

Chapter 2:
Mitigation pathways compatible
with 1.5°C in the context of
sustainable development

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The remaining carbon budget



Image source: NASA blue marble

The remaining carbon budget

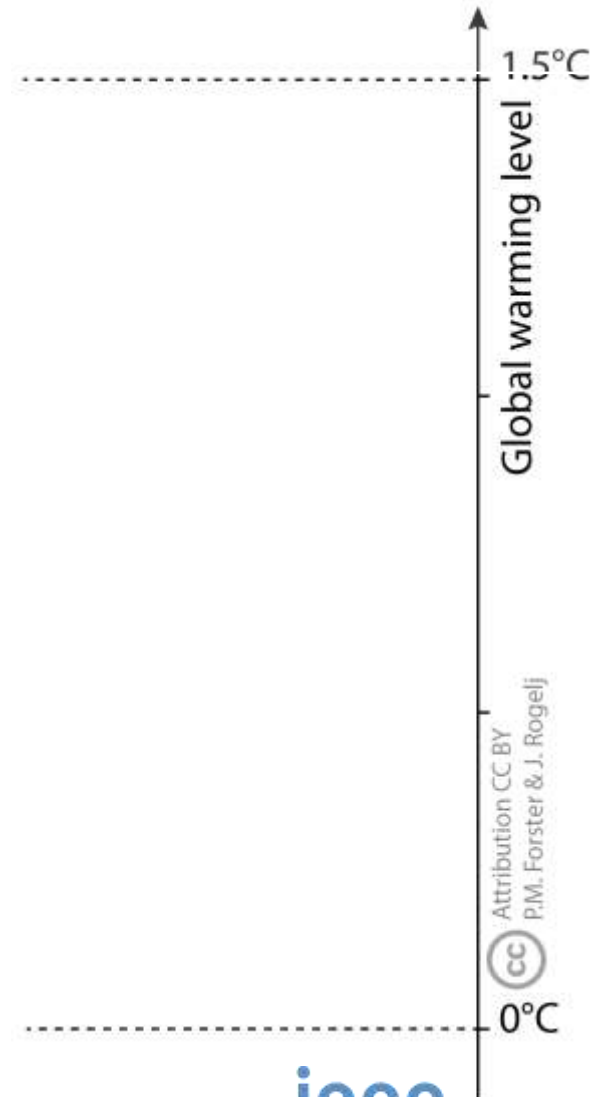


Image source: NASA blue marble

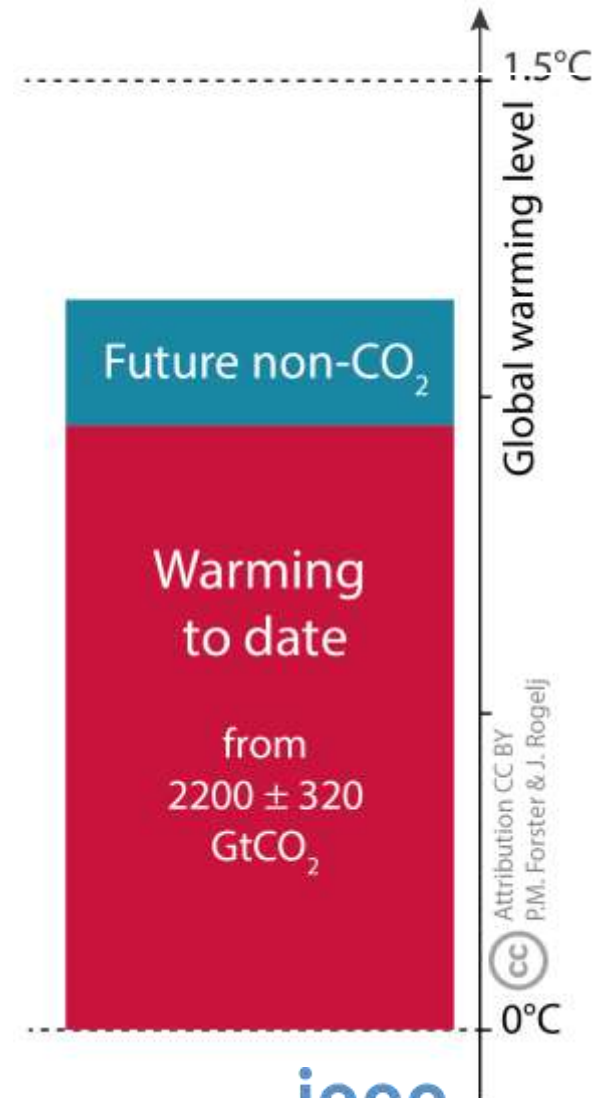
The remaining carbon budget



