

# Climate mitigation pathways and sustainable development

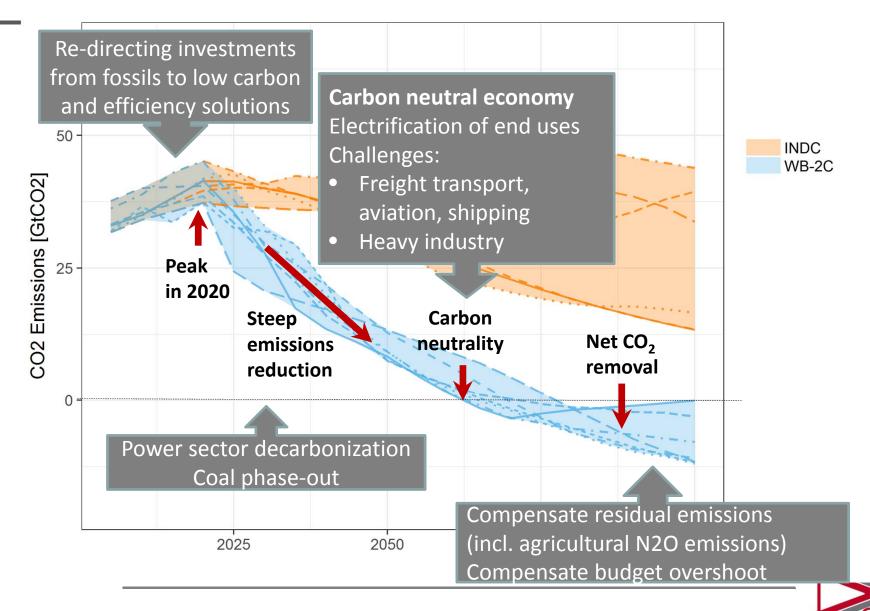
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ThinkForest Workshop on Climate Policy and Forest Bioeconomy

