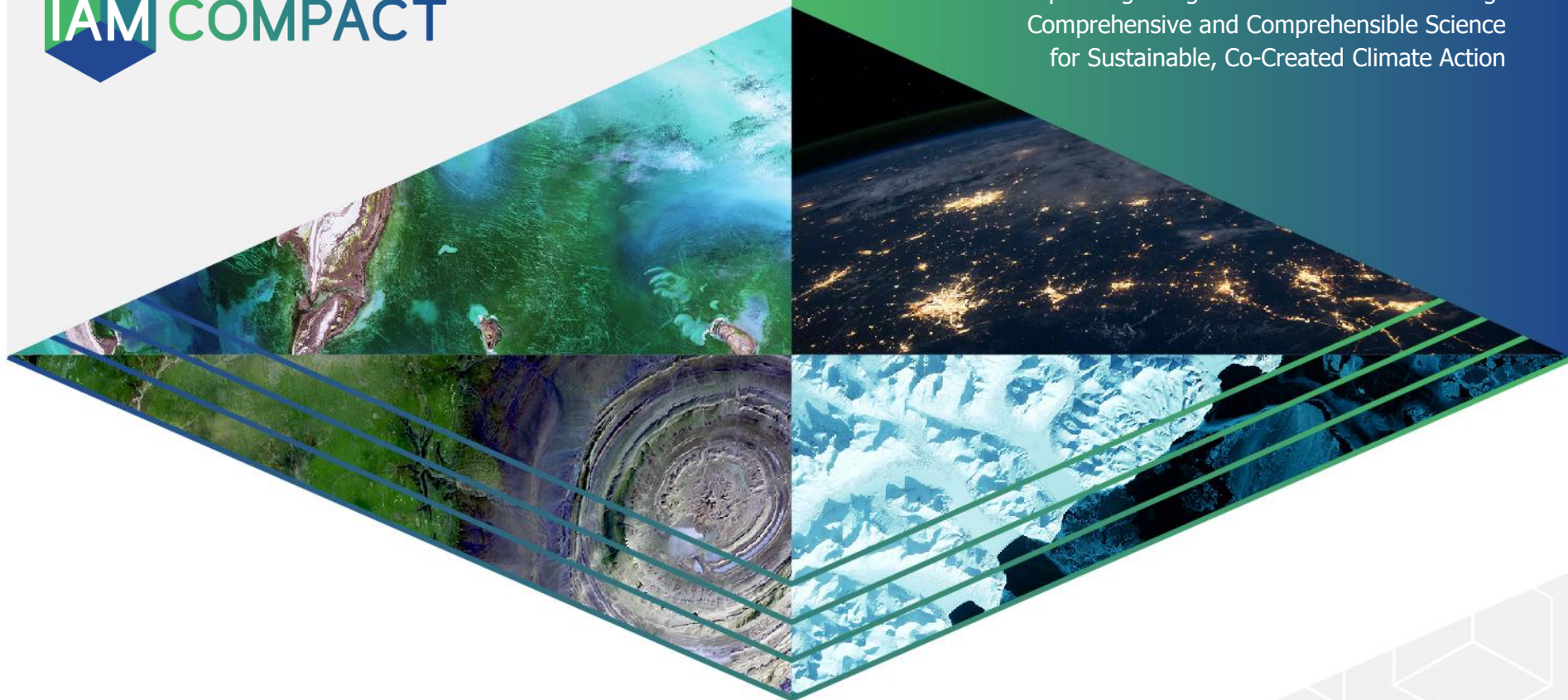




Expanding Integrated Assessment Modelling:
Comprehensive and Comprehensible Science
for Sustainable, Co-Created Climate Action



Responsive science in support of climate policymaking
IAM COMPACT Final Conference, Athens, 29 August 2025

Cross-sectoral mitigation and SDGs

Dr. Konstantinos Koasidis (NTUA)



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Paris Agreement:
Well-below 2°C