Image source: NASA blue marble

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The remaining carbon budget

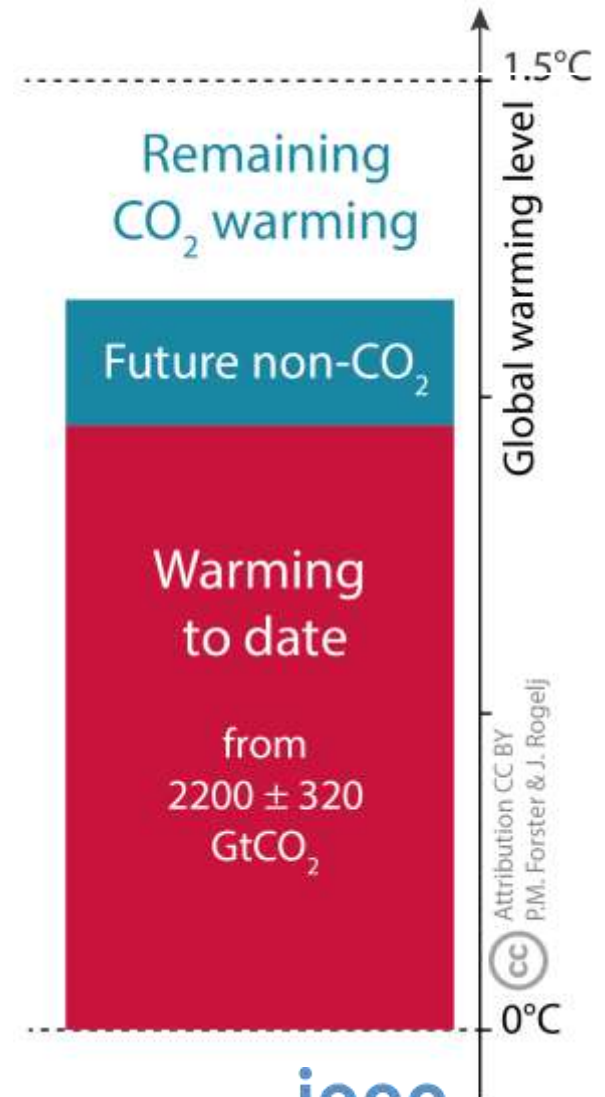


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The remaining carbon budget

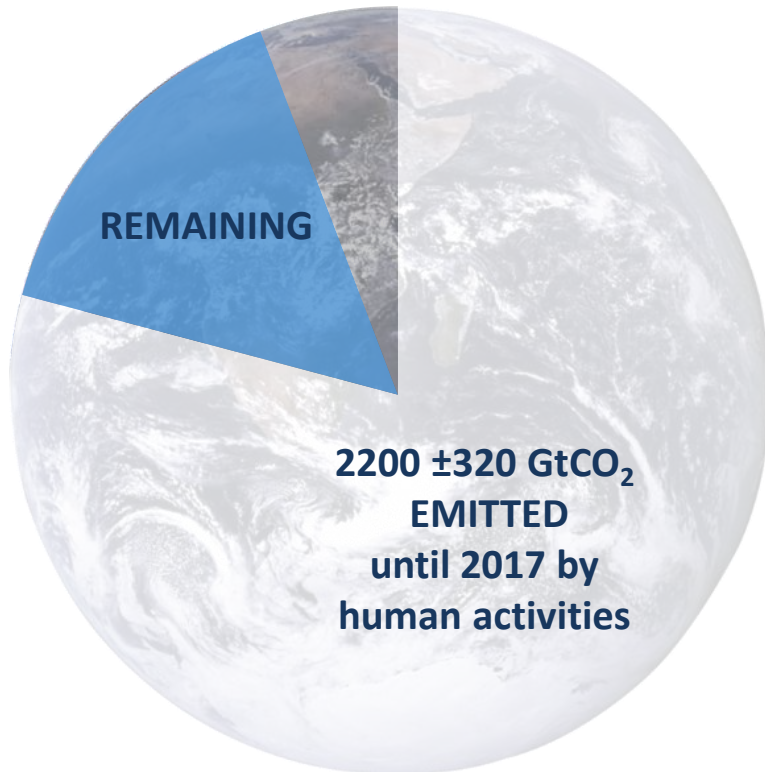


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The remaining 1.5°C carbon budget



