NAVIGATE

Next generation of advanced integrated assessment modelling to support climate policy making

E3Modelling Energy Economy Environment

TRANSFORMATIVE POLICIES ON THE PRODUCTION SIDE CAN PAVE THE WAY TO 1.5° C

Nico Bauer, Panagiotis Fragkos NAVIGATE Final Conference

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 821124.

Key research questions

- Early and rapid emissions reductions as mandated by the Paris Agreement and national targets require using advanced mitigation measures.
  - Industry transformation (Nico Bauer in the round table)
  - Energy supply decarbonisation
  - Changes in land uses

- To what extent production- and energy supply-side policies leveraging advanced emission reduction options can pave the way towards Paris compatible pathways
  - With low overshoot
  - Without relying on consumption and demand-side transformations

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Methods, Models and scenarios

- We use a comparison of six IAMs, considerably improved within NAVIGATE to better represent structural change, technology innovation, industry transformation (integrating several novel mitigation technologies and processes), land-based mitigation and socio-economic developments.
- The scenarios explore different combinations of:
  - climate policy (well-below 2°C or 1.5°C with low overshoot),
  - two different supply paradigms (enhanced electrification (Elec), or a continuation of combustion systems (Comb) and
  - technology limitations (limited nuclear (LimNuc), limit on CCS (LimCCS), or a limited biomass but high variable renewable energy scenario (HighVRE).

- In the mitigation scenarios, a uniform carbon pricing across regions and sectors is imposed to meet the carbon budget of 1150 Gt CO_2 (for well-below 2°C scenarios) and 650 $GtCO_2$ (for 1.5°C scenarios) from 2020 to the time of net zero CO_2 emissions.

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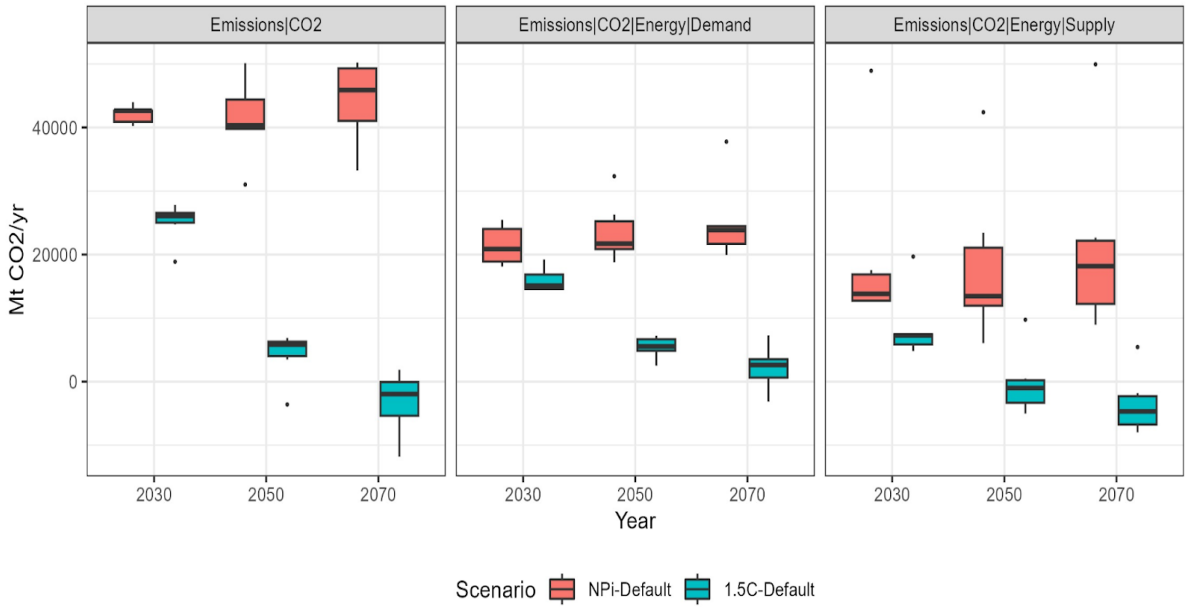
NAVIGATE Global emission pathways



- 1.5oC- compatible pathways lead to a rapid reduction in global CO2 emissions by 45% (2030) and 88% (2050) on average reaching net-zero around 2060.
- After 2050s, all models show net-negative emissions driven by the uptake of CDR technologies
- Supply-side emissions reach net zero in the 2040-2050 decade driven by the rapid transformation of energy supply through massive uptake of RES
- Mitigation scenarios significantly reduce demand-side emissions to around 5Gt by 2050 and 2.5Gt by 2070, but some bottlenecks exist in specific sub-sectors

