2° VISION WORKSHOP

28 November 2023 14:00 – 16:00 CET - ONLINE

Responsible Negative Emissions Technologies and Practices

Building a vision towards climate neutrality

NEGEM

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. 869192.

Agenda

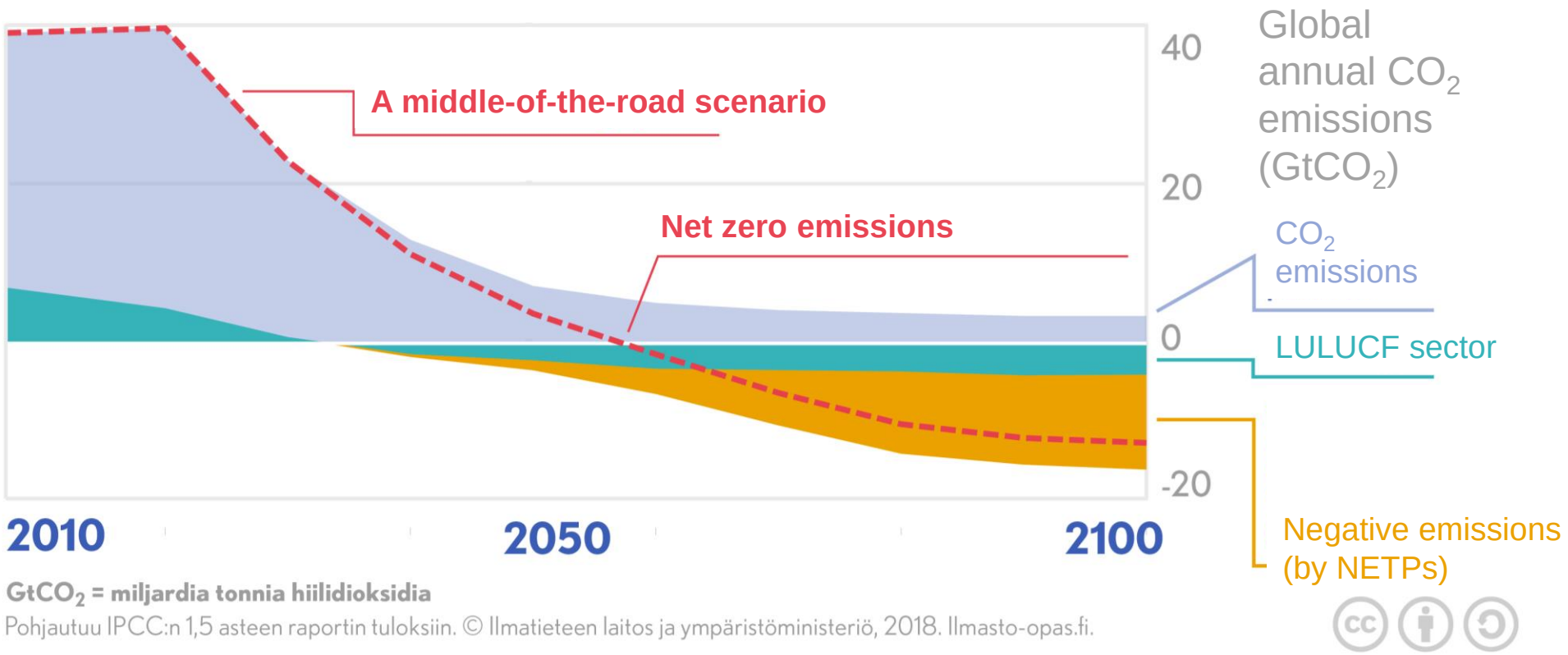
Programme and speakers

14:00 (CET)	**Welcoming words**	Kati Koponen, NEGEM coordinator
14:05	**Carbon dioxide removals – current developments in Europe**	Christian Holzleitner, EC DG Clima
14:20	**NEGEM scenarios on realistic potential for NETPs globally and in Europe**	Kati Koponen & Antti Lehtilä, VTT
14:55	**Presentation of the NEGEM Vision**	Tiina Koljonen, VTT
15:20	**Discussion on the NEGEM vision**	Moderator: Kati Koponen
15:35	**Implementation gap: how NETPs fit existing climate frameworks**	Fabiola de Simone, Carbon Market Watch
15:55	**Closing of the event**	Kati Koponen, NEGEM coordinator

Terms to be used in the workshop

CDR	= carbon dioxide removals
NETPs	= negative emissions technologies and practices
BECCS / bio-CCS	= biogenic CO_2 capture and storage of from energy production or from industry
DACCS	= direct air capture and storage of CO_2 emissions
EW	= enhanced weathering
SCS	= soil carbon sequestration

NET ZERO emissions should be reached by mid-century



$GtCO_2$ = miljardia tonnia hiilidioksidia

Pohjautuu IPCC:n 1,5 asteen raportin tuloksiin. © Ilmatieteen laitos ja ympäristöministeriö, 2018. Ilmasto-opas.fi.

The objective of NEGEM is to analyse the realistic potential of negative emission technologies and practices (NETPs)

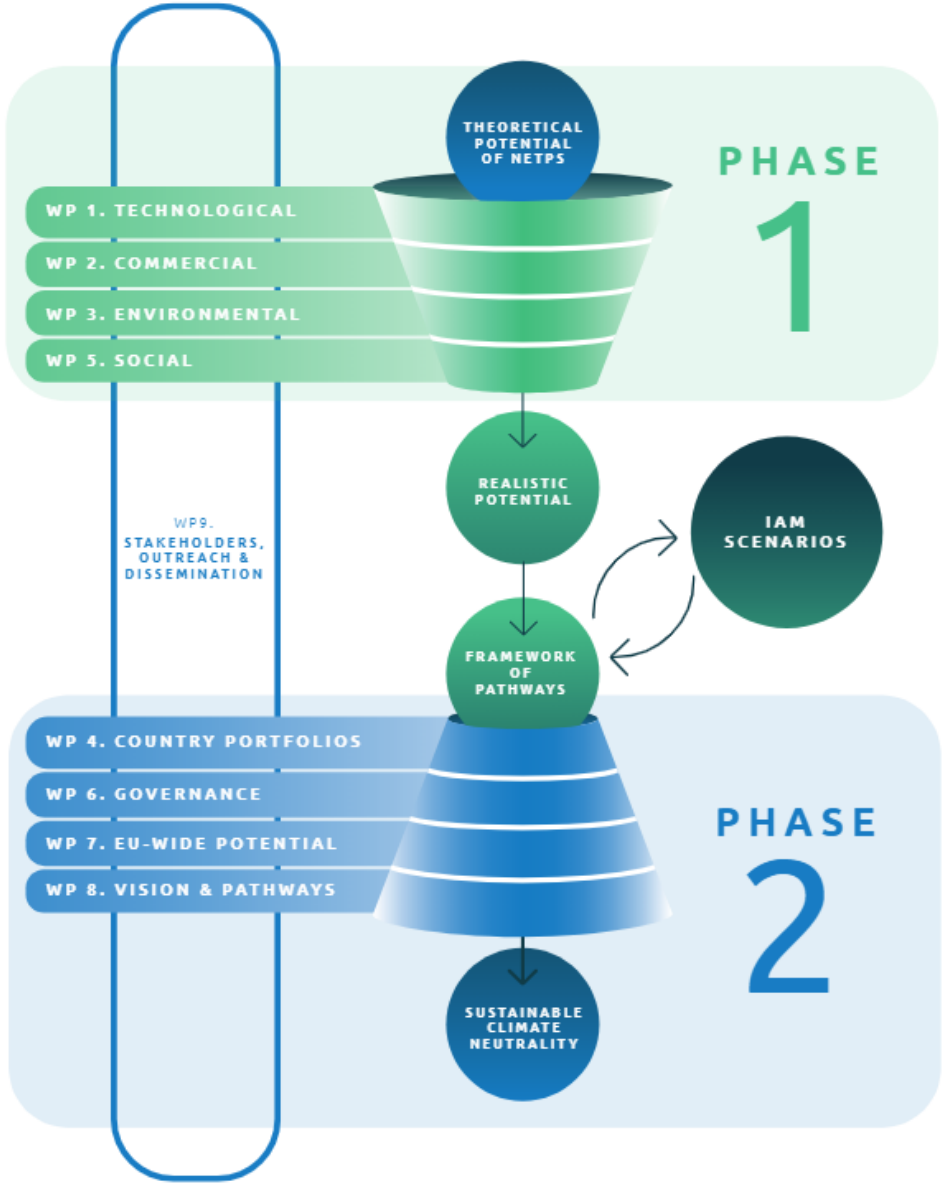
PHASE 1: What is the realistic potential for NETPs?

