NEGEM

NEGEM – Quantifying and Deploying Responsible Negative Emissions

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Content

- NEGEM project
- Need for carbon dioxide removals
- Environmental constraints
- Scenario modelling
- Social licence to operate
- Key conclusions

NEGEM Consortium:

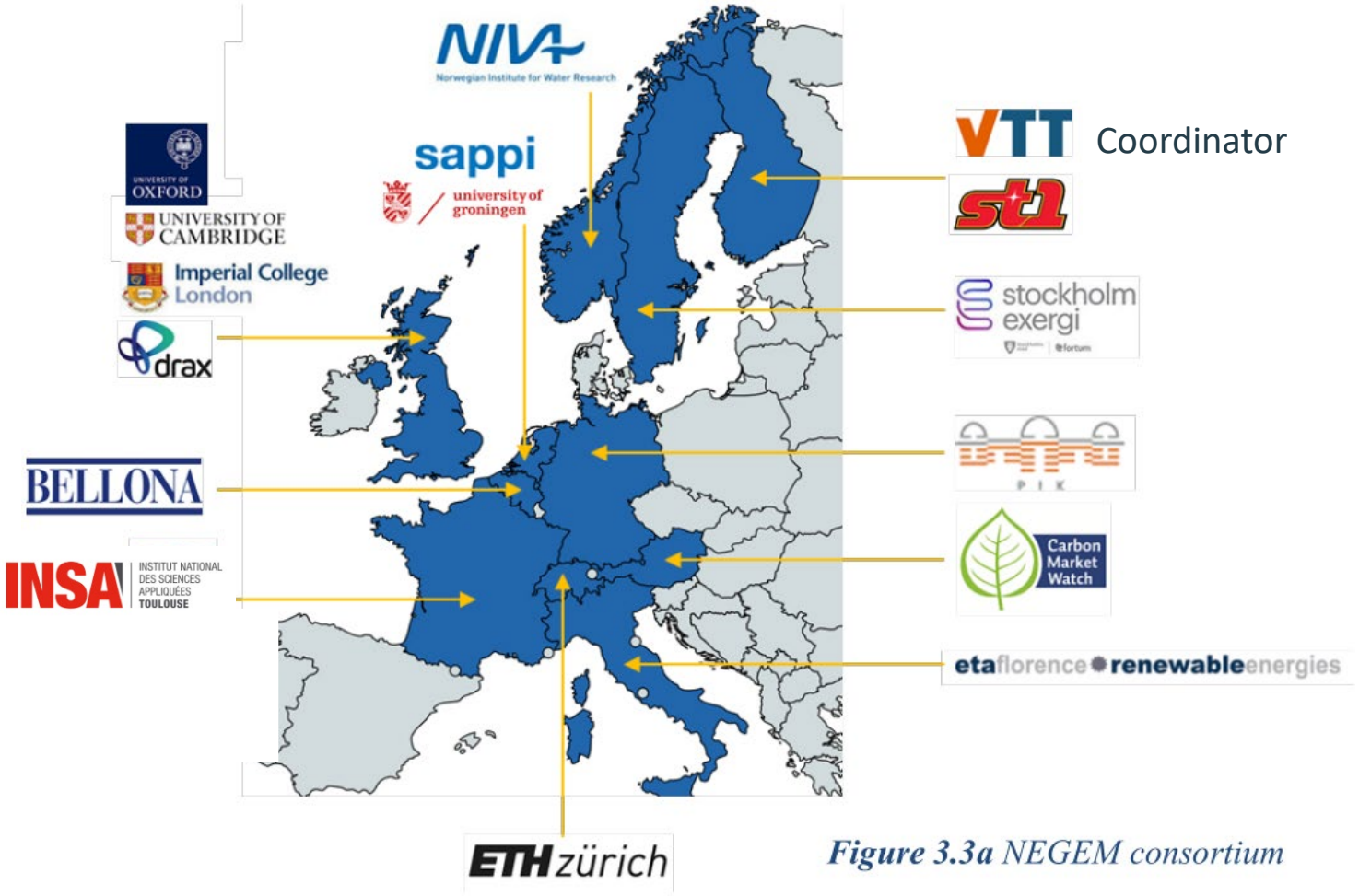


Figure 3.3a NEGEM consortium

- 16 partners
- 11 countries
- 6 universities
- 3 RTOs
- 2 NGOs
- 5 industrial

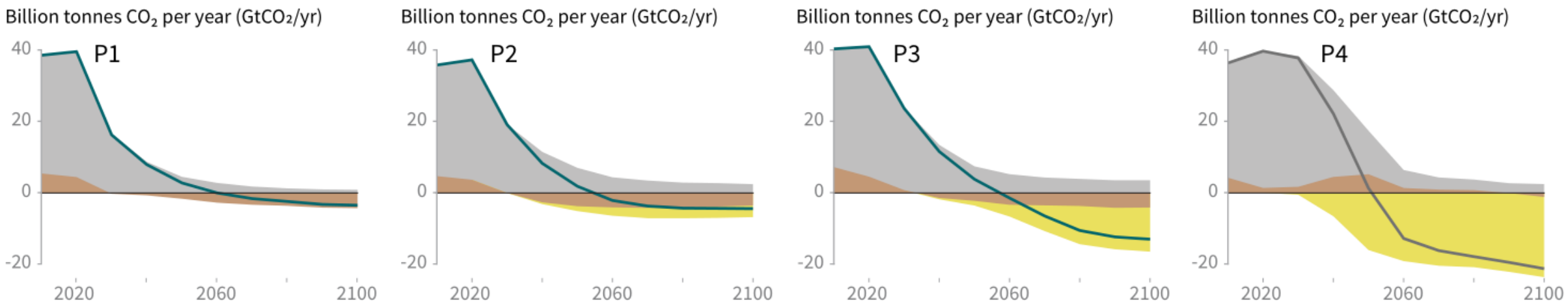
- June 2020 – May 2024
- 5.8 M€ budget

https://www.negemproject.eu/

Increasing focus on removing CO_2 from the atmosphere in the climate debate