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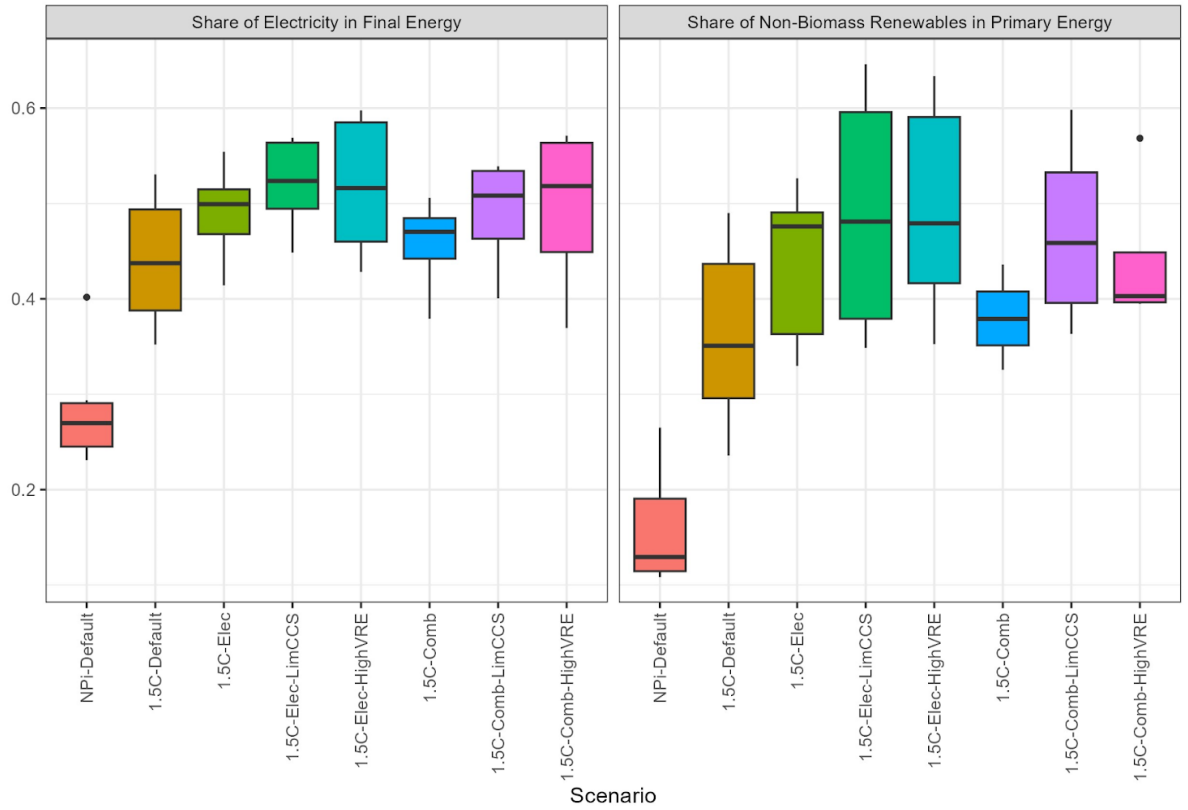
Energy transition in 1.5C pathways



Decarbonisation is based on:

- High RES expansion, with non-biomass RES driving the transition accounting for than 80% of power production and 50% of primary energy in 2050
- Accelerated electrification of energy and mobility end-uses
- Emergence of clean fuels (e.g H2, e-fuels) that represent more than 25% of final energy esp. in the Comb scenarios
- Further electrification is constrained by demand, not by RES potentials

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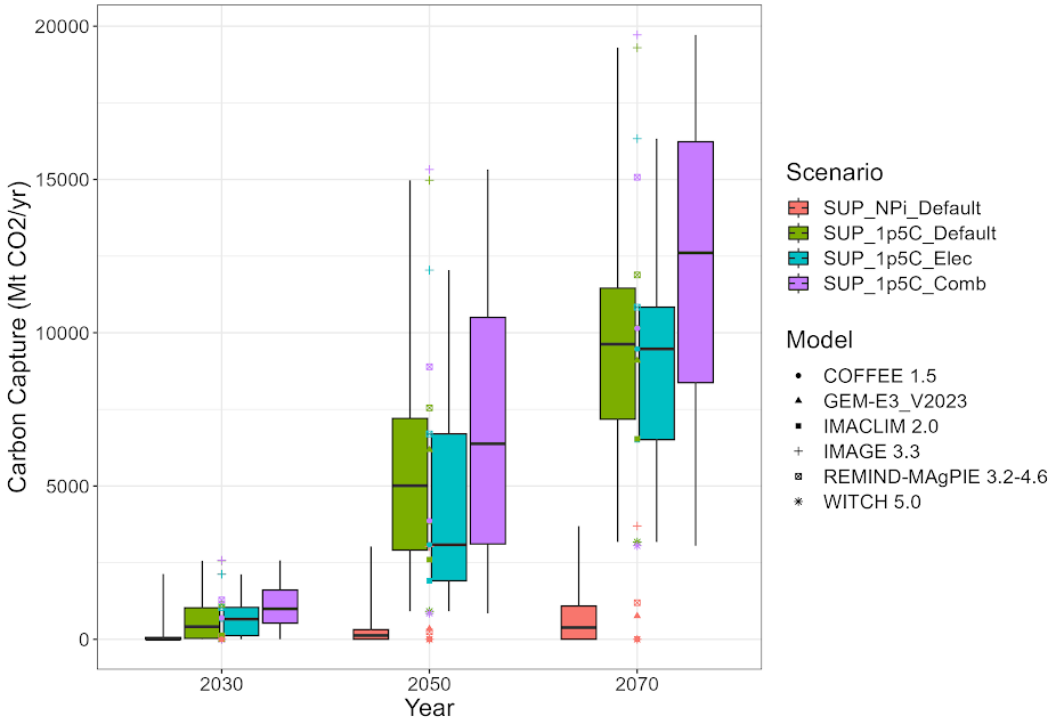
NAVIGATE Carbon capture and storage/use



- CCS can be a major option to reduce industrial emissions and reach net negative CO2 emissions (e.g. through BECCS)
- In 1.5C scenarios, CCS increases to more than 5 Gt in 2050 and 10 Gt in 2070 with some models showing even higher uptake
- A policy push that pursues a combustion narrative requires higher uptake of CCS (higher than 15 Gt after 2050), raising issues of technical and economic feasibility for such a rapid technology upscale.
- Decarbonisation is feasible even when assuming limitations in CCS to less than 4 Gt annually (LimCCS), but this pushes other mitigation options to their limits

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Thank you. Q&A session

For more information

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