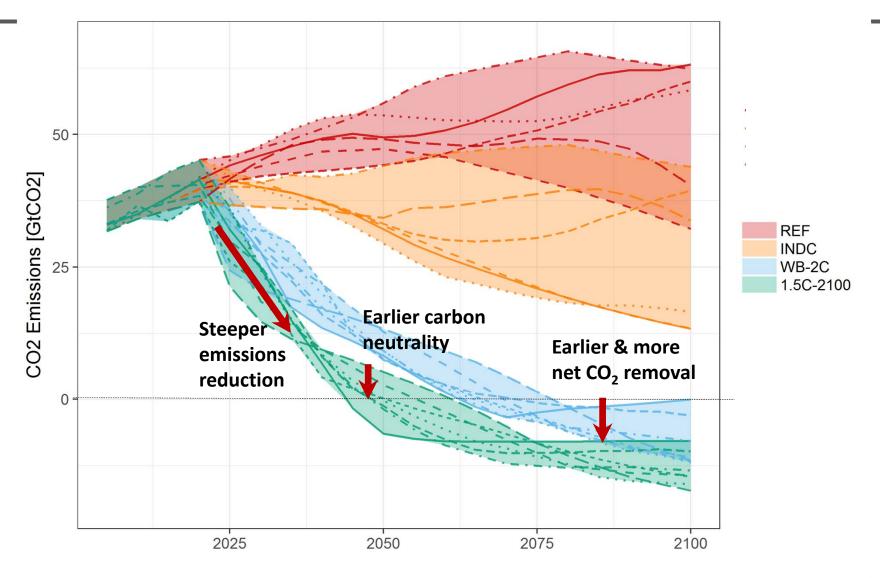
Brussels, December 4<sup>th</sup>, 2018



### The Story of 2°C Mitigation Pathways



### The Additional Challenge of Limiting Warming to 1.5°C

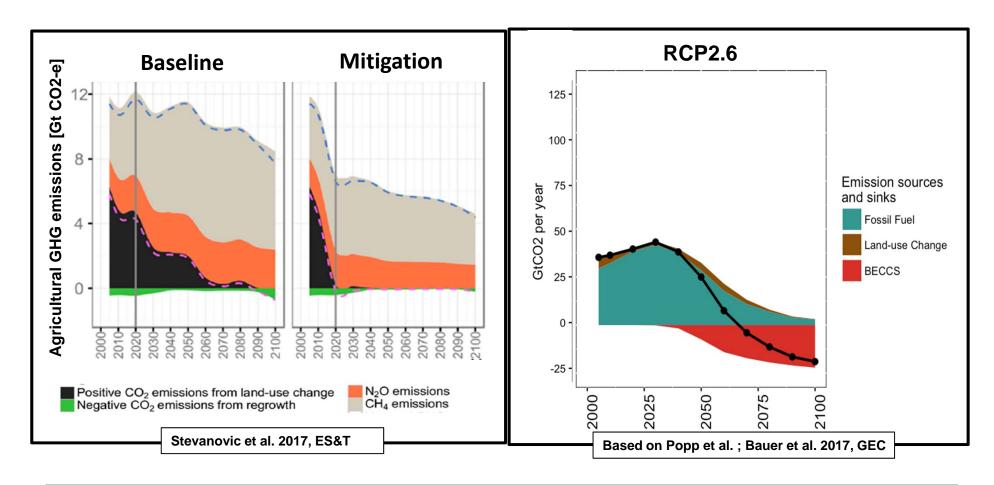




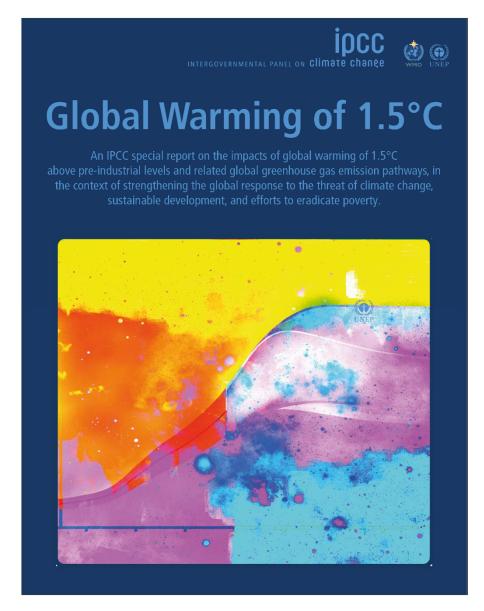
## The role of land in 1.5 and 2°C pathways

GHG emission reduction

Carbon dioxide removal (CDR)







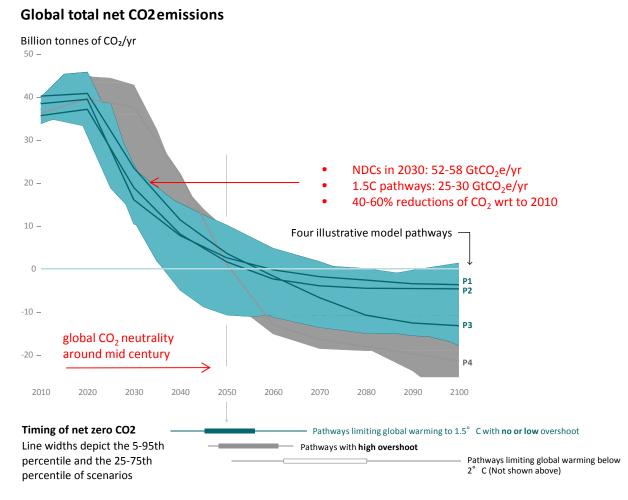


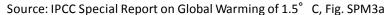




## IPCC SR1.5 findings on 1.5°C pathways

- Requires substantial emissions reductions until 2030 and global net zero CO2 emissions by mid century
- If NDCs until 2030 are implemented, 1.5C will be breached, even if supplemented by drastic emissions reductions thereafter.
- Requires transformational change at unprecedented scale in all sectors



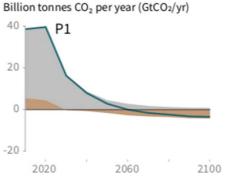


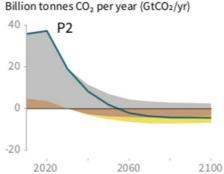


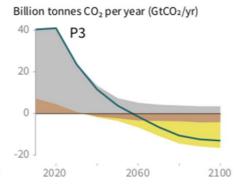
## The timing of land-based mitigation and CDR