Remaining carbon budget

580 GtCO₂ left (50% chance of 1.5°C)

420 GtCO₂ left (66% chance of 1.5°C)

± 400 GtCO₂ geophysical uncertainty

± 250 GtCO₂ depends on non-CO₂ reductions

Unrepresented Earth system feedbacks

reduce budget by 100 GtCO₂ until

Currently: 42 ± 3 GtCO₂/yr annually

IAMC 1.5°C SCENARIO EXPLORER

Welcome to the IAMC 1.5°C Scenario Explorer hosted by IIASA

Select an existing workspace or create a new one...

Create new workspace

Import

Showing all workspaces

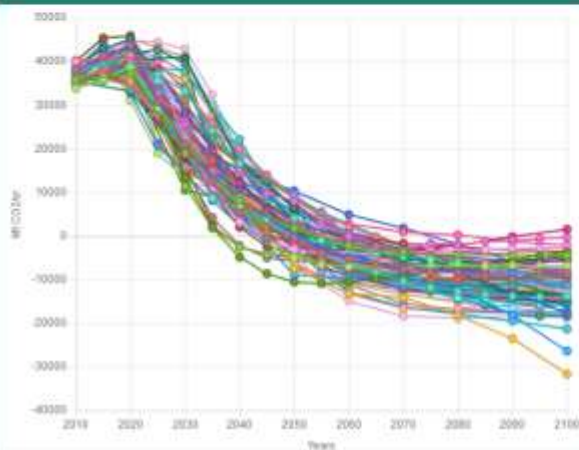
Ordered by name



Global emissions pathways (SPM Figure 3a)

This workspace shows the panels of Figure 3a in the Summary for Policymakers of the SR15. It displays the net carbon dioxide emissions in all pathways limiting global warming to below 1.5°C pathways at the end of the century, and the methane, black carbon and nitrous oxide emissions in all

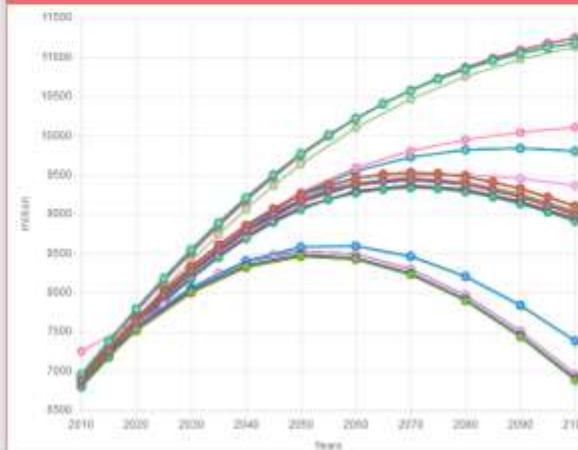
Open



Socio-economic drivers in 1.5°C pathways

This workspace shows the range of socio-economic assumptions and drivers in pathways limiting global warming to 1.5°C by the end of the century; it is based on Figure 2.4 in Chapter 2 of the SR15.

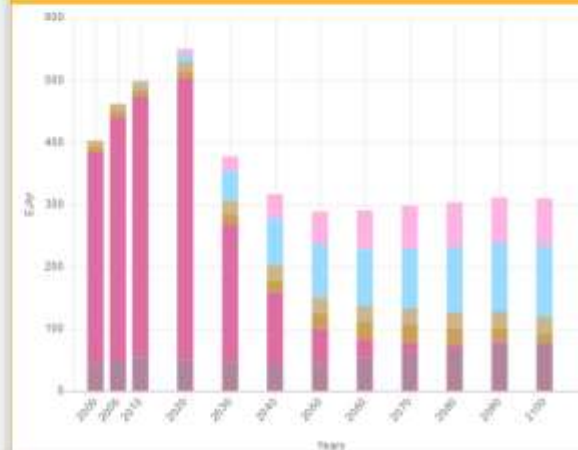
Open



The energy system in the four illustrative path...