Breakdown of contributions to global net CO_2 emissions in four illustrative model pathways

Fossil fuel and industry AFOLU BECCS => Carbon dioxide removals



Steep emission cuts to almost zero leave little need for CO_2 removal

Less steep cuts require more CO_2 removal

Higher residual emissions require yet more CO_2 removal

Delayed cuts require the most CO_2 removal

Source: IPCC SR15

The objective of NEGEM is to analyse the realistic potential for Negative Emission Technologies and Practices

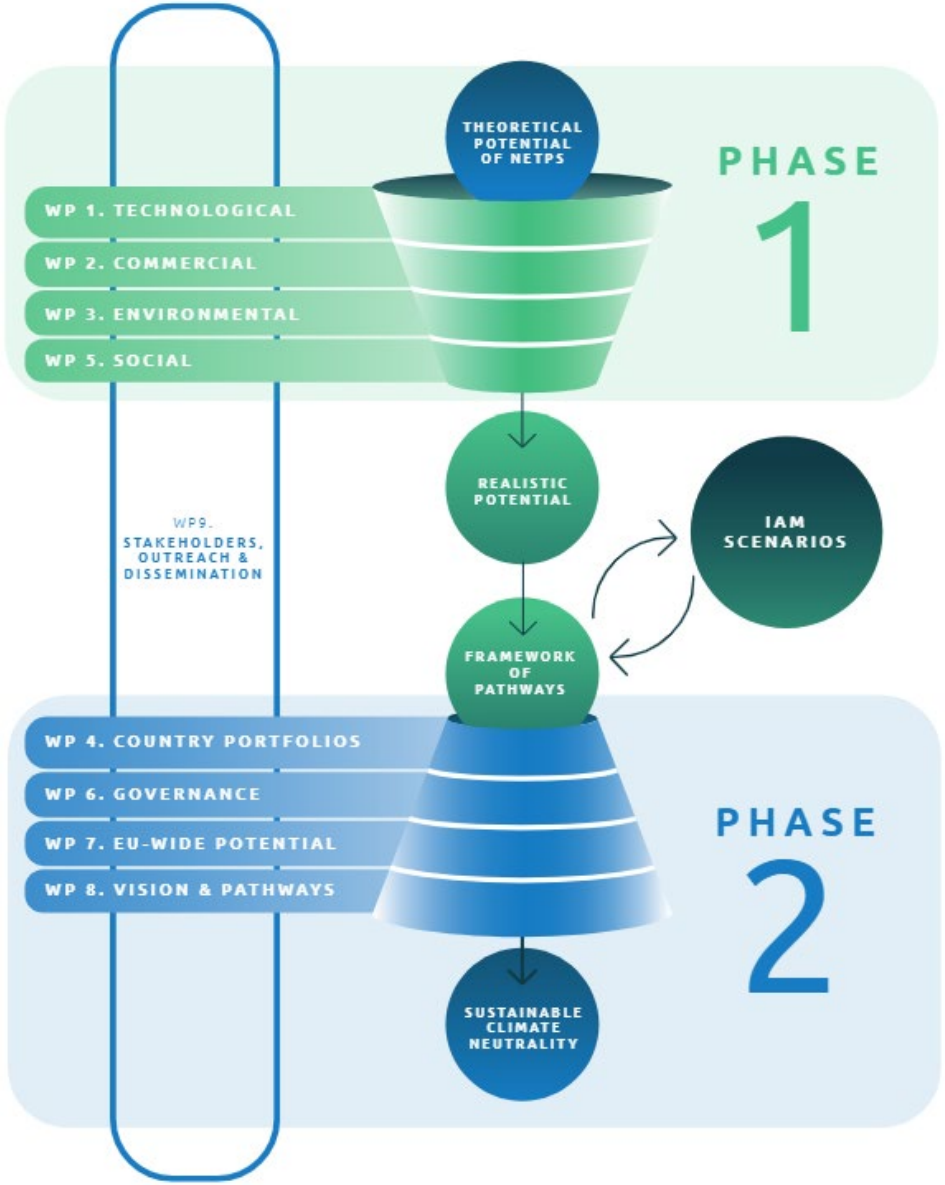
PHASE 1: What is the realistic potential for NETPs?