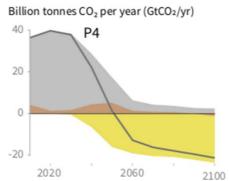
#### Breakdown of contributions to global net CO2 emissions in four illustrative model pathways

■ Fossil fuel and industry
■ AFOLU
● BECCS







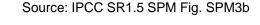


P1: A scenario in which social, business, and technological innovations result in lower energy demand up to 2050 while living standards rise, especially in the global South. A down-sized energy system enables rapid decarbonisation of energy supply. Afforestation is the only CDR option considered; neither 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.





## Range of carbon dioxide removal options

**Portfolio of CDR technologies** would limit deployment and therefore sustainability issues for each single technology

- Soil carbon enhancement, biochar and land restoration
- Afforestation
- BECCS using energy crops
- BECCS using algae
- Direct Air Capture (DAC) + Geological storage
- Carbon capture and usage (e.g. carbon fiber / wood)
- Enhanced Weathering
- Artificial ocean alkalinization

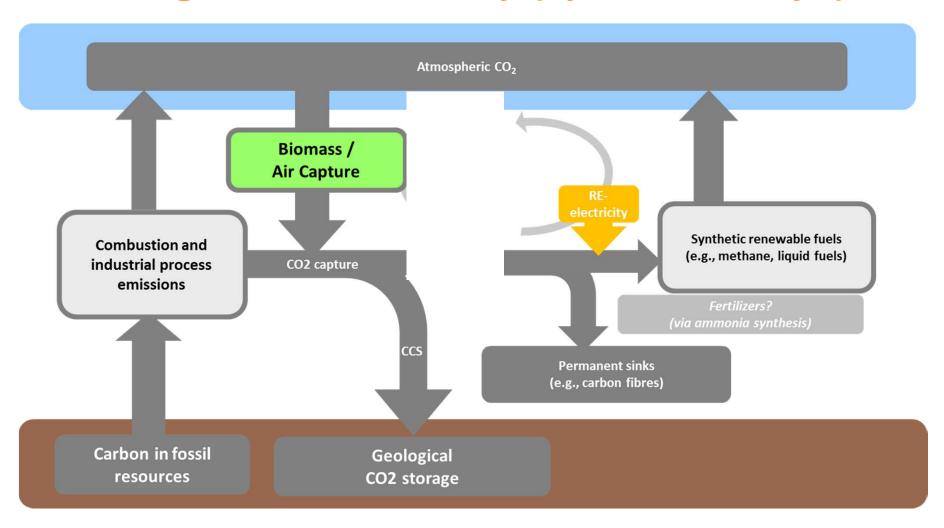
Terrestrial storage Early deployment

Geological storage Medium-Long term

Mineralisation Medium-Long term

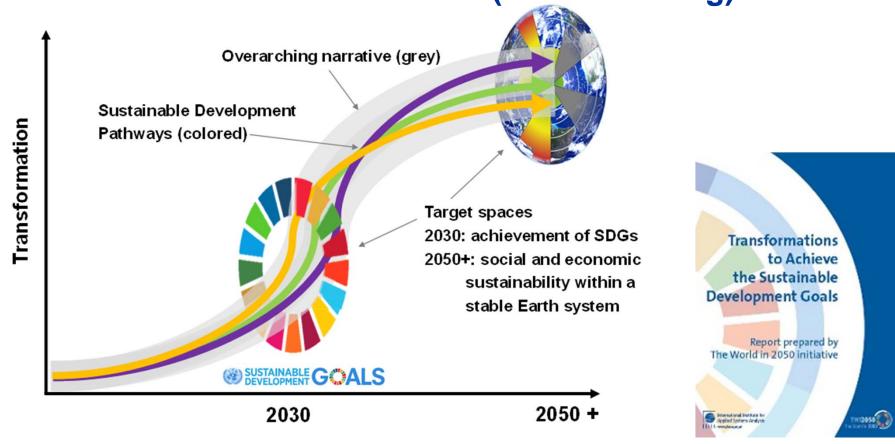


## Integrated Carbon Management for Reaching Carbon Neutrality (by Mid Century?)



# From mitigation patways to sustainable development pathways

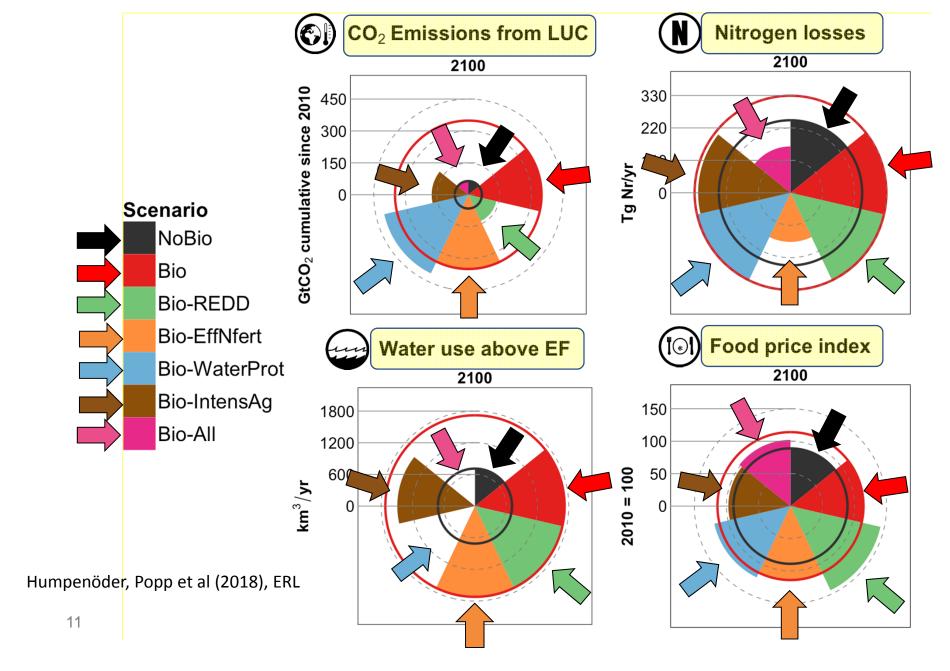
"The World in 2050" Framework (www.twi50.org)



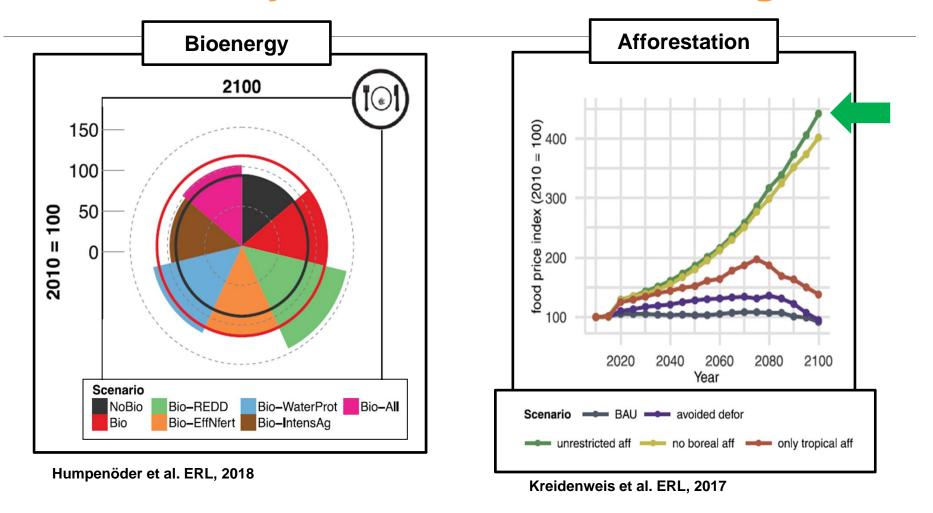
http://www.iiasa.ac.at/web/home/research/twi/Report2018.html



## Sustainability of land-use based mitigation



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Serious consequence for food prices due to increased competition for land.



## Discussion

SENSES project on scenario communication and visualization (senses-project.org)

Primer on Climate Change Scenario Approaches: https://climatescenario.org/primer/