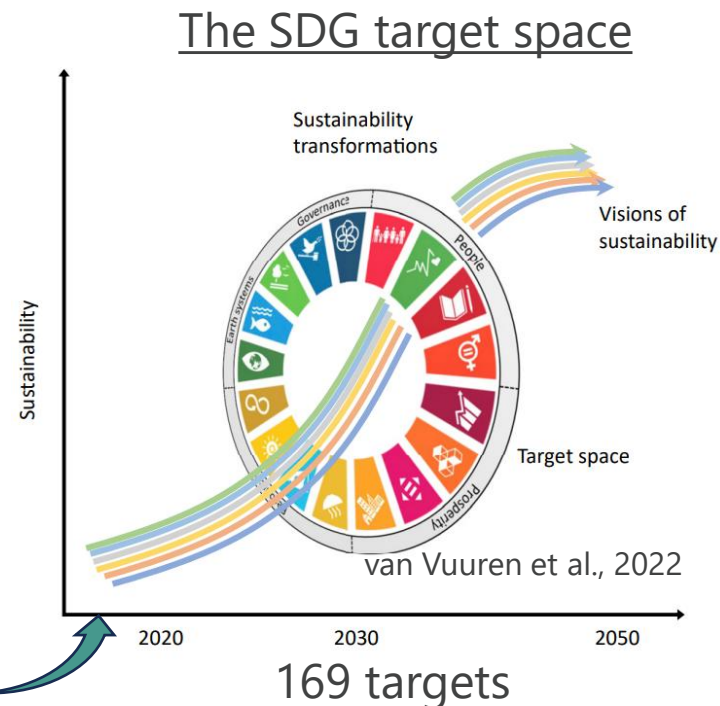
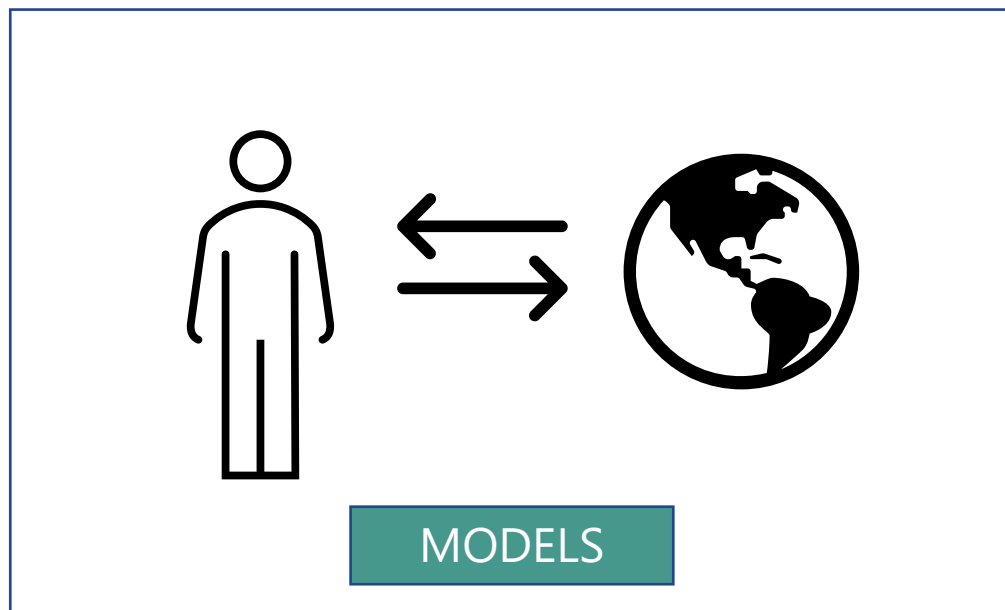


Sustainable Development Agenda:

- 17 goals
- 231 unique indicators



- **Current approaches:** Impact of climate action and policies on SDGs



- **Usefulness:** Identification of co-benefits/synergies and trade-offs.
- **Limitation:** IAMs typically focus on economic performance, hence it is difficult to prioritise overall SDG performance.