- Technological parameters
- Planetary and regional boundaries
- Costs, opportunities and risks
- Social acceptance, uptake and political feasibility

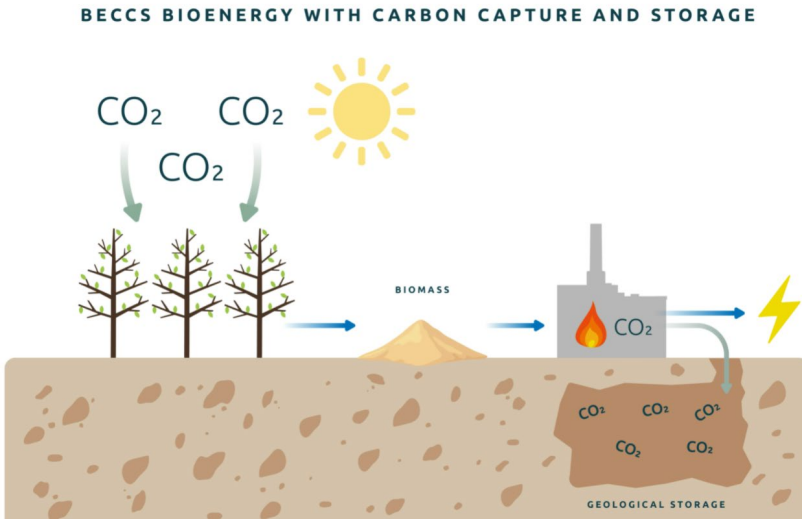
Sustainable NETP deployment

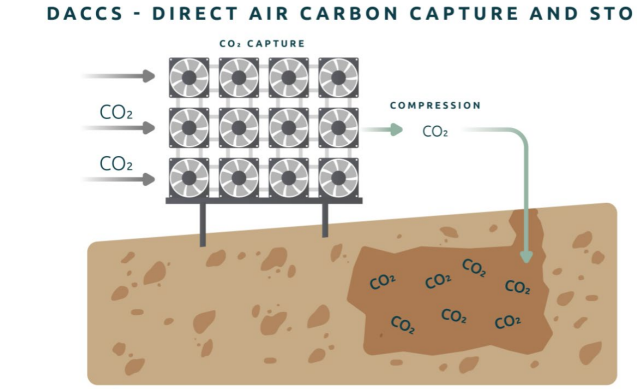
PHASE 2: How do we meet the realistic potential for NETPs?

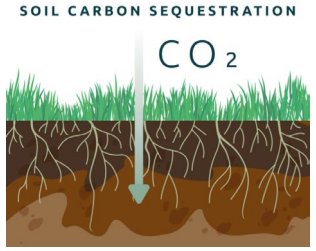
- Country portfolios, EU-wide potentials
- Enabling governance frameworks

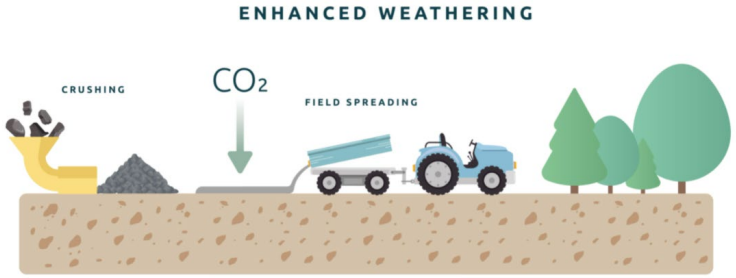


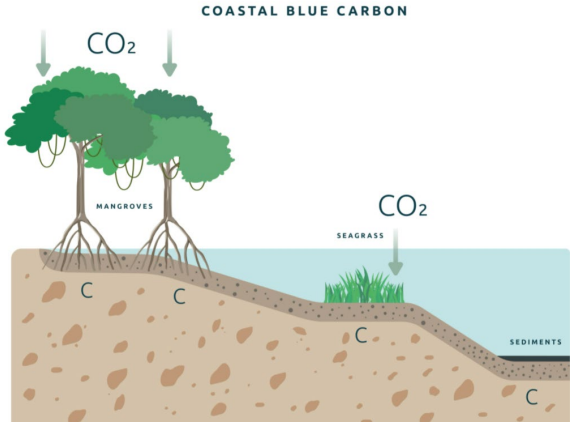
Negative emission technologies and practices (NETPs)