- 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



NEGEM Consortium

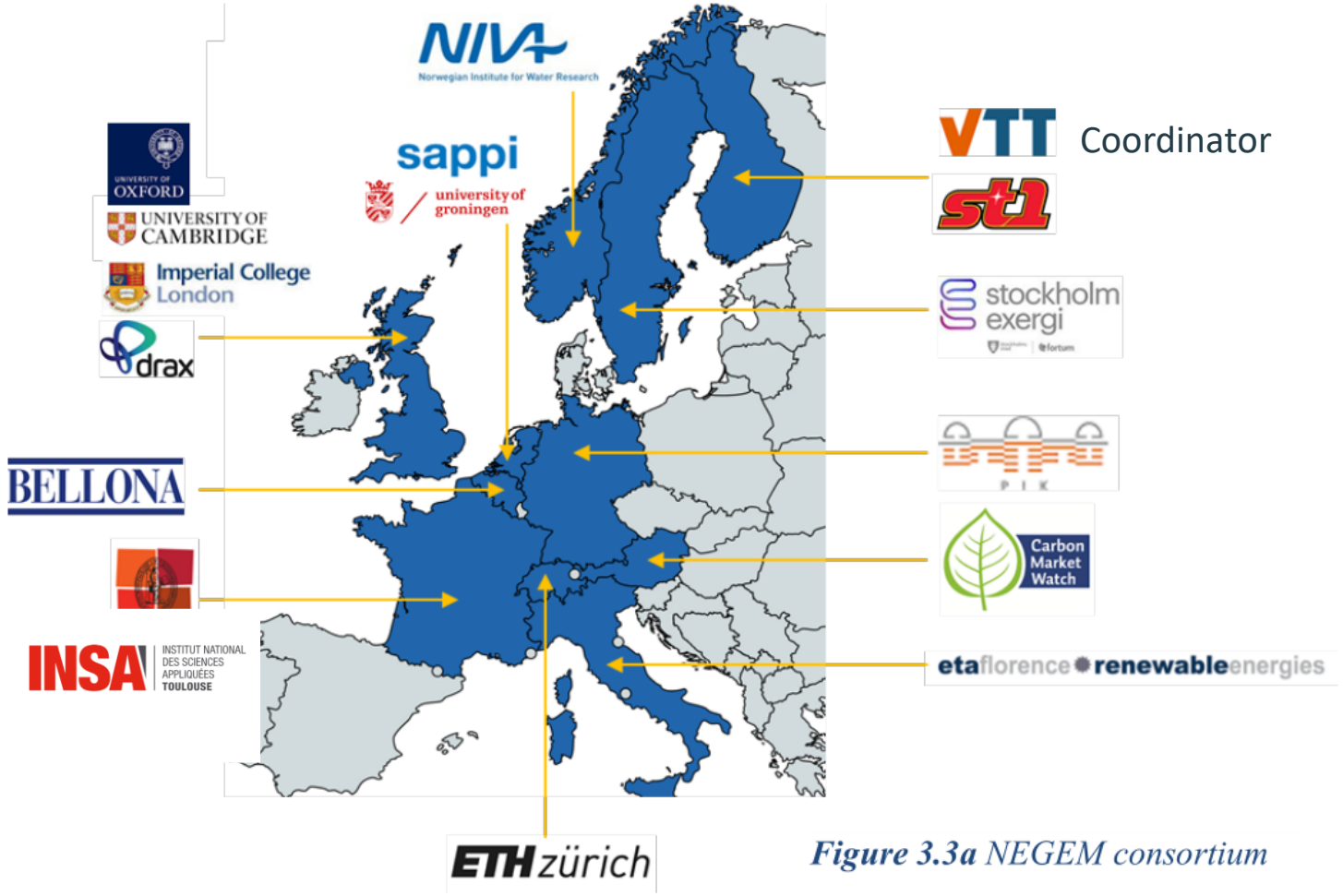


Figure 3.3a NEGEM consortium

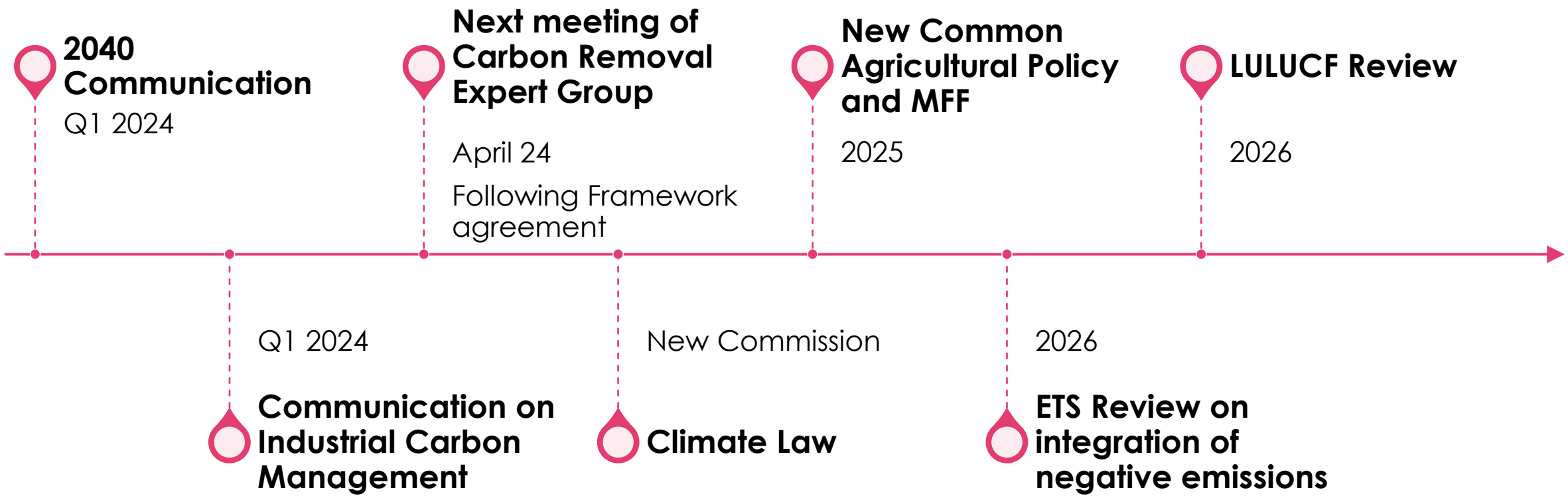
- 16 partners
- 11 countries
- 6 universities
- 3 RTOs
- 2 NGOs
- 5 industrial

https://www.negemproject.eu/

Carbon dioxide removals – Current developments in Europe

Christian Holzleitner, DG Clima

Milestones


2040 Communication
Q1 2024
Next meeting of Carbon Removal Expert Group
April 24
Following Framework agreement
New Common Agricultural Policy and MFF
2025
LULUCF Review
2026
Q1 2024
Communication on Industrial Carbon Management
New Commission
Climate Law
2026
ETS Review on integration of negative emissions

Introduction to NEGEM storylines and scenario modelling

Kati Koponen VTT

Content

- Aim of NEGEM scenario work
- Use of NEGEM results for the storylines and scenarios
- Storyline descriptions
- Key assumptions on NETPs in the storylines
- Limitations

→ Scenario modelling results by Antti Lehtilä: Global & European results

- The whole study can be found from: https://www.negemproject.eu/wp-content/uploads/2023/11/NEGEM_D8.2_NEGEM-scenarios.pdf

Aim of NEGEM scenario work

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?

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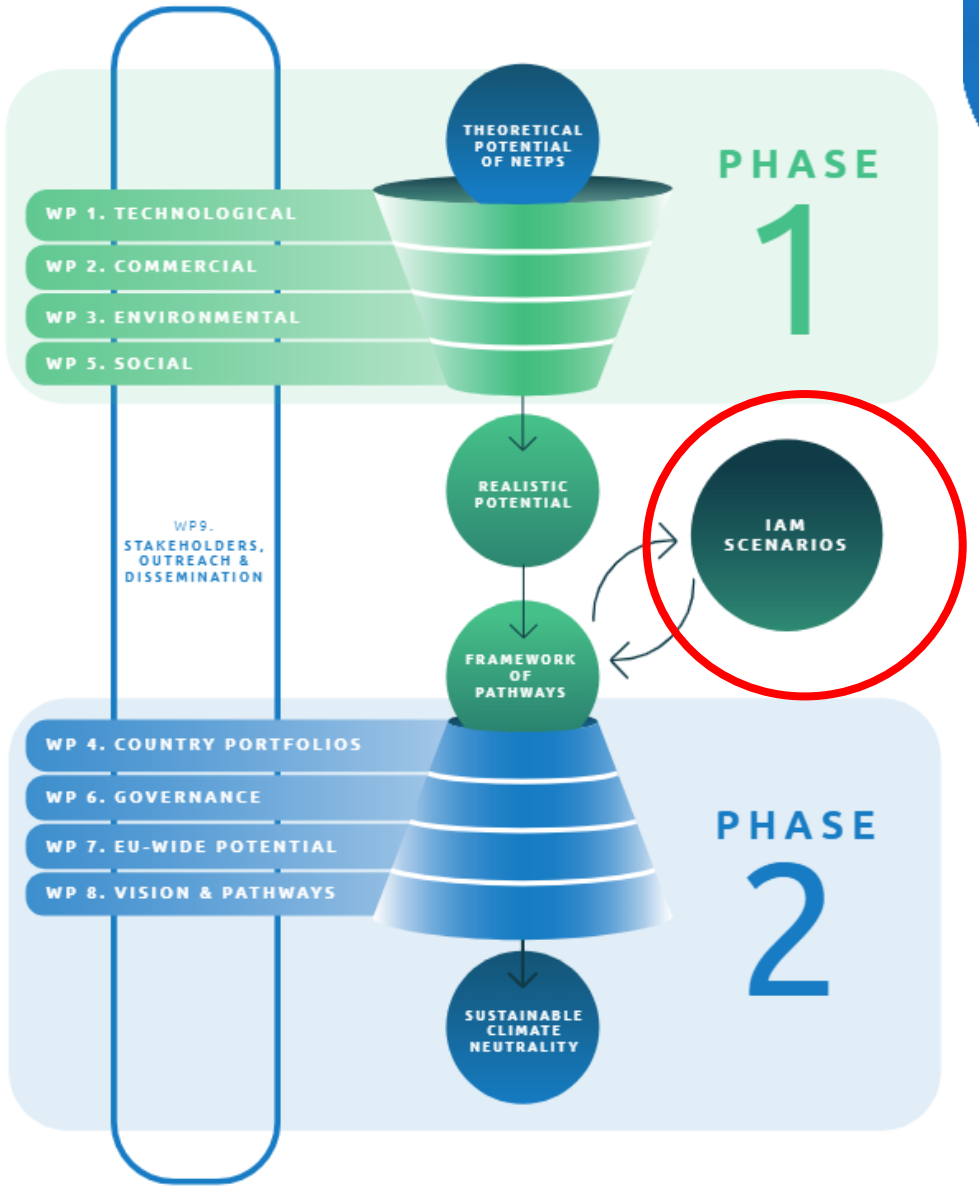


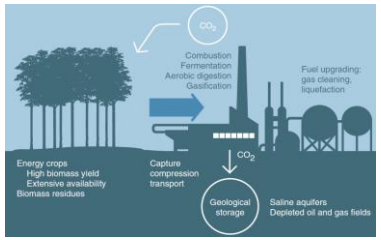
Side-effects and trade-offs:

LCA for a portfolio of NETPs

Afforestation, reforestation, harvested wood products, biochar (BC)

