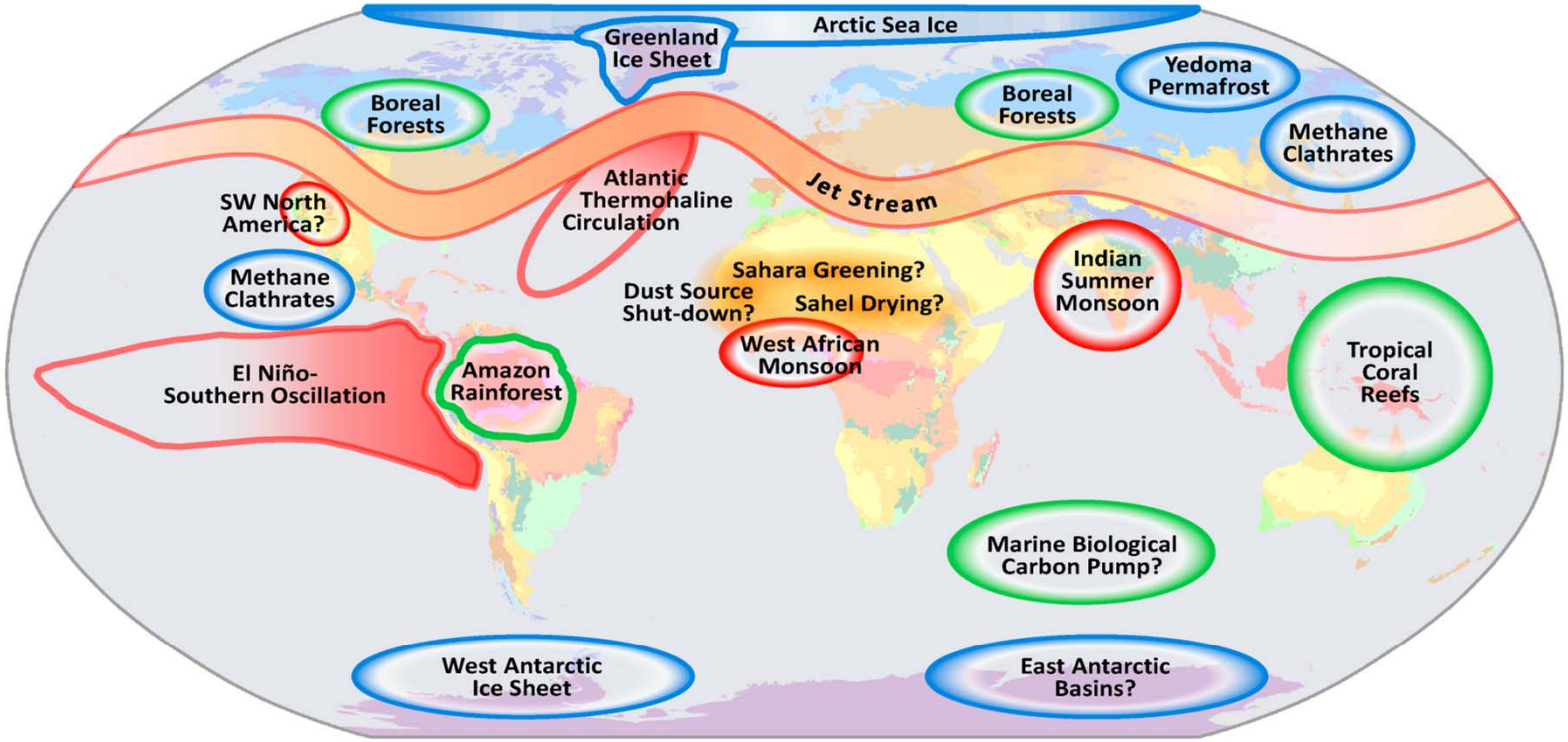
- By 2100, global mean sea level rise will be around 10 cm lower, irreversible loss of Greenland ice sheet could be triggered between 1.5°C and 2°C.
- Less extreme weather where people live, including extreme heat and rainfall.
- Global population exposed to water shortages up to 50% less
- Up to several hundred million fewer people exposed to climate-related risk and susceptible to poverty by 2050