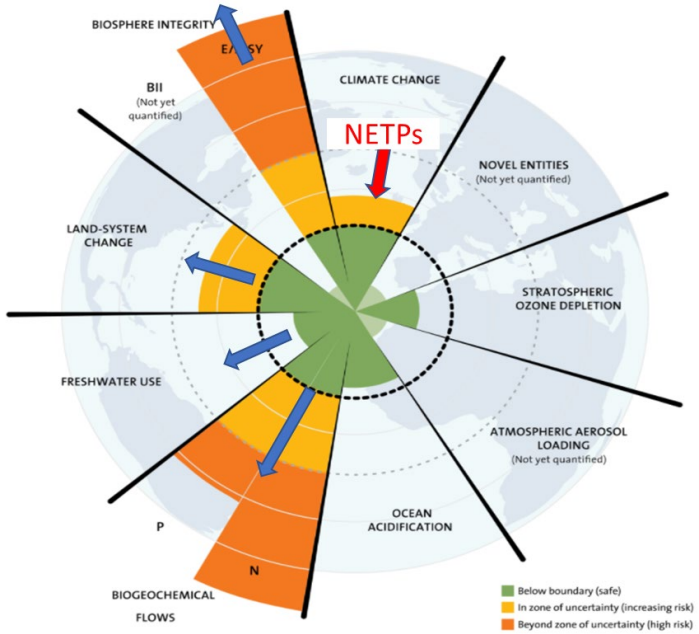








NETPs likely needed to ensure the planetary boundary for climate



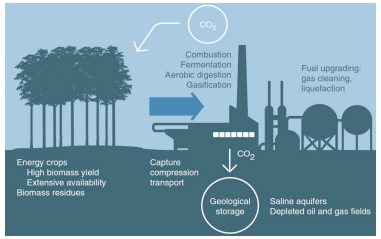
NETPs may put pressure on other planetary / regional boundaries

Side-effects and trade-offs:

Afforestation, reforestation, HWP, biochar (BC)

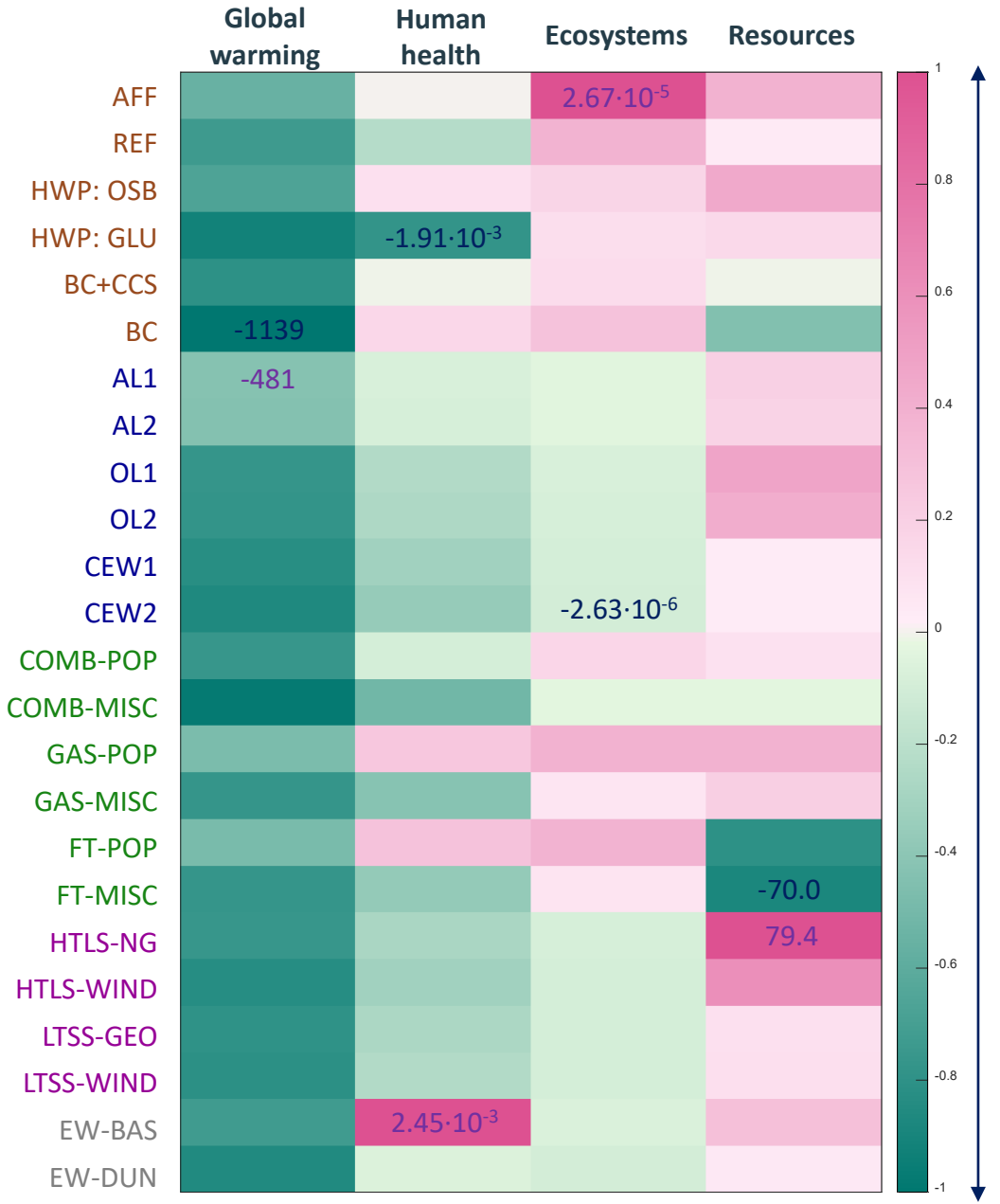
Marine NETPs

BECCS



DACCS

Enhanced weathering (basalt or dunite)