Six economic sectors



Five SDGs



average food basket price



premature mortality



GDP_{pc} growth



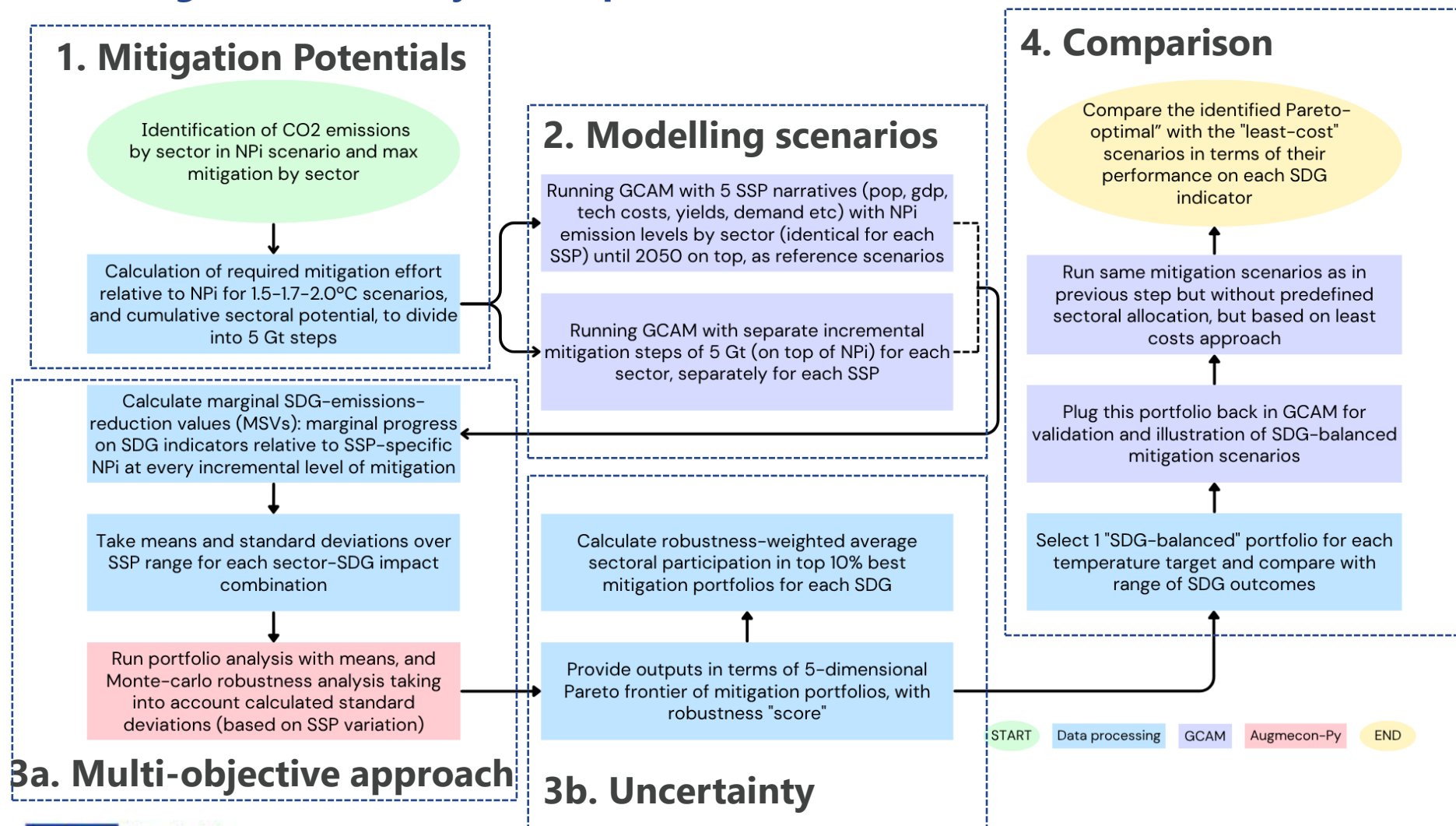
water scarcity



potential species loss

Optimal allocation of mitigation effort per sector to maximise performance over several sustainability dimensions

From single- to multi-objective optimisation:

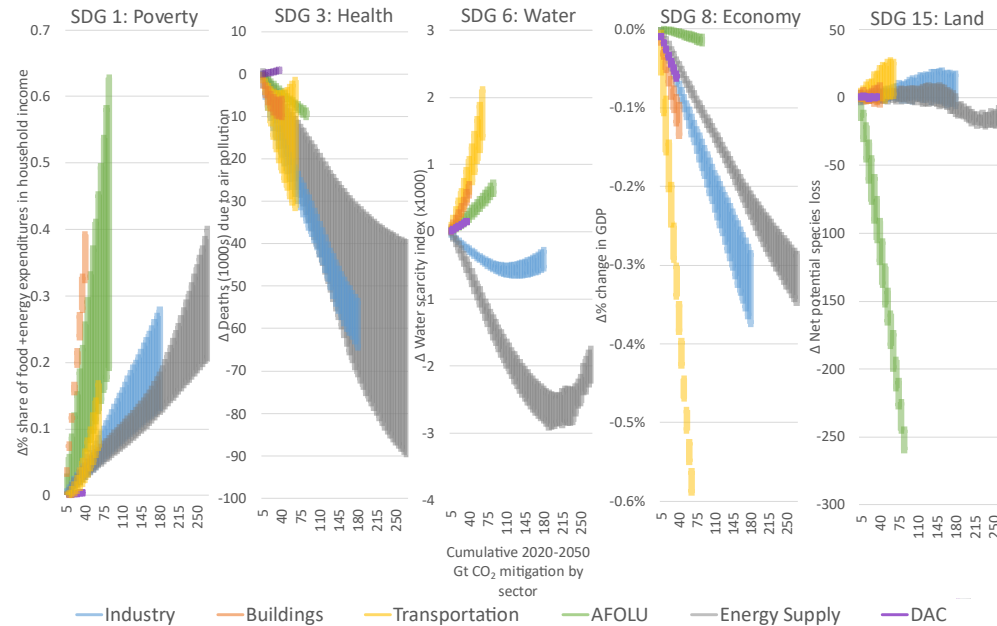


Each year, the world emits ~40Gt of CO₂, i.e., 1000 Gt CO₂ by 2050 with no policy action. There is still a significant ambition gap in current policies.

Sector	Mitigation Potential by 2050 (Gt CO ₂)
Industry	180
Buildings	40
Transportation	65
AFOLU	85
Power Supply	270
DAC	35
Sum	675

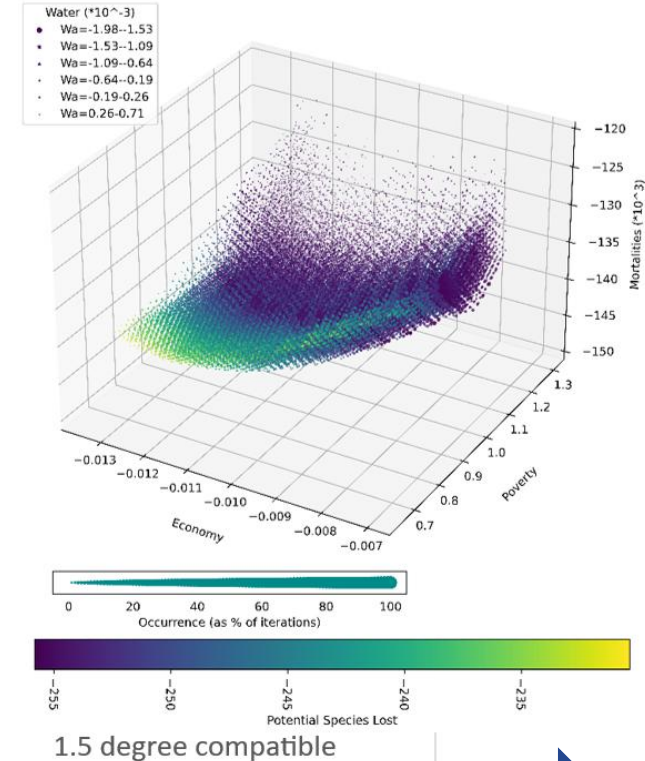
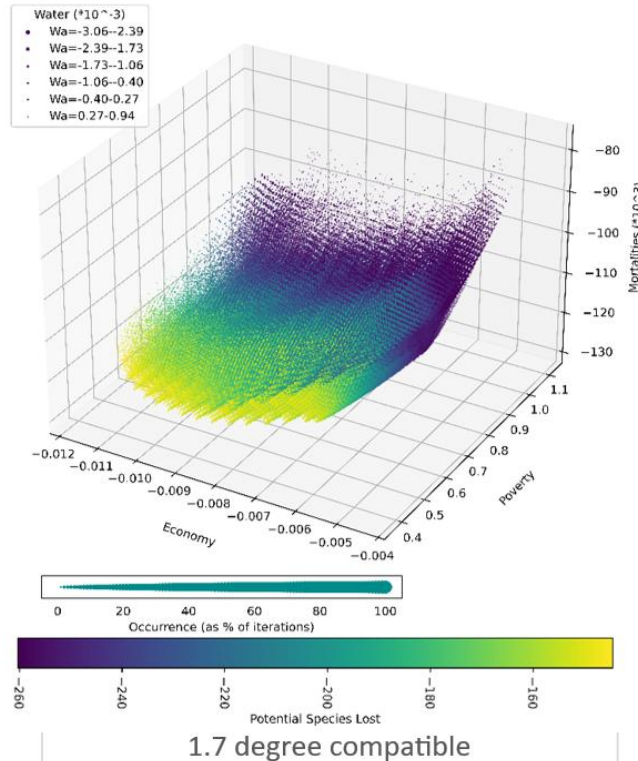
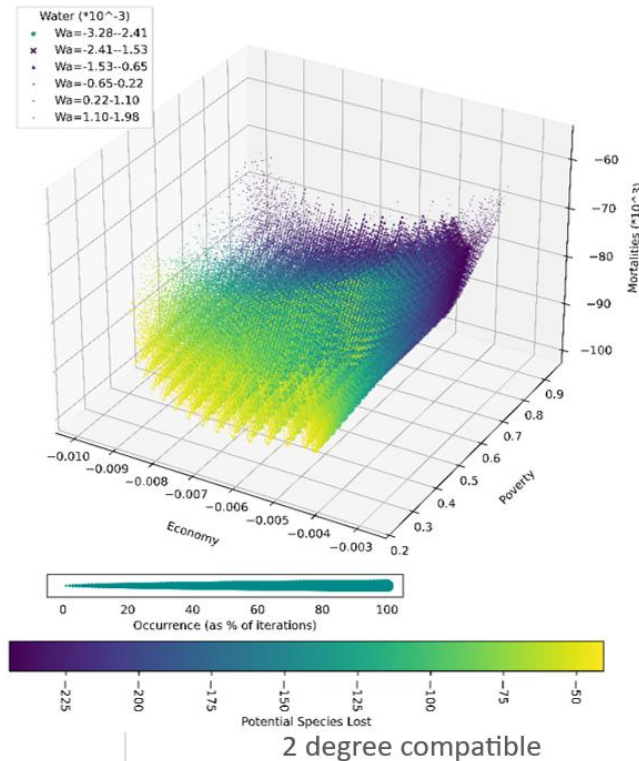
Temperature Target	Total Mitigation required to reach each given target by 2050 (Gt CO ₂)
1.5°C	560
1.7°C	415
2°C	300