SPM2 | 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

Tipping Elements in the Earth System

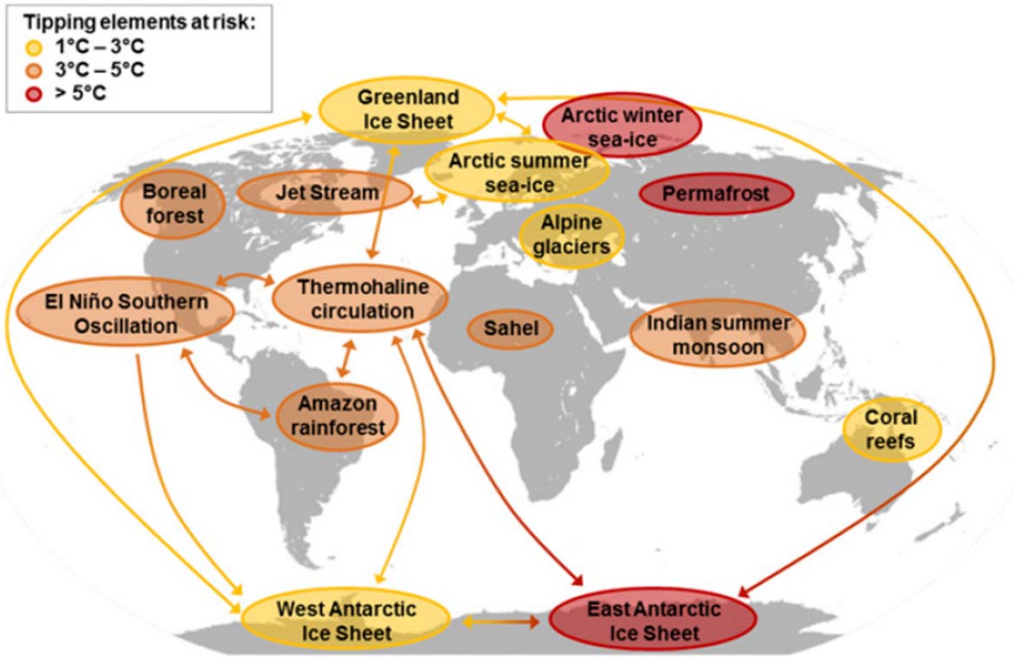


Cryosphere Entities
Circulation Patterns
Biosphere Components

Köppen Climate Classification

Ar Am Aw As BS BW Cr Cs Cw Do Dc Eo Ec FT FI

Interaction of Tipping Elements: “Hothouse Earth”



PERSPECTIVE

Trajectories of the Earth System in the Anthropocene

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Edited by William C. Clark, Harvard University, Cambridge, MA, and approved July 6, 2018 (received for review June 19, 2018)

We explore the risk that self-reinforcing feedbacks could push the Earth System toward a planetary threshold that, if crossed, could prevent stabilization of the climate at intermediate temperature rises and cause continued warming on a “Hothouse Earth” pathway even as human emissions are reduced. Crossing the threshold would lead to a much higher global average temperature than any interglacial in the past 1.2 million years and to sea levels significantly higher than at any time in the Holocene. We examine the evidence that such a threshold might exist and where it might be. If the threshold is crossed, the resulting trajectory would likely cause serious disruptions to ecosystems, society, and economies. Collective human action is required to steer the Earth System away from a potential threshold and stabilize it in a habitable interglacial-like state. Such action entails stewardship of the entire Earth System—biosphere, climate, and societies—and could include decarbonization of the global economy, enhancement of biosphere carbon sinks, behavioral changes, technological innovations, new governance arrangements, and transformed social values.

Earth System trajectories | climate change | Anthropocene | biosphere feedbacks | tipping elements

The Anthropocene is a proposed new geological epoch (1) based on the observation that human impacts on essential planetary processes have become so profound (2) that they have driven the Earth out of the Holocene epoch in which agriculture, sedentary communities, and eventually, socially and technologically complex human societies developed. The formalization of the Anthropocene as a new geological epoch is being considered by the stratigraphic community (3), but regardless of the outcome of that process, it is becoming apparent that Anthropocene conditions transgress Holocene conditions in several respects (2). The knowledge that human activity now rivals geological forces in influencing the trajectory of the Earth System has important implications for both Earth System science and societal decision making. While recognizing that different societies around the world have contributed differently and unequally to pressures on the Earth System and will have varied capabilities to alter future trajectories (4), the sum total of human impacts on the system needs to be taken into account for analyzing future trajectories of the Earth System.