per tonne CO_2 sequestered

Net additional impacts
Net prevented impacts

Conclusion:
A portfolio of CDR measures is needed to balance the impacts

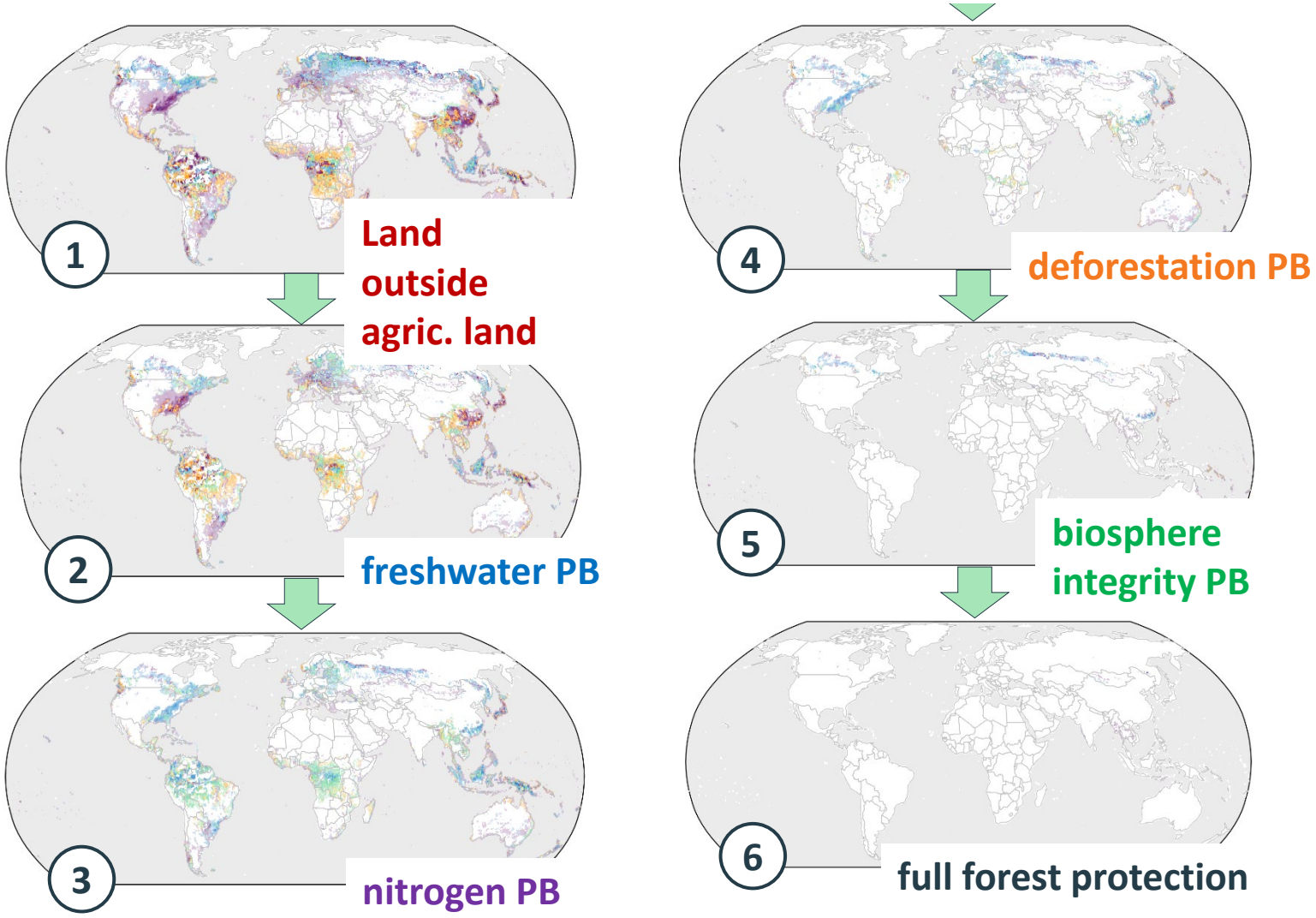
ETH zürich

More results:

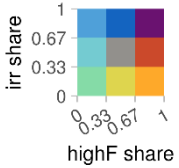
Cobo et al. 2023. Sustainable scale-up of negative emissions technologies and practices: where to focus
DOI 10.1088/1748-9326/acacb3

Cobo et al. 2022. Human and planetary health implications of negative emissions technologies https://www.nature.com/articles/s41467-022-30136-7

Potentials for BECCS from energy crops without further pressure on planetary boundaries?