This workspace shows the transformation of the energy system towards low- and high-carbon fuels in the four illustrative pathways. It is based on Figure 2.15 in Chapter 2 of the SR15.

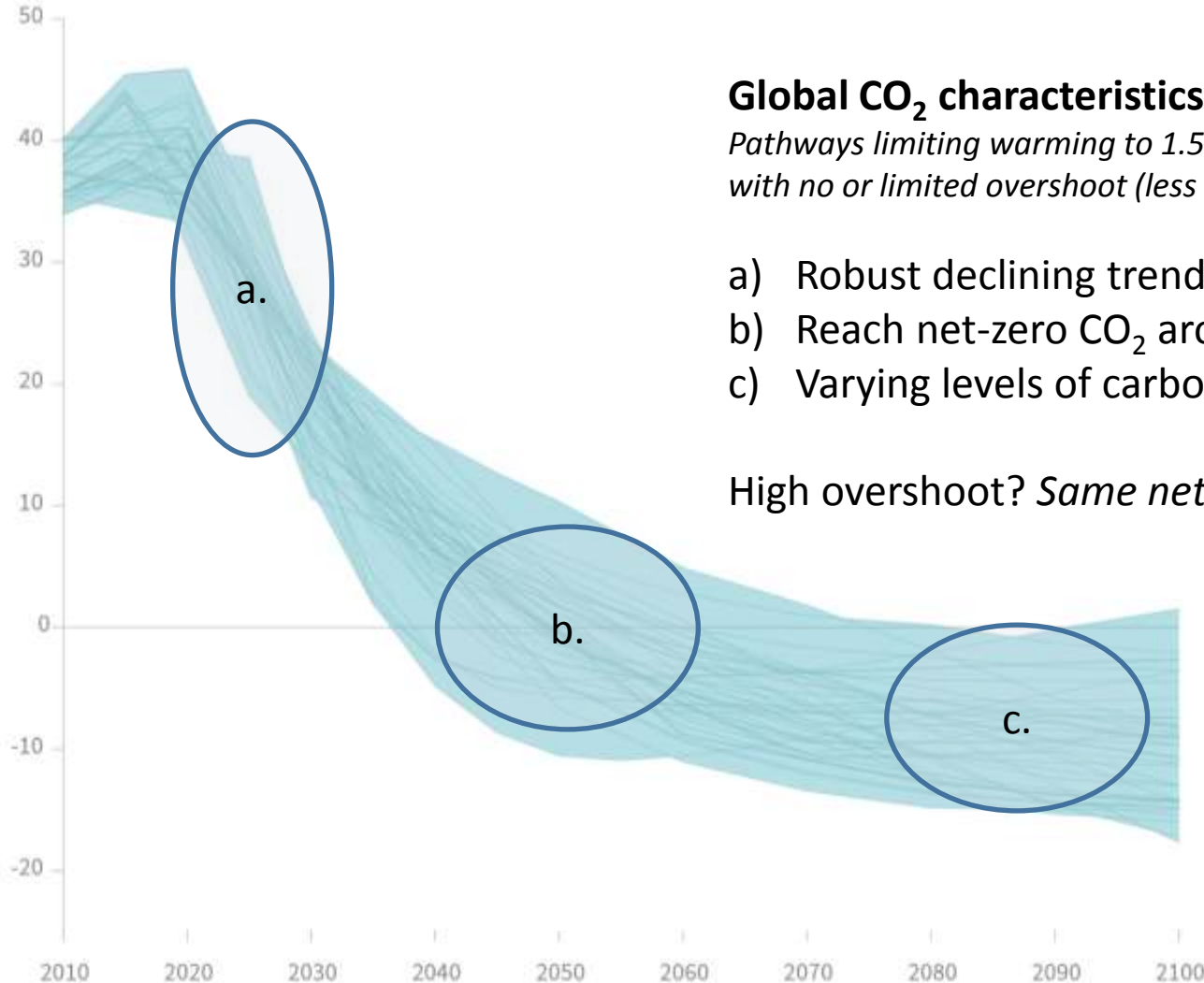
Open



<https://data.ene.iiasa.ac.at/iamc-1.5c-explorer/>

The emission reduction challenge