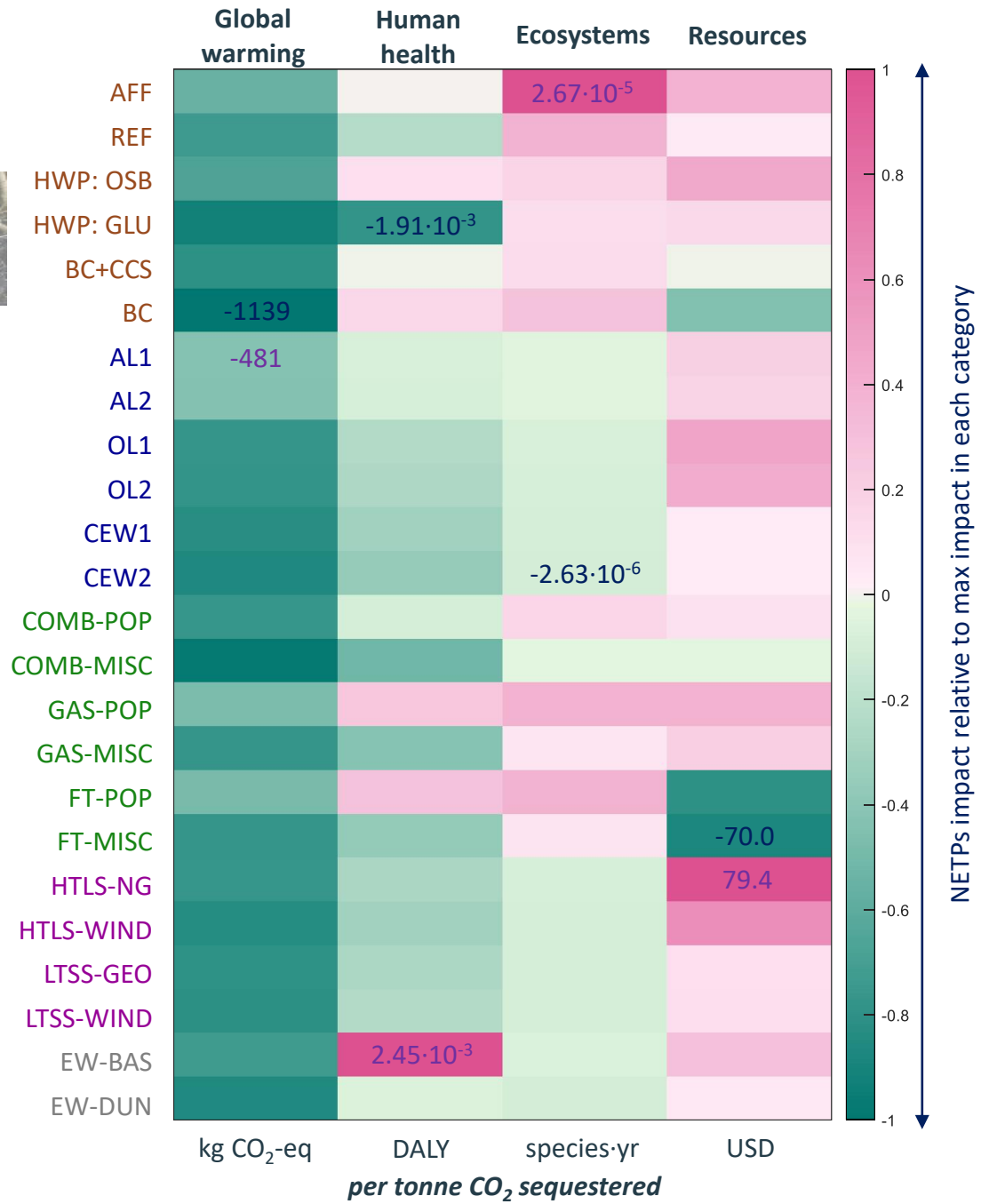
Marine NETPs

BECCS



DACCS

Enhanced weathering (basalt or dunite)



Net additional impacts
Net prevented impacts

ETH zürich

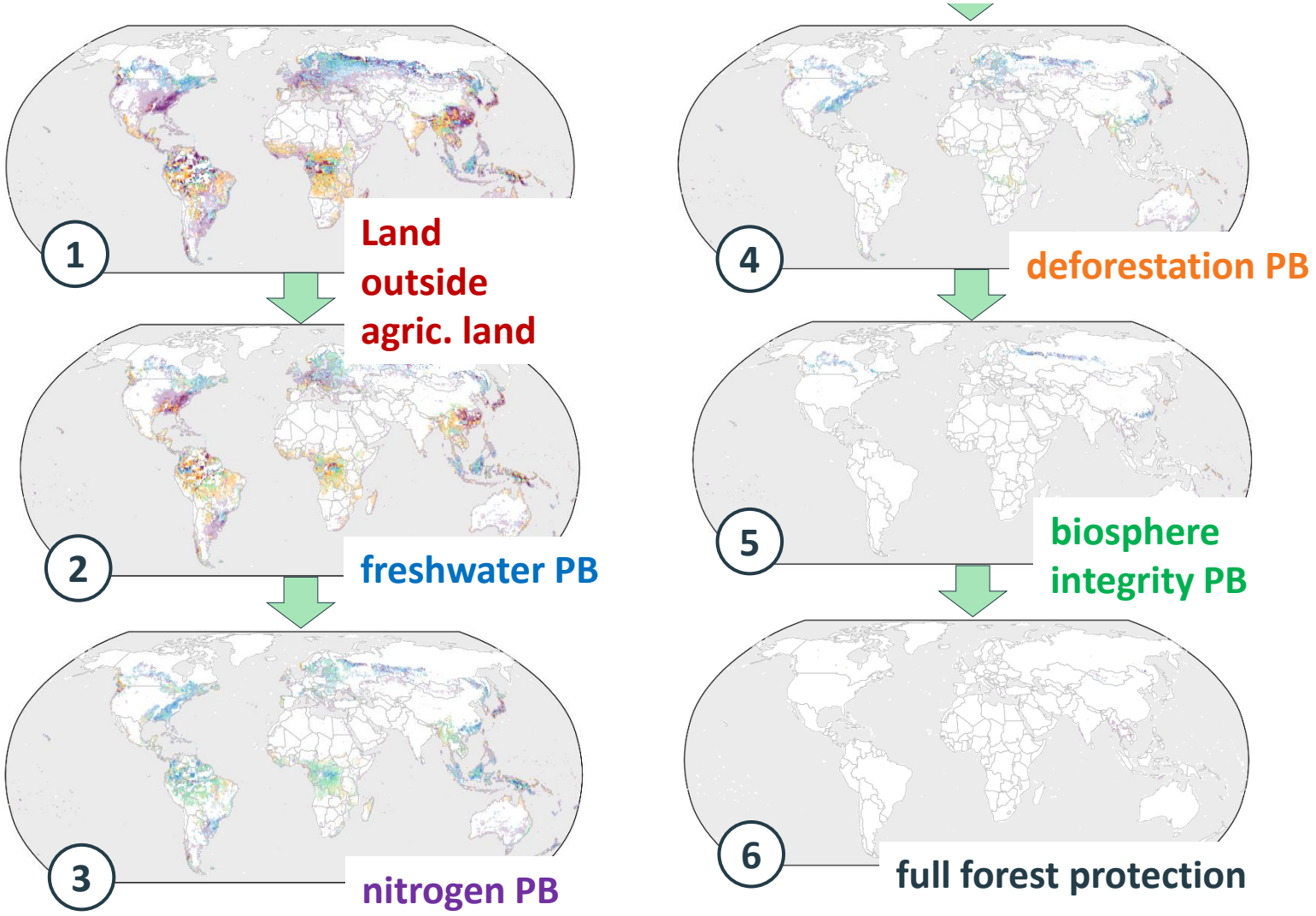
Contact:
Selene Cobo Gutiérrez

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

BECCS and reforestation potentials without further pressure on planetary boundaries?

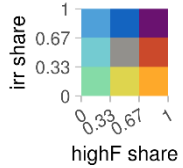


Contact:
Constanze Werner

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

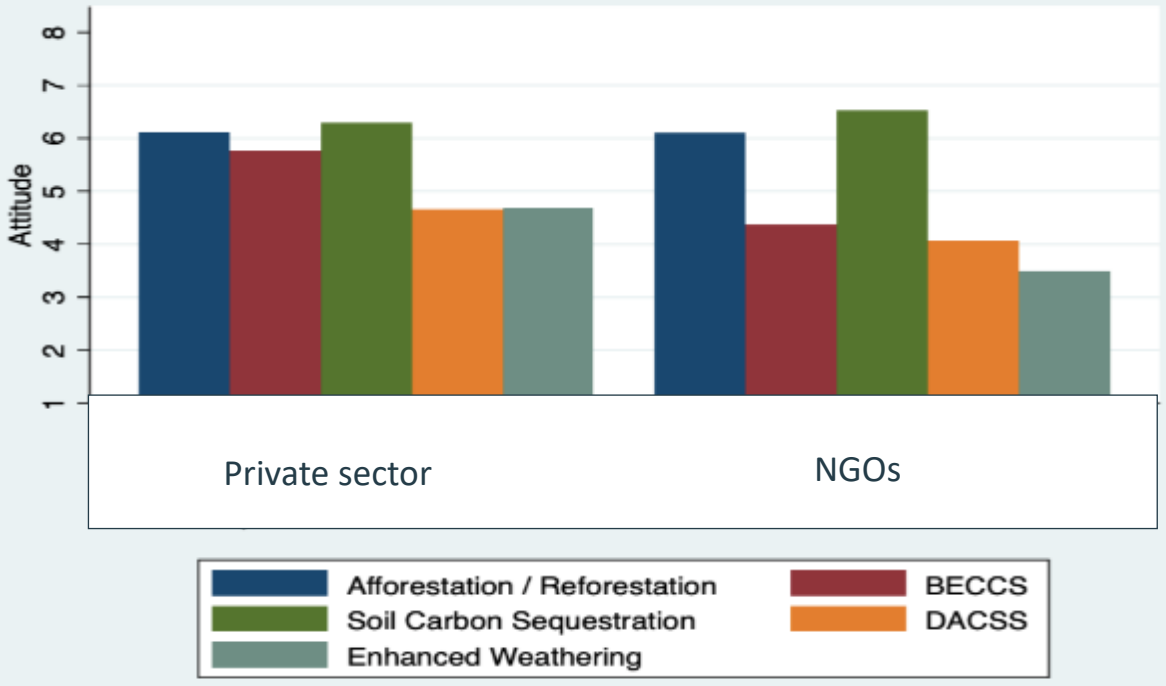
Deliverable 3.7
https://www.negemproject.eu/wp-content/uploads/2023/08/NEGEM_D3.7_Global-impacts-of-NETP-potentials-on-food-security.pdf



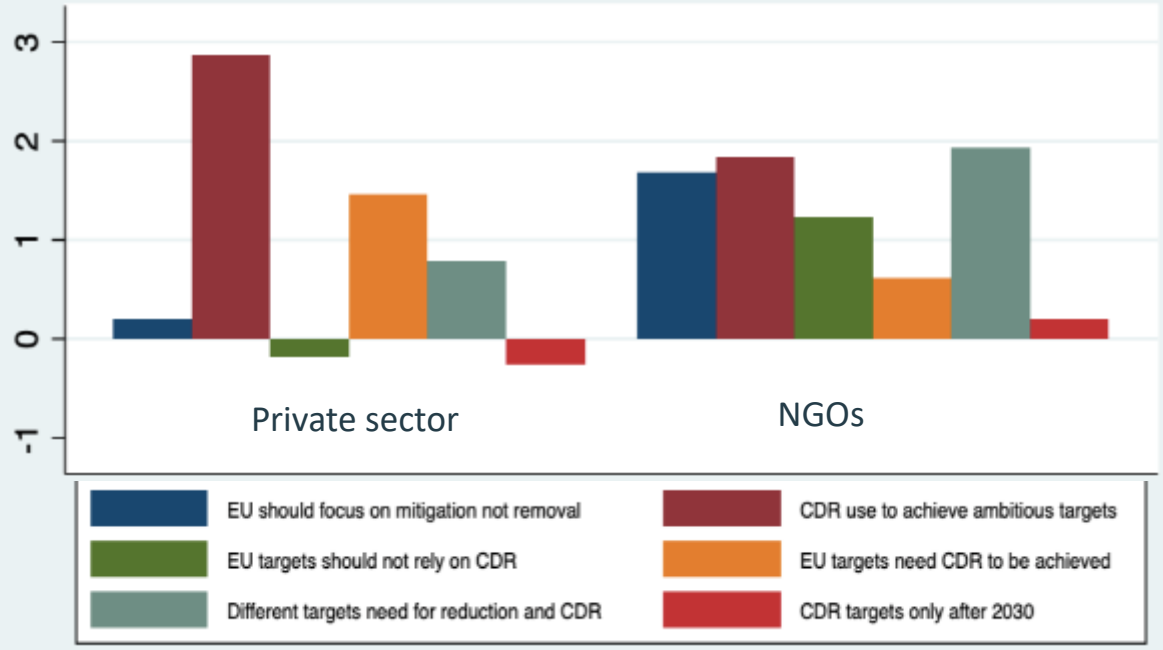
highF = high fertilization
irr = irrigation