Conclusion: Global dietary changes are needed to release pasture land for BECCS from bioenergy crops



highF = high fertilization
irr = irrigation

Contact:
Constanze Werner

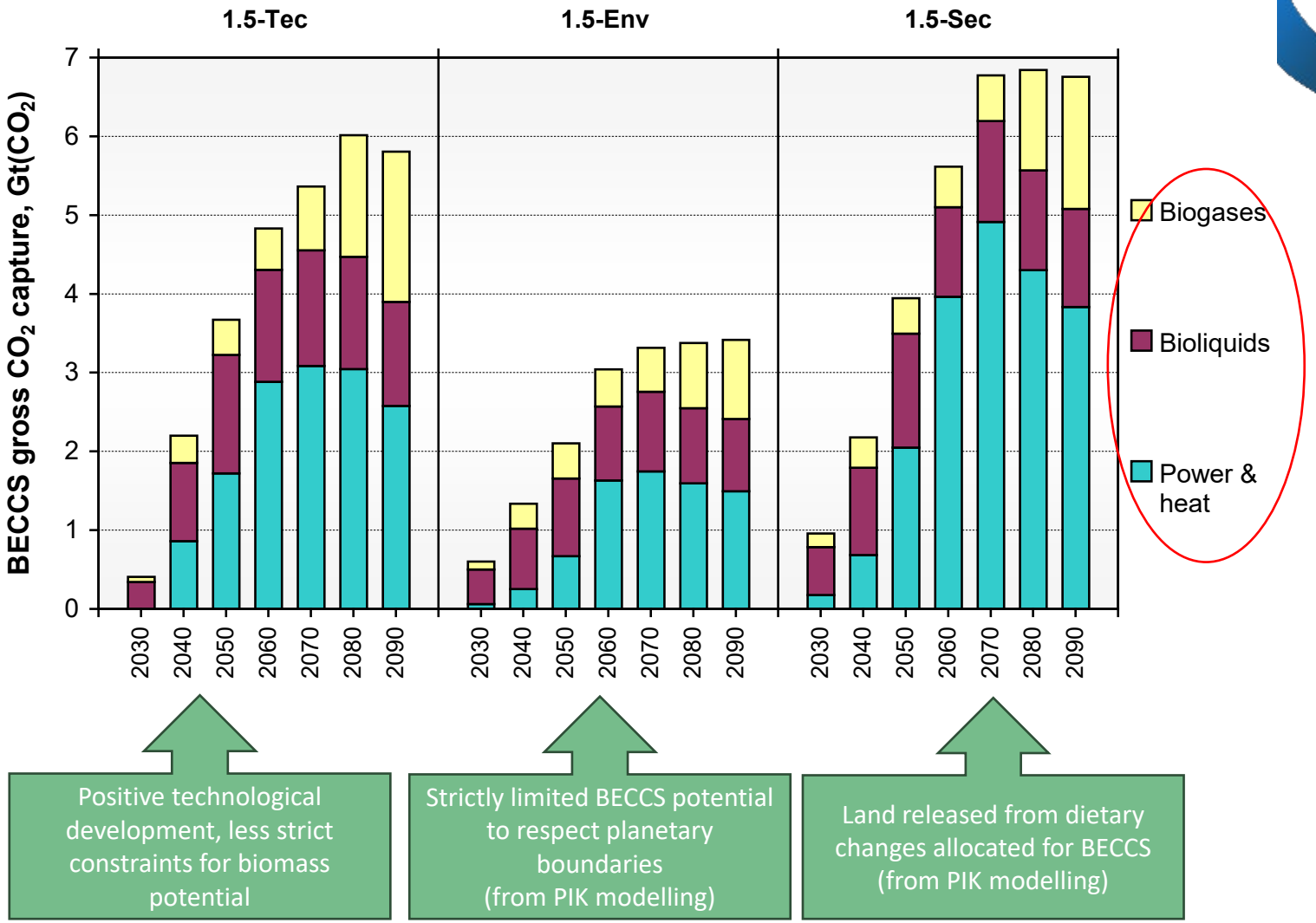
Deliverable 3.2
https://www.negemproject.eu/wp-content/uploads/2023/05/D-3.2-Global-NETP-biogeochemical-potential.pdf

Deliverable 3.3
https://www.negemproject.eu/wp-content/uploads/2023/08/NEGEM_D3.3_Global-assessment-of-NETP-impacts-utilising-concepts-of-biosphere-integrity.pdf

Deliverable 3.7
https://www.negemproject.eu/wp-content/uploads/2023/08/NEGEM_D3.7_Global-impacts-of-NETP-potentials-on-food-security.pdf