Billion tonnes of CO₂/yr



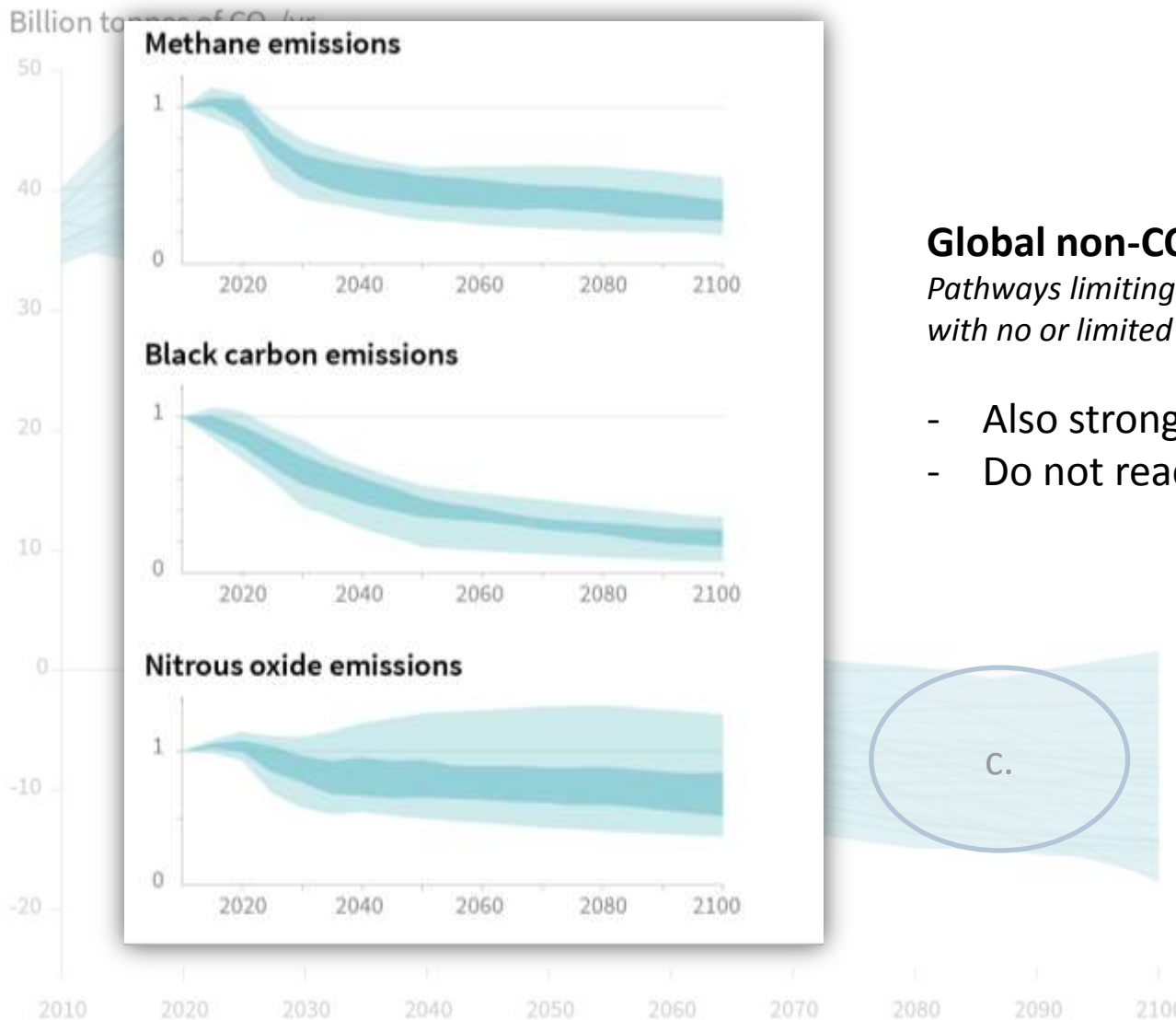
Global CO₂ characteristics

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

- a) Robust declining trend in next decade
- b) Reach net-zero CO₂ around mid-century
- c) Varying levels of carbon-dioxide removal (CDR)