To achieve 1.5°C we need to exhaust almost the maximum potential in all sectors



Notable trade-offs based on sectoral prioritisation:

- Transportation: effective towards health, but negative trade-offs with economy- and water-related SDGs
- AFOLU: Biodiversity co-benefits, but higher food prices (similar to the built environment)
- Energy supply and industry: Beneficial for health and water objectives, but with minor negative impacts on poverty, GDP, and biodiversity.



Lower number of solutions – Keeping 1.5°C is getting more difficult

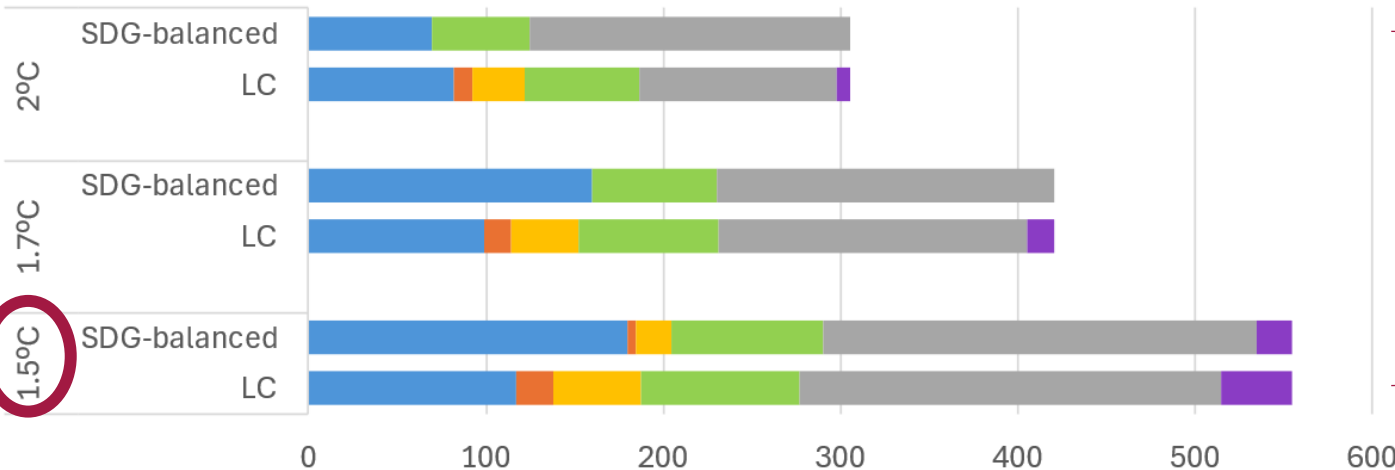
- A 1.5°C-aligned path designed to balance performance on SDGs would by 2050 entail:
- small economic sacrifices (i.e., 1% on GDP and food expenditure)
 - improved health (> 120,000 avoided deaths) and biodiversity (avoid the loss of > 200 species).