Social licence to operate: Stakeholder Perceptions & Expert elicitations

NETPs Attitude by Stakeholder Group



Policy attitudes



UNIVERSITY OF CAMBRIDGE
Judge Business School

Contact:
David Reiner
Lucrezia Nava

Deliverable 5.2 “Stakeholder Perceptions of NETPs”
https://www.negemproject.eu/wp-content/uploads/2021/12/D-5.3-Stakeholder-views-on-NETP-governance.pdf

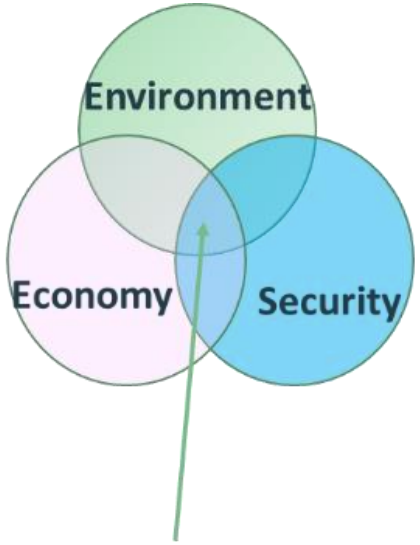
Deliverable 5.4 “Expert elicitation for NETPs”
https://www.negemproject.eu/wp-content/uploads/2023/08/NEGEM_D5.4-Expert-elicitation.pdf

NEGEM storylines

- All storylines aim at **1.5°C warming**
- All storylines aim to describe **the realistic potentials of NETPs** with emphasis on different aspects

1. **1.5C-Technology:** Storyline focusing on **optimistic technology development** of the NETPs
2. **1.5C-Environment:** Storyline focusing on global **environmental sustainability** and lifestyle changes
3. **1.5C-Security:** Storyline focusing on **security and self-sufficiency** due to geopolitical fragmentation and regional markets.

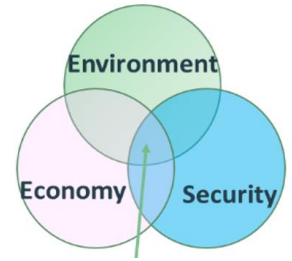
- The **reference pathway** follows the UN NDCs (Nationally Determined Contributions in October 2021)



Inputs for realistic NETP potentials and for final NEGEM vision

Full storylines can be found from Deliverable 8.2: https://www.negemproject.eu/wp-content/uploads/2023/11/NEGEM_D8.2_NEGEM-scenarios.pdf

Key assumptions regarding NETPs in the storylines



1.5C Tech

BECCS:
- Moderate used of bioenergy crops
- field and forest residues included
- bio-CCS from biogenic CO_2 point-sources

DACCS: optimistic

Af-/reforestation: included

Biochar: optimistic

Soil carbon sequestration: moderate potential due to wider land-use for other NETPs

Enhanced weathering: included

Ocean alkalinisation: included (OceanNETs data)

CO_2 storage potentials: no political barriers (i.e. also onshore storage allowed).

1.5C Env

BECCS:
- Use of energy crops **strictly constrained**
- field and forest residues included
- bio-CCS from biogenic CO_2 point-sources

DACCS: optimistic

Afforestation: excluded due to risk of monocultures

Reforestation: enabled on pastureland released from **dietary changes** (50% global shift Planetary Health Diet by 2050 and 100% shift by 2100)

Biochar: limited

Soil carbon sequestration: High potential due to reduced land-use for other NETPs

Enhanced weathering: constrained, eco-toxicity risks

Ocean alkalinisation: forbidden, concerns of environmental risks

CO_2 storage potentials: constrained due to lack of social acceptance (e.g. on-shore storage potential not used)

1.5C Sec

BECCS:
- energy crops **potential enabled by dietary changes** (25% shift to Planetary Health Diet)
- field and forest residues included
- bio-CCS from biogenic CO_2 point-sources

DACCS: pessimistic price development

Af-/reforestation: included, local solutions.

Biochar: moderate

Soil carbon sequestration: moderate potential due to wider land-use for other NETPs

Enhanced weathering: included, local solution

Ocean alkalinisation: forbidden due to lack of international co-operation on policy and regulation

CO_2 storage potentials: constrained, lack of international co-operation and security concerns.

Constraints for pipeline infrastructures, imports of oil, gas and electricity (Russian gas, CO_2 pipelines, etc.).

Limitations of the study

- The storylines and scenarios describe **potential trajectories** on how the future might unfold.
    - They are not to be interpreted as scenarios forecasting the future.
    - However, they **can provide scale and understanding on the magnitude of solutions needed.**

- Future technologies & scaling them up: u**ncertainties** on technical parameters, prices, etc.

- Uncertainty on how the **land use based NETPs** can be used together to **avoid double counting**
    - Here biochar & BECCS potentials fit together, as no residue use is assumed for biochar
    - E.g. use of residues for bioenergy vs. soil carbon sequestration potentials?

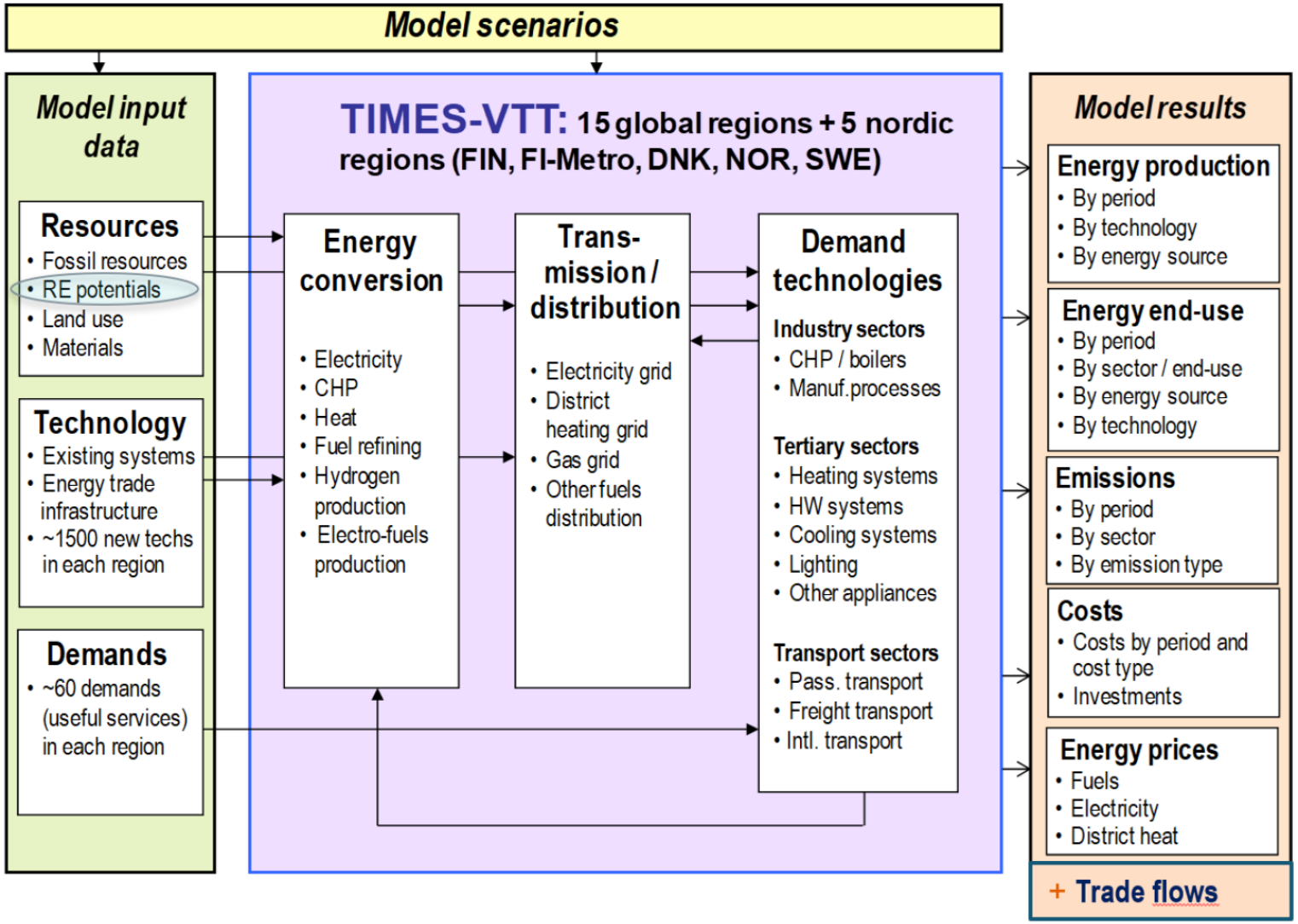
NEGEM Scenario results

Antti Lehtilä VTT

Whole report available: https://www.negemproject.eu/wp-content/uploads/2023/11/NEGEM_D8.2_NEGEM-scenarios.pdf

VTT-TIMES model with NEGEM updates

- Global VTT-TIMES model: partial equilibrium, technology-rich IAM model with climate module
- Updated especially with data on NETPs, CO_2 storage potentials and biomass supply potentials
- Model covers all Kyoto GHG emissions: their sources, abatement options, and sinks
- Deforestation emissions also included but only as an exogenous projection