Global scenarios by TIMES-VTT: BECCS applications by technology clusters

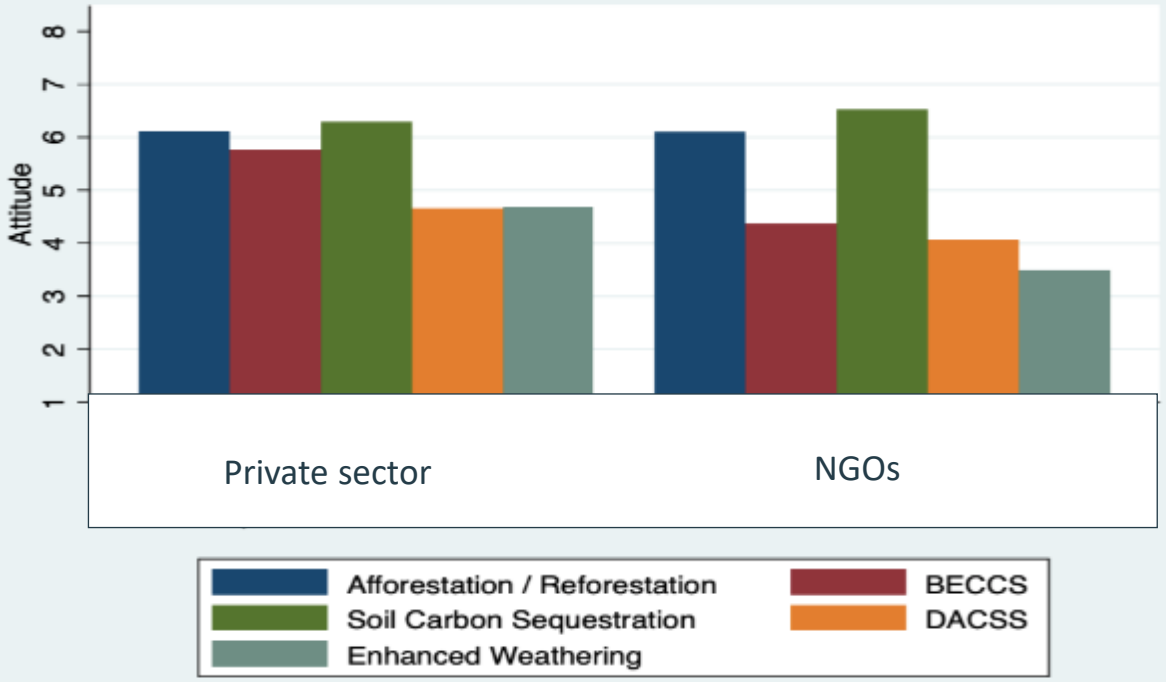
- BECCS applications in power, CHP, bioliquids and biogases (including hydrogen)
- The deployment starts at small scale already in 2030, the first applications focusing on biofuel plants where the capture costs are sufficiently low.



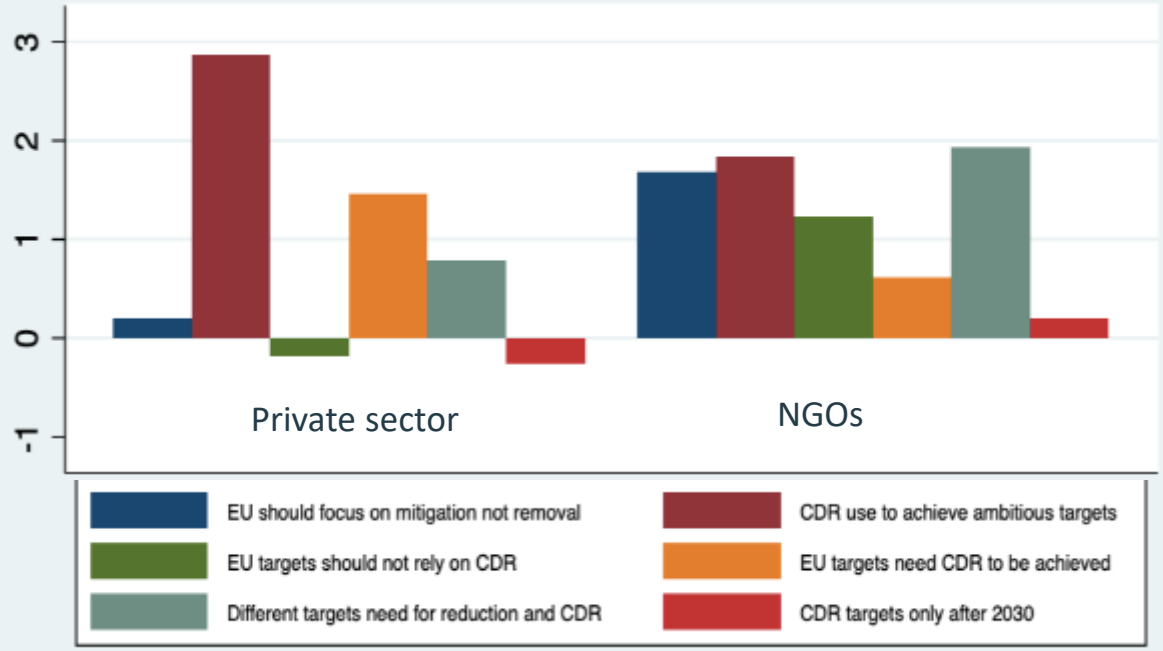
Source: Deliverable 8.2 Quantitative assessments of NEGEM scenarios with TIMES-VTT https://www.negemproject.eu/wp-content/uploads/2023/11/NEGEM_D8.2_NEGEM-scenarios.pdf

Social licence to operate: Stakeholder Perceptions

NETPs Attitude by Stakeholder Group



Policy attitudes



- NGOs have most favourable attitudes towards nature-based solutions
- Private sector more in favour of also technological solutions

- Private sector sees the role of CDR more necessary to achieve EU targets
- NGOs more in favour of separate targets & focusing on mitigation