Here, we explore potential future trajectories of the Earth System by addressing the following questions.

Is there a planetary threshold in the trajectory of the Earth System that, if crossed, could prevent stabilization in a range of intermediate temperature rises?

Given our understanding of geophysical and biosphere feedbacks intrinsic to the Earth System, where might such a threshold be?

(Steffen et al., 2018)

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

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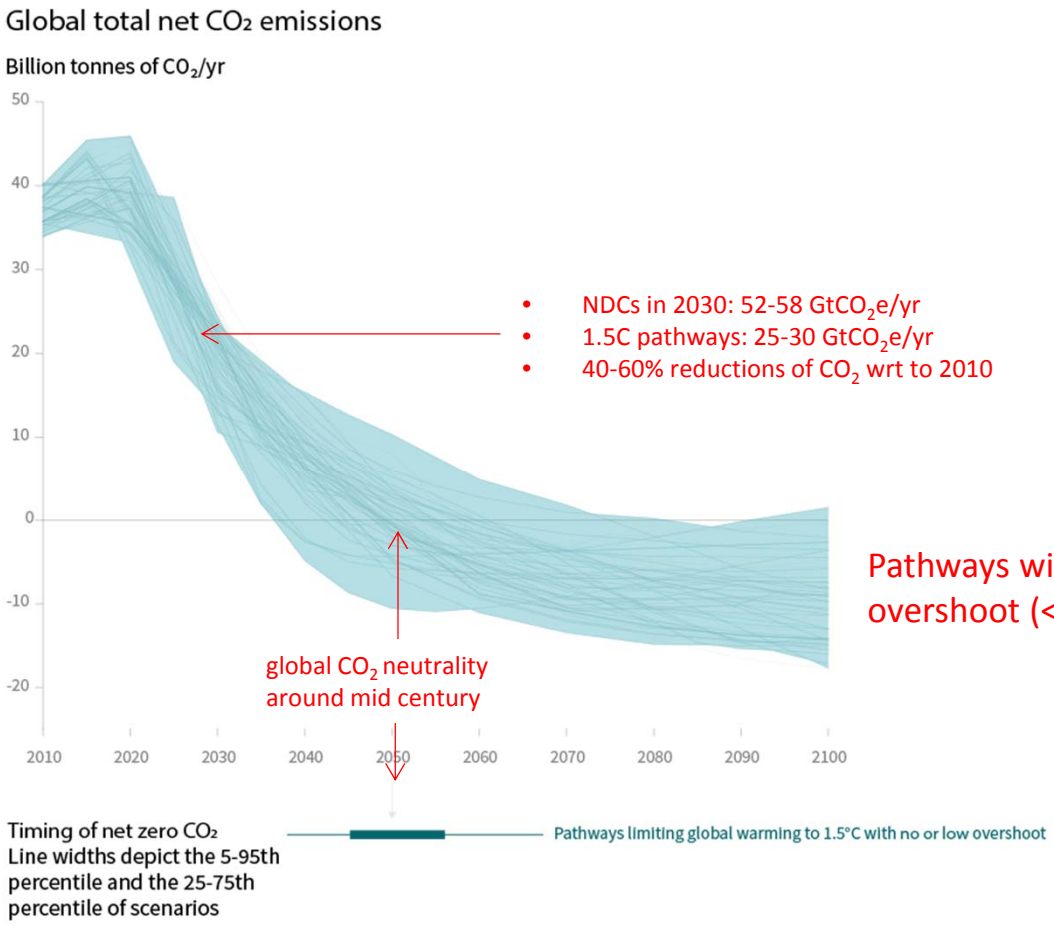
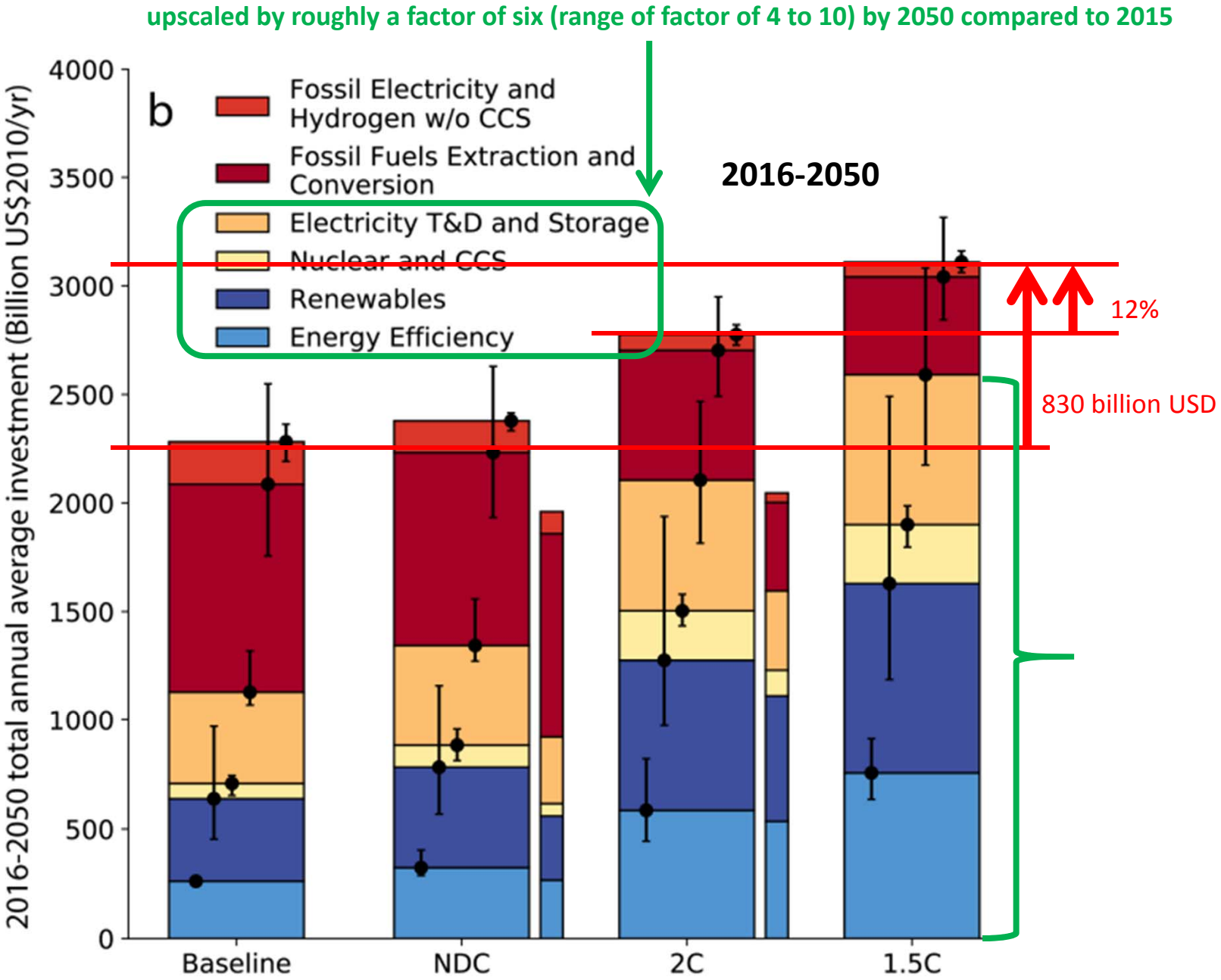
SPM3a | Global emissions pathway characteristics