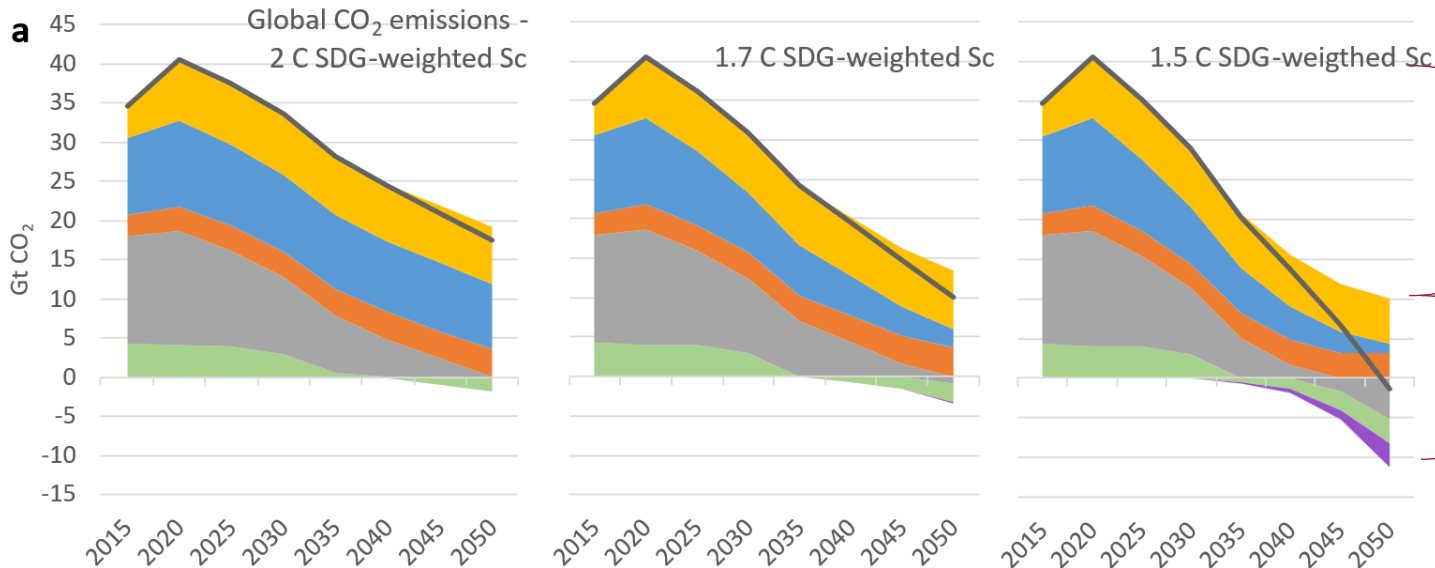
How do we get there?

Mitigation portfolios

Decarbonisation of **power generation** and **industry** is necessary in all cases



Effort needed on all sectors



Major emission cuts

Negative emissions provide leeway for **demand side**

Conclusions

- The path to 1.5°C is getting narrower, while a significant gap yet exists to achieve the target.
- A different approach towards sustainable development policy support.
- All sectors almost exhaust total potential for a 1.5°C.
- Yet, the role of power & industry is crucial even in targets of lower ambition.

Future work

- Deep dives on differences between SDG-balanced and least cost configurations
- Similar analyses at different granular levels (e.g., for EU member states)





Thank you!

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