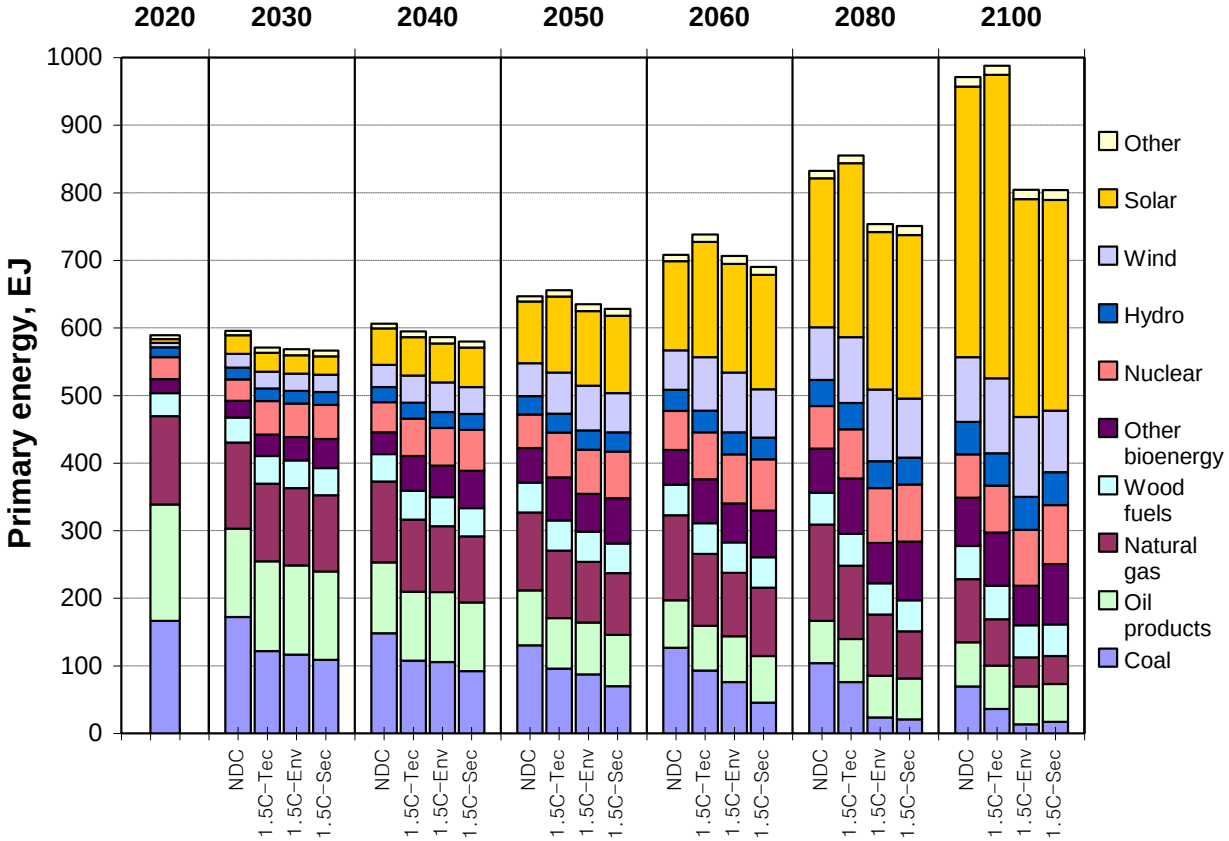


From storylines to scenarios → quantification of the storylines (G = Global, E = Europe excluding FSU–Baltics)

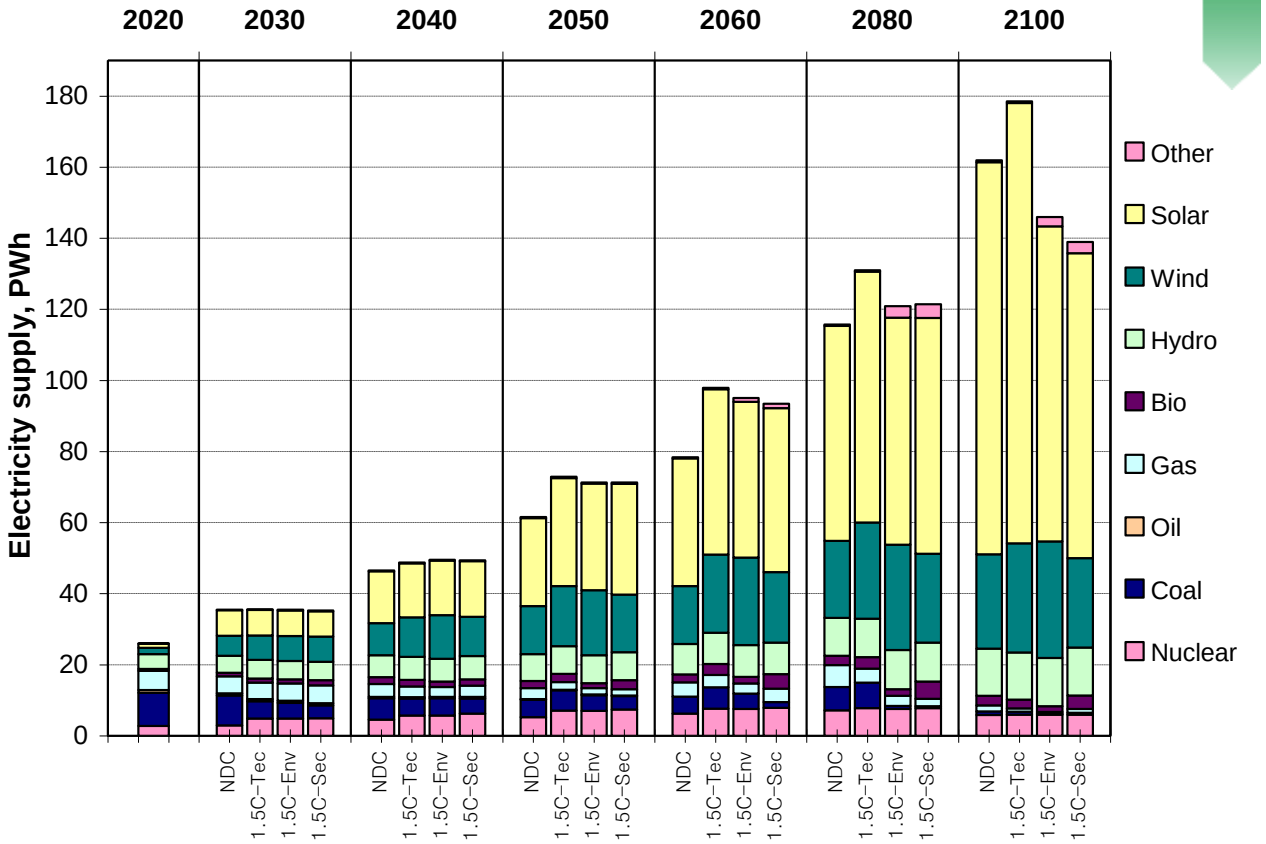
NETP assumption	NDC	1.5C-Tec	1.5C-Env	1.5C-Sec	References
Energy crop feedstock potential	G-2050: 45 EJ/a G-2080: 60 EJ/a E-2050: 2.4 EJ/a	G-2050: 45 EJ/a G-2080: 60 EJ/a E-2050: 2.4 EJ/a	G-2050: 14 EJ/a G-2080: 20 EJ/a E-2050: 1.5 EJ/a	G-2050: 55 EJ/a G-2080: 70 EJ/a E-2050: 3.8 EJ/a	Ruiz et al (2019) Vera et al (2021) Frank et al (2021)
BECCS potential	Driven by feedstock supply potentials	Driven by feedstock supply potentials	Driven by feedstock supply potentials	Driven by feedstock supply potentials	Fuss et al (2018)
DACCS potential	G-2050: 5 Gt(CO_2)/a G-2080: 30 Gt(CO_2)/a	G-2050: 5 Gt(CO_2)/a G-2080: 30 Gt(CO_2)/a	G-2050: 5 Gt(CO_2)/a G-2080: 20 Gt(CO_2)/a	G-2050: 5 Gt(CO_2)/a G-2080: 20 Gt(CO_2)/a	Fuss et al (2018) Realmonte et al 2019
Biochar potential	G-2050: 1.9 Gt(CO_2)/a G-2100: 2.3 Gt(CO_2)/a	G-2050: 1.9 Gt(CO_2)/a G-2100: 2.3 Gt(CO_2)/a	G-2050: 0.2 Gt(CO_2)/a G-2100: 0.3 Gt(CO_2)/a	G-2050: 0.4 Gt(CO_2)/a G-2100: 0.7 Gt(CO_2)/a	Schmid et al (2019) Werner et al (2021a) Werner et al (2021b)
SCS potential	Not considered	G-2050: 2.0 Gt(CO_2)/a	G-2050: 2.9 Gt(CO_2)/a	G-2050: 2.0 Gt(CO_2)/a	Roe et al (2021)
Afforestation potential	G-2050: 3.0 Gt(CO_2)/a G-2100: 5.0 Gt(CO_2)/a	G-2050: 3.0 Gt(CO_2)/a G-2100: 5.0 Gt(CO_2)/a	Not allowed	G-2050: 3.0 Gt(CO_2)/a G-2100: 5.0 Gt(CO_2)/a	Doelman et al (2020) Frank et al (2021) Braun et al (2022)
Reforestation potential	Not considered (included elsewhere)	Not considered (included elsewhere)	G-2050: 2.9 Gt(CO_2)/a G-2100: 200 Gt(CO_2) (cumul. by 2100)	Not considered (included elsewhere)	Braun et al (2022) Werner et al (2023)
Ocean alkalinisation	G-2050: 2.2 Gt(CO_2)/a G-2080: 3.0 Gt(CO_2)/a	G-2050: 2.2 Gt(CO_2)/a G-2080: 3.0 Gt(CO_2)/a	Not allowed	Not allowed	Fuss et al (2018) Van Knooten (2022)
Enhanced weathering	Not considered	G-2050: 2.0 Gt(CO_2)/a	G-2050: 1.1 Gt(CO_2)/a	G-2050: 2.0 Gt(CO_2)/a	Fuss et al (2018) Beerling et al (2020)
Geological CO_2 storage potential	G: 6700 Gt(CO_2) E: 175 Gt(CO_2)	G: 6700 Gt(CO2) E: 175 Gt(CO2)	G: 3200 Gt(CO2) E: 110 Gt(CO2)	G: 2700 Gt(CO2) E: 80 Gt(CO2)	Kearns et al. (2017) Selosse & Ricci (2017) Nixon et al (2022)

Global scenarios: Basic energy supply results

- Moderate growth in total primary energy consumption compared to past decades
- Electricity supply however rapidly increasing due to electrification in all sectors
- Totals compare quite well with e.g. the JRC Global Energy and Climate Outlook 2022
- Lower GDP growth assumptions for 1.5C-Env and 1.5C-Sec have notable impact beyond 2050