Pathways with no or limited overshoot (<0.1°C) of 1.5°C


upscaled by roughly a factor of six (range of factor of 4 to 10) by 2050 compared to 2015
b
Fossil Electricity and Hydrogen w/o CCS
Fossil Fuels Extraction and Conversion
Electricity T&D and Storage
Nuclear and CCS
Renewables
Energy Efficiency
2016-2050
12%
830 billion USD
2016-2050 total annual average investment (Billion US$2010/yr)
4000
3500
3000
2500
2000
1500
1000
500
0
Baseline
NDC
2C
1.5C

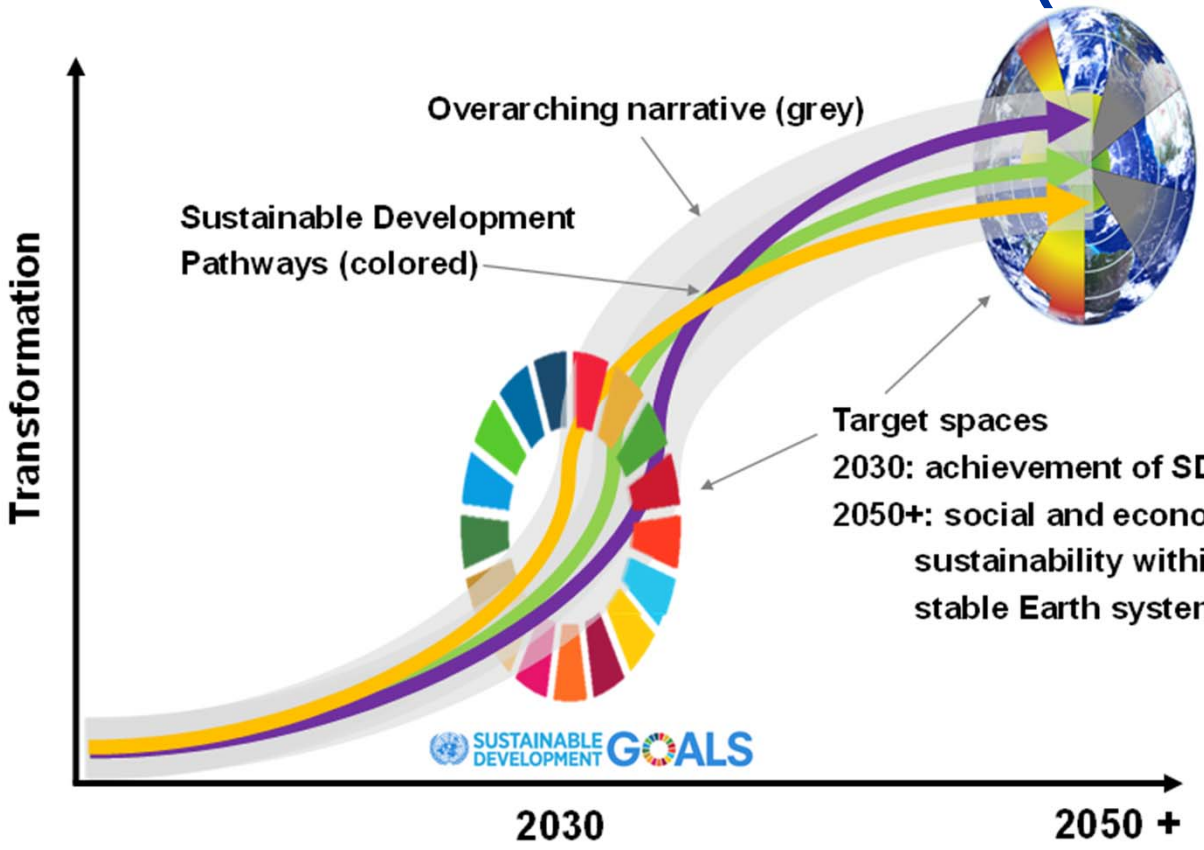
Strengthening the Global Response in the Context of Sustainable Development and Efforts to Eradicate Poverty

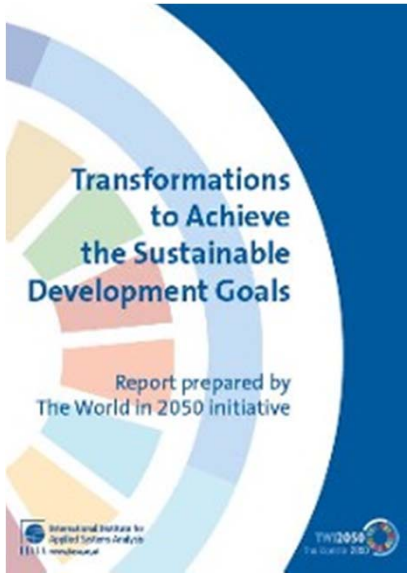
Climate change and people

- 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

From mitigation pathways to sustainable development pathways

"The World in 2050" Framework (www.twi2050.org)





http://www.iiasa.ac.at/web/home/research/twi/Report2018.html

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Thank you very much for your attention!

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