High overshoot? Same net zero timing - More CDR

The emission reduction challenge



Global non-CO₂ characteristics

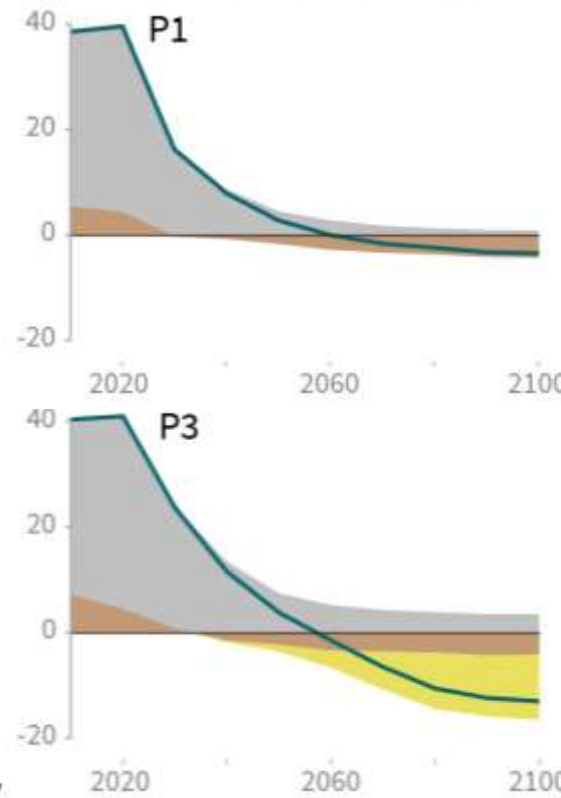
Pathways limiting warming to 1.5°C with no or limited overshoot (less than 0.1°C):

- Also strongly reduced
- Do not reach zero globally

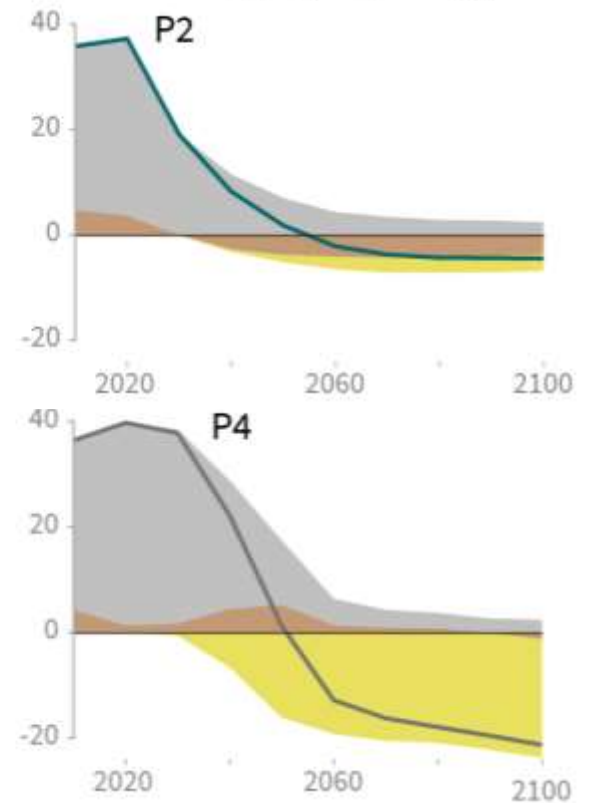
Not all 1.5°C pathways are created equal



Billion tonnes CO₂ per year (GtCO₂/yr)



Billion tonnes CO₂ per year (GtCO₂/yr)



Where do we need to go?



Global greenhouse gas (GHG) in 2016:
about 52 GtCO₂e/yr

2030 GHG emissions

1.5°C pathways	2°C pathways
with no or limited overshoot over 21 st century	with at least 2/3 rd chance during 21 st century
25-30 GtCO ₂ e/yr	30-42 GtCO ₂ e/yr



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Image source: www.vertic.ca

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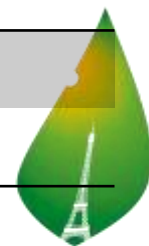
Paris Agreement Pledges

NDC global GHG emissions in 2030

unconditional	conditional
52-58 GtCO ₂ e/yr	50-54 GtCO ₂ e/yr

From 2018-2030

400-560 GtCO₂ projected to be emitted



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Implications of where we are today



Implications of this mismatch:

- Current NDCs on track for 3°C this century
- Remaining 1.5°C carbon budget exhausted by 2030 or due to steepest reductions thereafter
- Commitment to higher maximum warming
- Commitment to large-scale carbon-dioxide removal (CDR) for ambitious climate targets
- Challenges increase, do not disappear, but are pushed one decade into the future



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