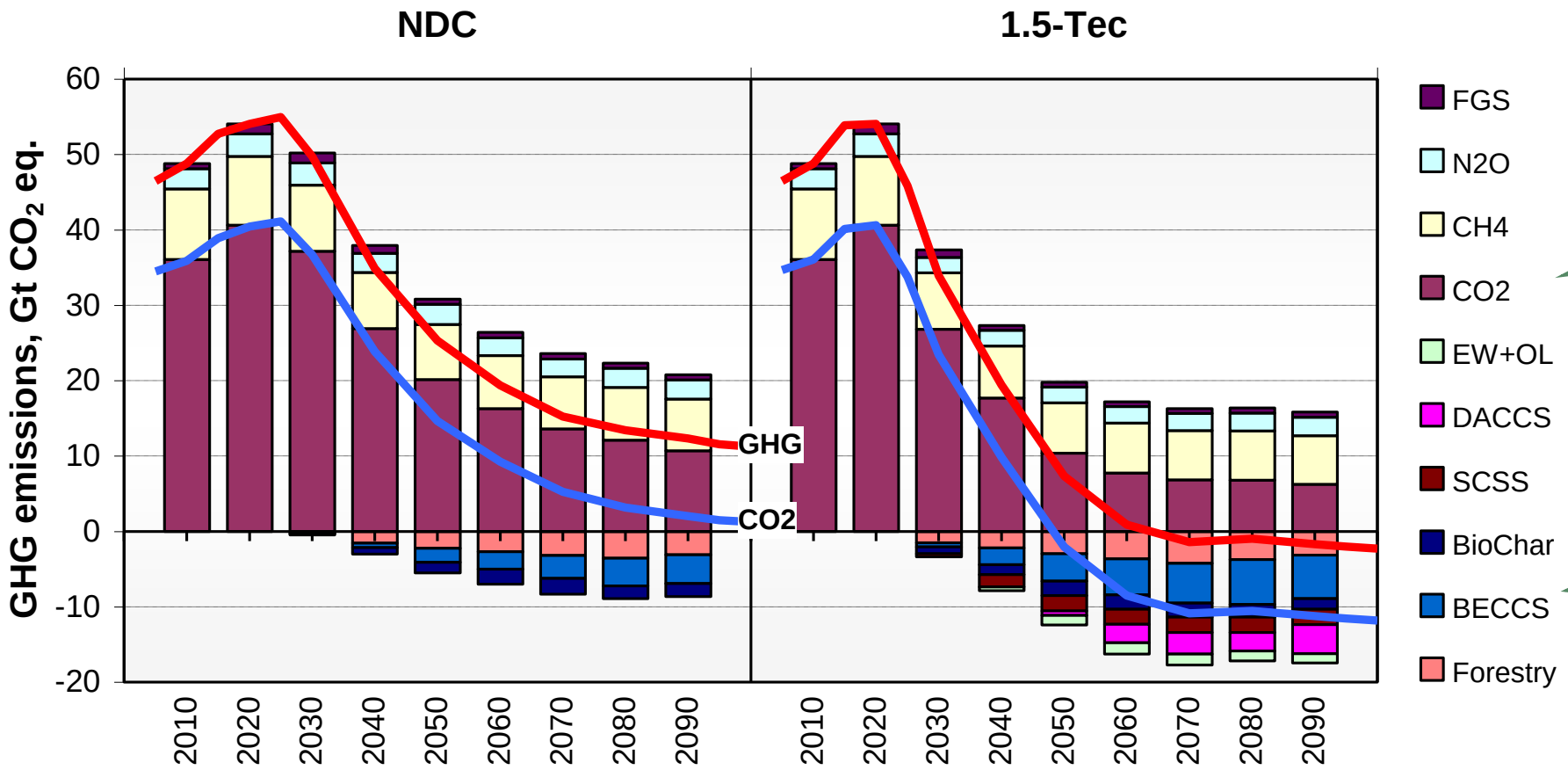


Primary energy supply



Electricity supply

Global scenarios: Reference scenario & 1.5Tech scenario

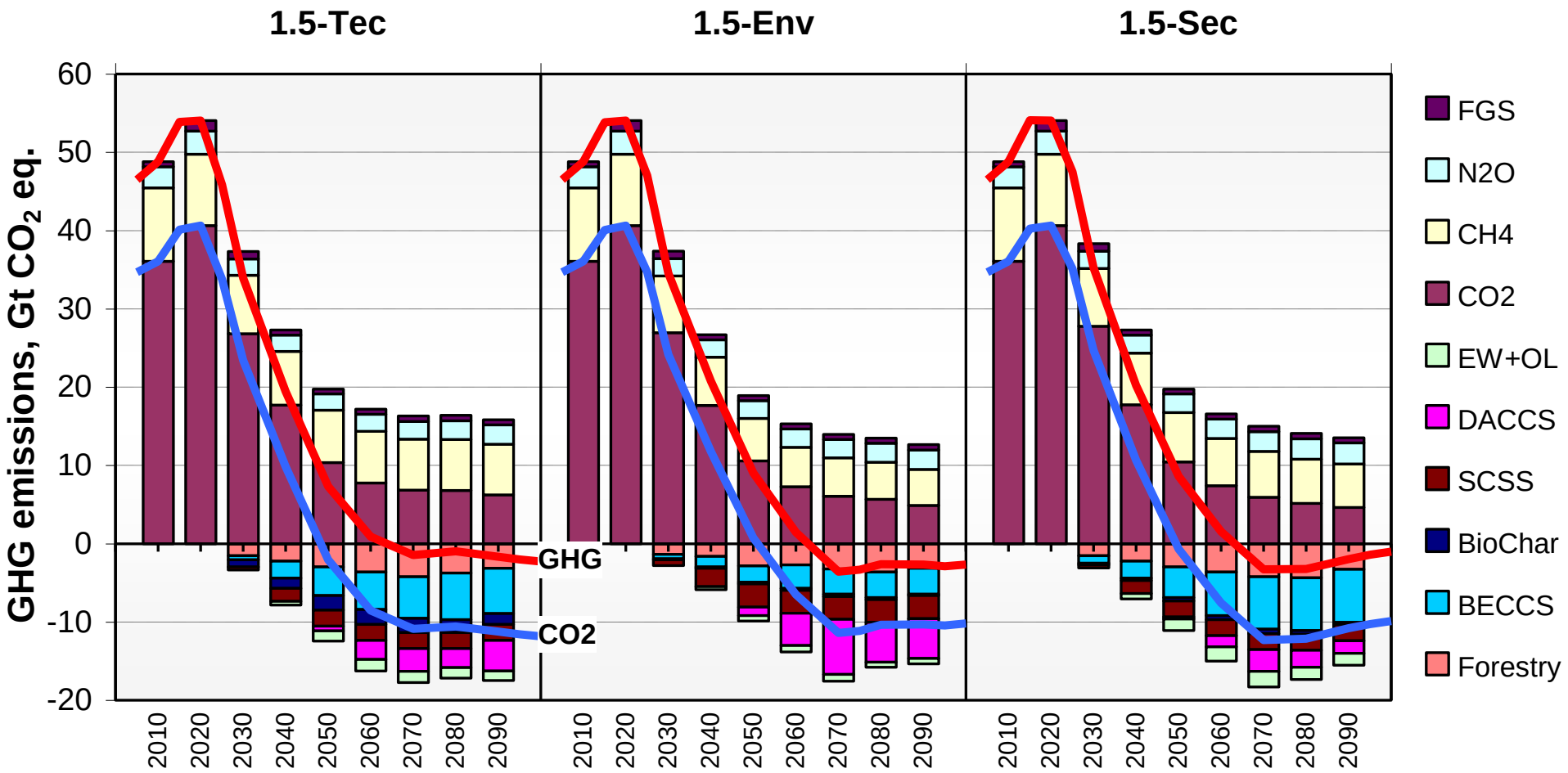


Fossil CO2 emissions included here (excluding those captured & stored)

Fossil CCS not included here, and so the need for CO2 storage is in fact larger

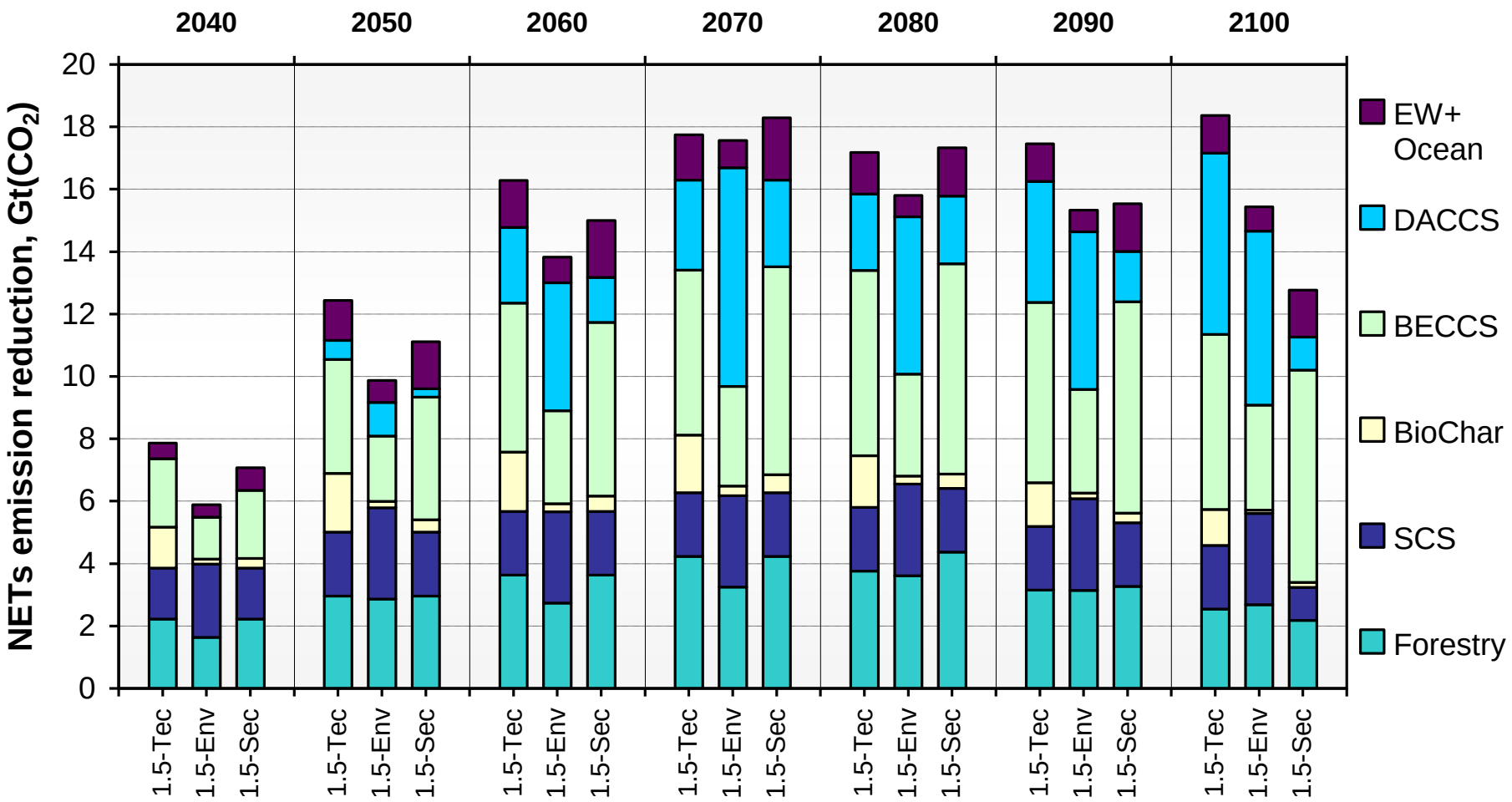
- *Red and blue lines represent total net emissions of GHGs and CO_2, respectively.*
- *Vertical bars show the gross emissions (positive) and removals (negative).*
- *BECCS = bioenergy with CCS, Forestry = afforestation and reforestation, EW + OL = enhanced weathering & ocean liming (ocean liming only in 1.5C Tech scenario) .*