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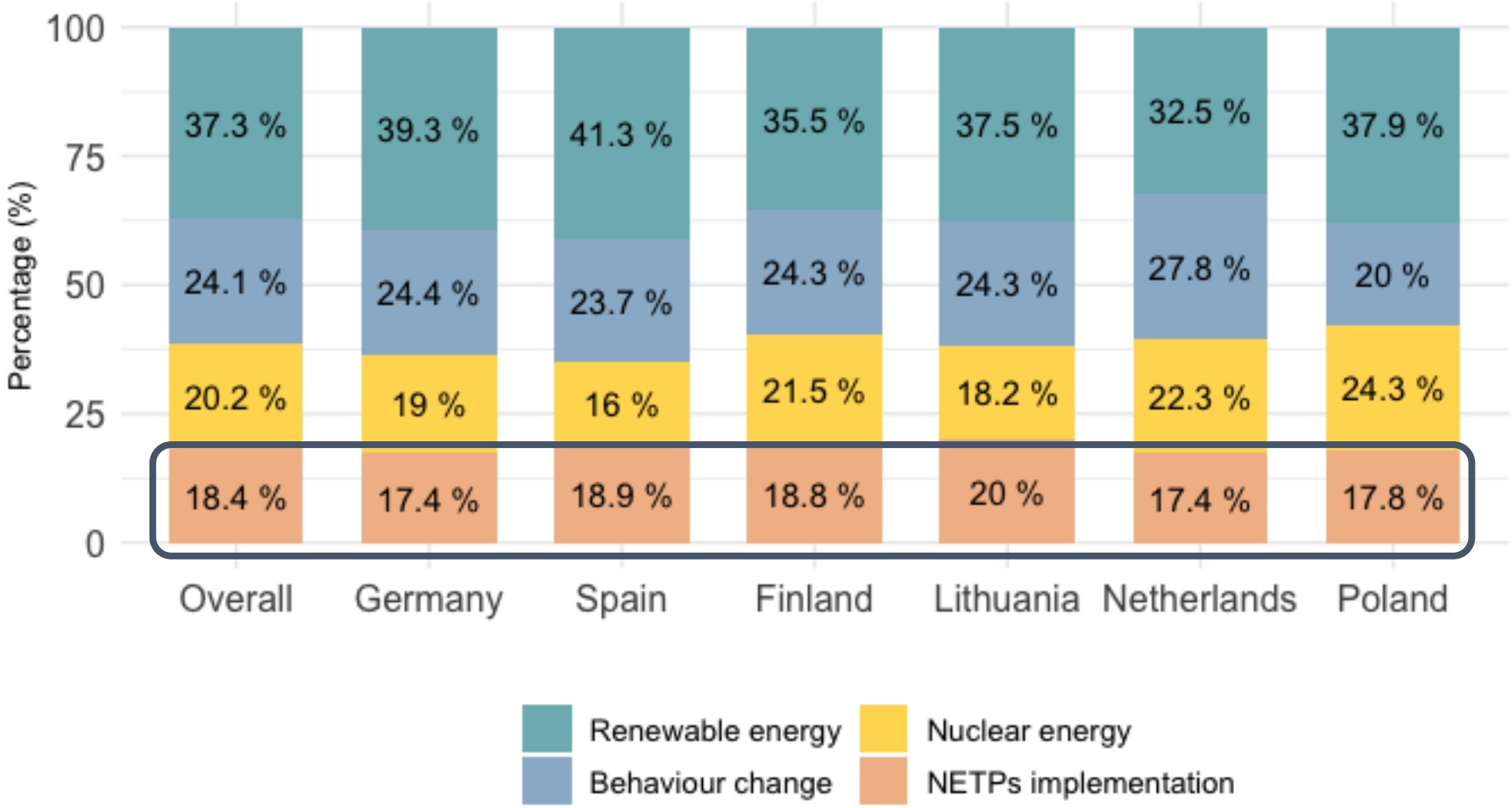
Source: Deliverable 5.2 by Cambridge University "Stakeholder Perceptions of NETPs"
https://www.negemproject.eu/wp-content/uploads/2021/12/D-5.3-Stakeholder-views-on-NETP-governance.pdf

The final matched sample 86 respondents: 46 representatives of NGOs, and 40 representatives of the private sector

Public awareness: People think CO_2 emissions should mostly be reduced by renewable energy and behaviour change



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Deliverable 5.5 Public awareness and assessments of NETPs: Results of a series of cross-national public surveys
https://www.negemproject.eu/wp-content/uploads/2023/11/NEGEM_D5.5_Public-awareness.pdf

NEGEM key conclusions

- **Carbon dioxide removals are needed to SUPPLEMENT emission reductions (not to replace them)**
  - Dependence on CDR should be kept to a minimum
  - **Technical solutions (BECCS and DACCS) with geological-timescale** storages provide permanent CDR and **are needed to reach climate neutrality**.
  - **Nature-based methods (e.g. reforestation)** are needed as they provide strong **synergies** between climate change mitigation and international targets for nature restoration.
  - **Social licence to operate** is needed

- **Co-operation** between EU Member States and outside EU is needed for CDR (CO_2 transport & storage).

- **Agreement on CDR regulation** is needed as soon as possible, in order to establish a clear investment horizon for stakeholders.

https://www.negemproject.eu/news/visions-and-pathways-for-cdr-in-the-eu-negem-final-event/