Global scenarios: Development of greenhouse gas emissions (Kyoto gases) in the three scenario variants (D8.2, D8.6)



- *Red and blue lines represent total net emissions of GHGs and CO_2, respectively.*
- *Vertical bars show the gross emissions (positive) and removals (negative).*
- *BECCS = bioenergy with CCS, Forestry = afforestation and reforestation, EW + OL = enhanced weathering & ocean liming (ocean liming only in 1.5C Tech scenario) .*

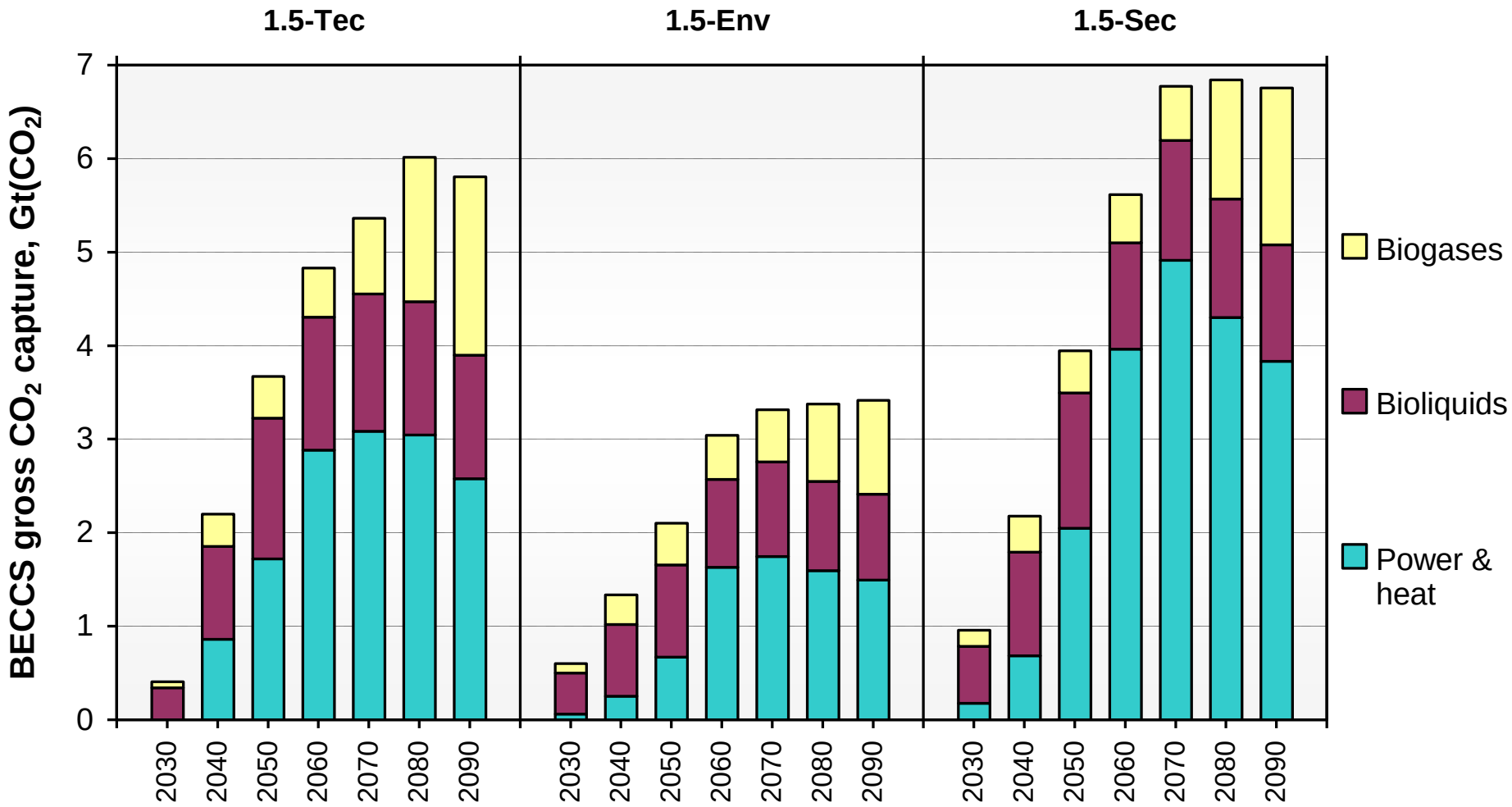
Global scenarios: Contribution of NETPs to the emission reductions



- *Amounts shown are the direct impact of NETs, while their net impact is somewhat smaller e.g. for BECCS and DACCS.*
- *Data for ocean liming NETs are based on collaboration with the H2020 OceanNETs.*
- *EW+Ocean consists mostly of enhanced weathering (only marginal share of ocean liming in 1.5-Tec scenario)*

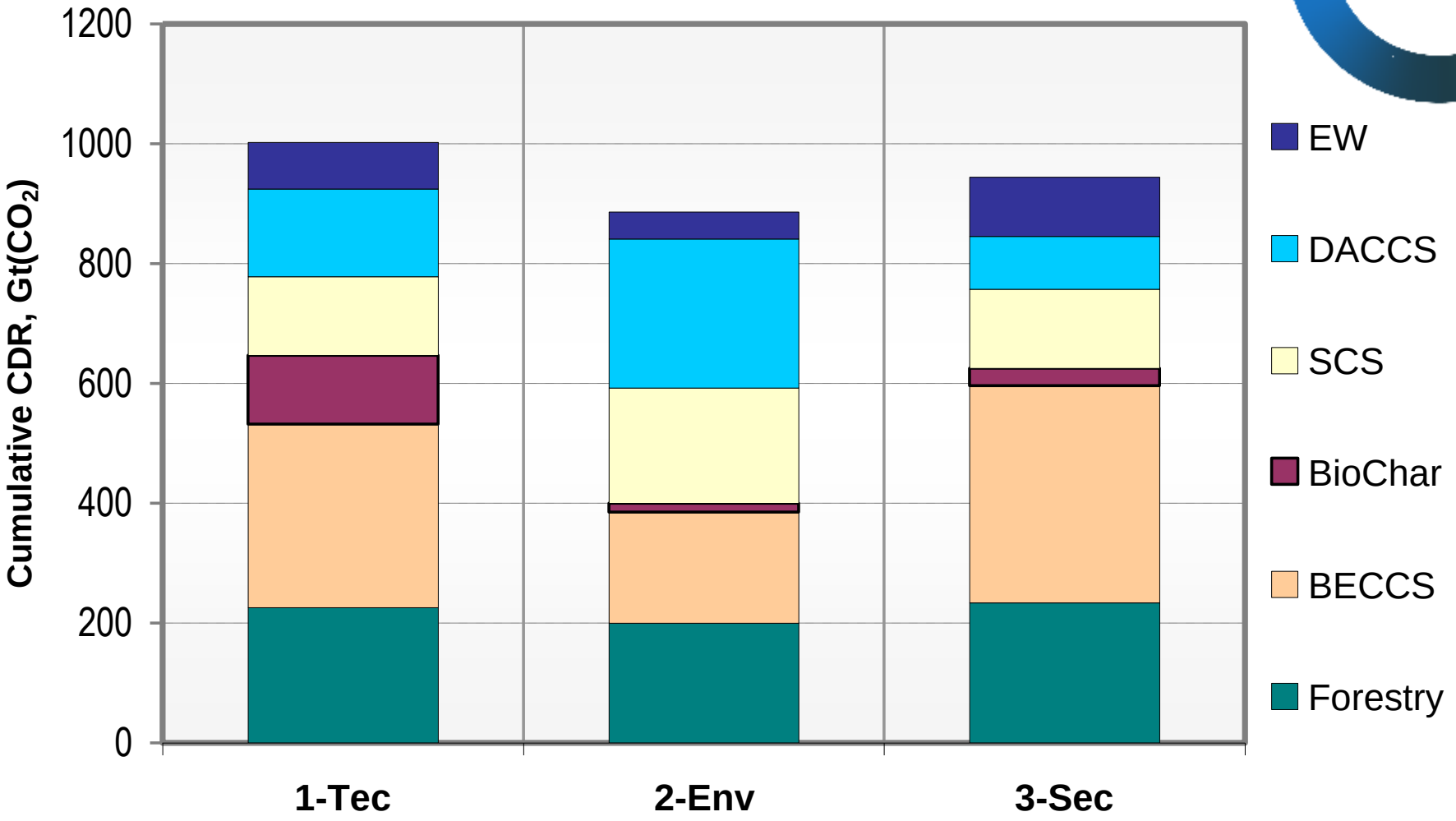
BECCS applications by technology clusters

- 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.



Cumulative cost-effective potentials

- Figures refer to gross CDR by NETPs (offsets from upstream emissions included in the total GHG balance)
- Reforestation & afforestation may be considered priority nature-based solutions (after deforestation↓)
- Combined cost-effective potential of biochar and SCS likewise substantial
- BECCS has more co-benefits from energy system integration than DACCS, but higher risks for sustainability

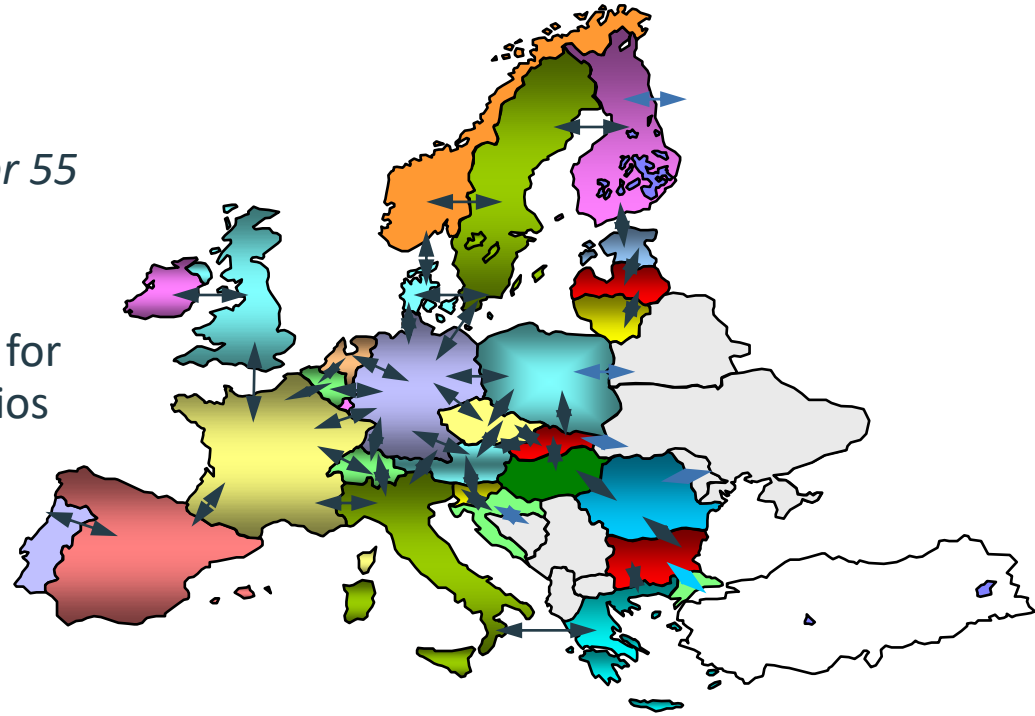


Key conclusions from the global modelling

- NETPs would be needed in gigaton scale to reach the 1.5–2.0°C mitigation goals and no NETP option should be excluded from mitigation portfolios at this stage.
- GHG mitigation targets were achieved by cost-optimization of the mitigation pathway (no additional policy measures, in addition to NDCs, and ETS price for Europe in 2 scenarios)
    - Stricter policies and measures to phase out fossil fuels are needed, and would also to some extent reduce the need for NETPs
- If bioenergy crop potential for BECCS is strictly limited, then DACCS would be needed despite its relatively high price
    - Gigaton scale implementation of DACCS remains a question mark (energy, CO_2 storage)
    - However, DACCS does not appear to cause added pressure on critical metals demand
- In the NEGEM scenarios nature-based solutions provide around half of the global removals needed by 2050, and around one third by 2100
- Enhanced weathering provides moderate contribution, further research is needed on its environmental and practical implications.

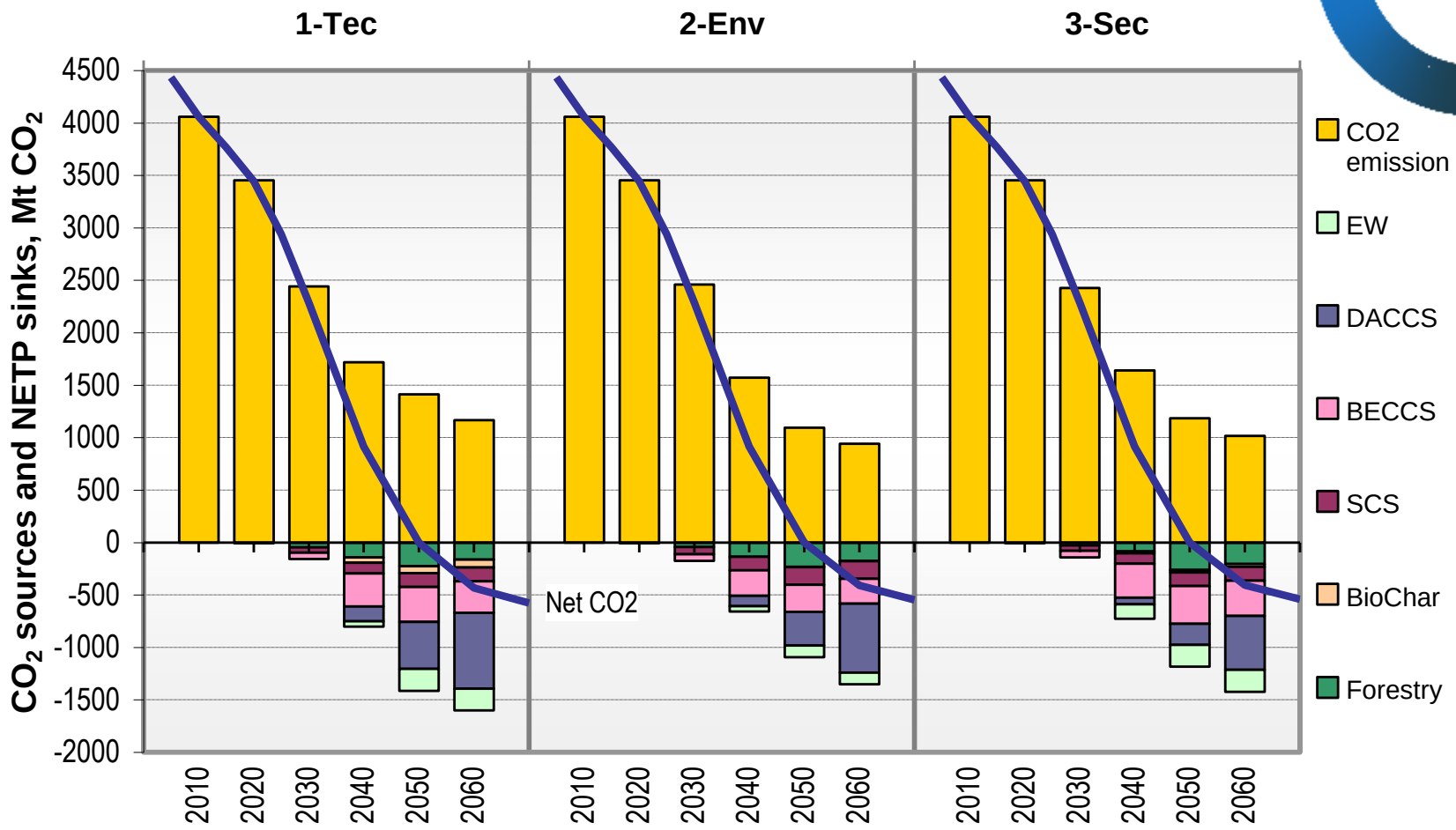
EU level modelling – specific features and assumptions

- PAN-European TIMES model used (based on JRC-EU-TIMES)
  - Bottom-up technology-rich partial equilibrium model
  - Country-level regions covering whole Europe, except for FSU minus Baltics
  - The Negem scenarios were modelled for “EU-31” (with only CO_2 considered)
- EU-Specific assumptions:
  - Scenarios modelled up to 2060
  - Russian trade restricted, and most severely in 1.5C-Sec
  - ETS sector & effort sharing sector targets in line with the *Fit for 55* package & EU effort sharing regulation (EU 2023/857)
  - Net zero CO_2 target for EU-31 as a whole by 2050
  - ETS carbon price trajectory according to EC recommendations for WAM scenario (EC 2022), in the 1.5C-Env and 1.5C-Sec scenarios
  - National macroeconomic drivers including GDP growth, private consumption and sector production growth were not varied in the European scenarios



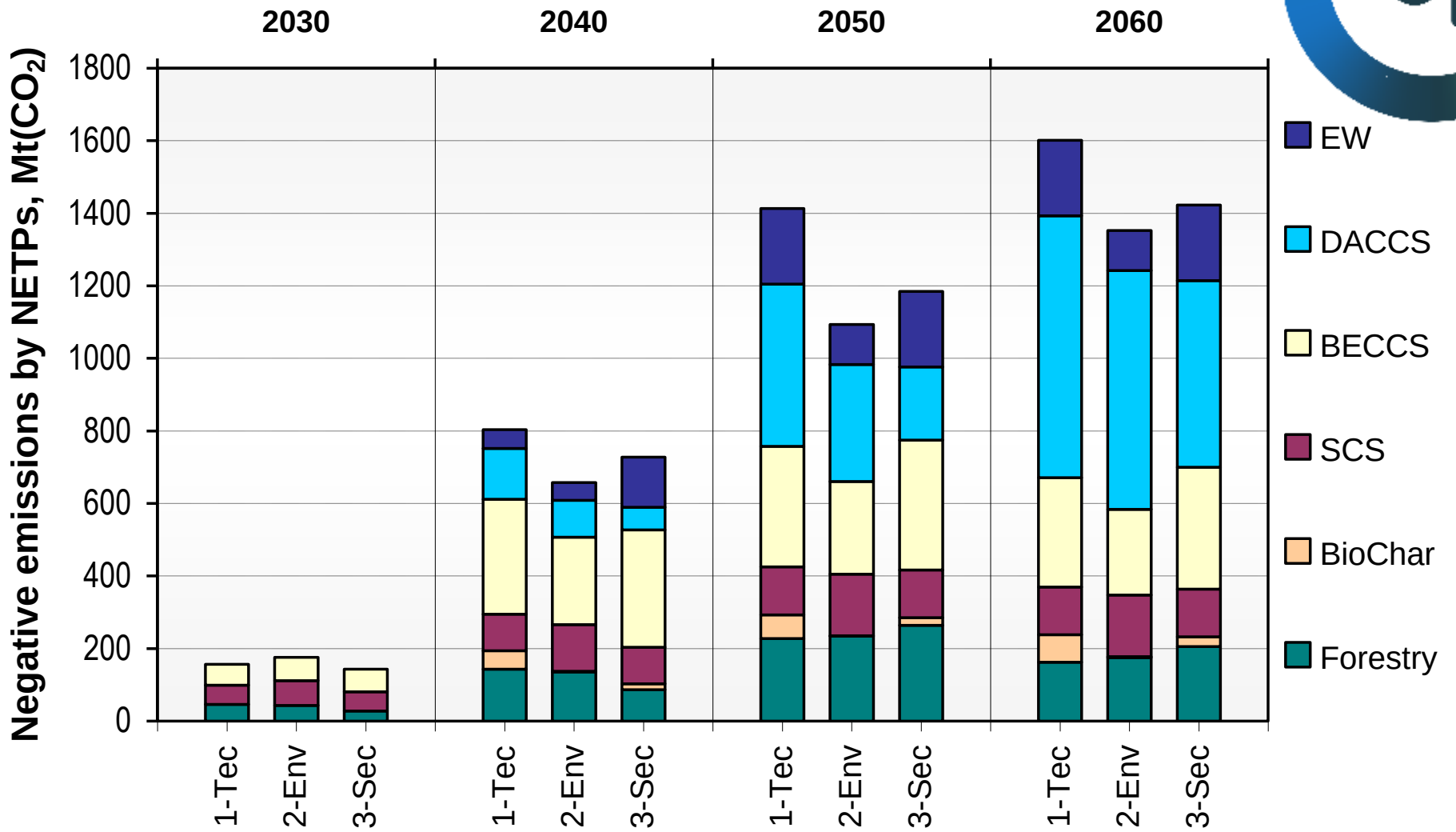
EU-31 scenarios: CO_2 Balances

- Results indicate that deep reductions in emissions would become costly without NETPs
- A wide variety of NETP options appear to become cost-effective and thus merit consideration
- In 1.5C-Tec and 1.5-Env BECCS would be left in a smaller role than DACCS by 2050, due to limited resources of sustainable biomass



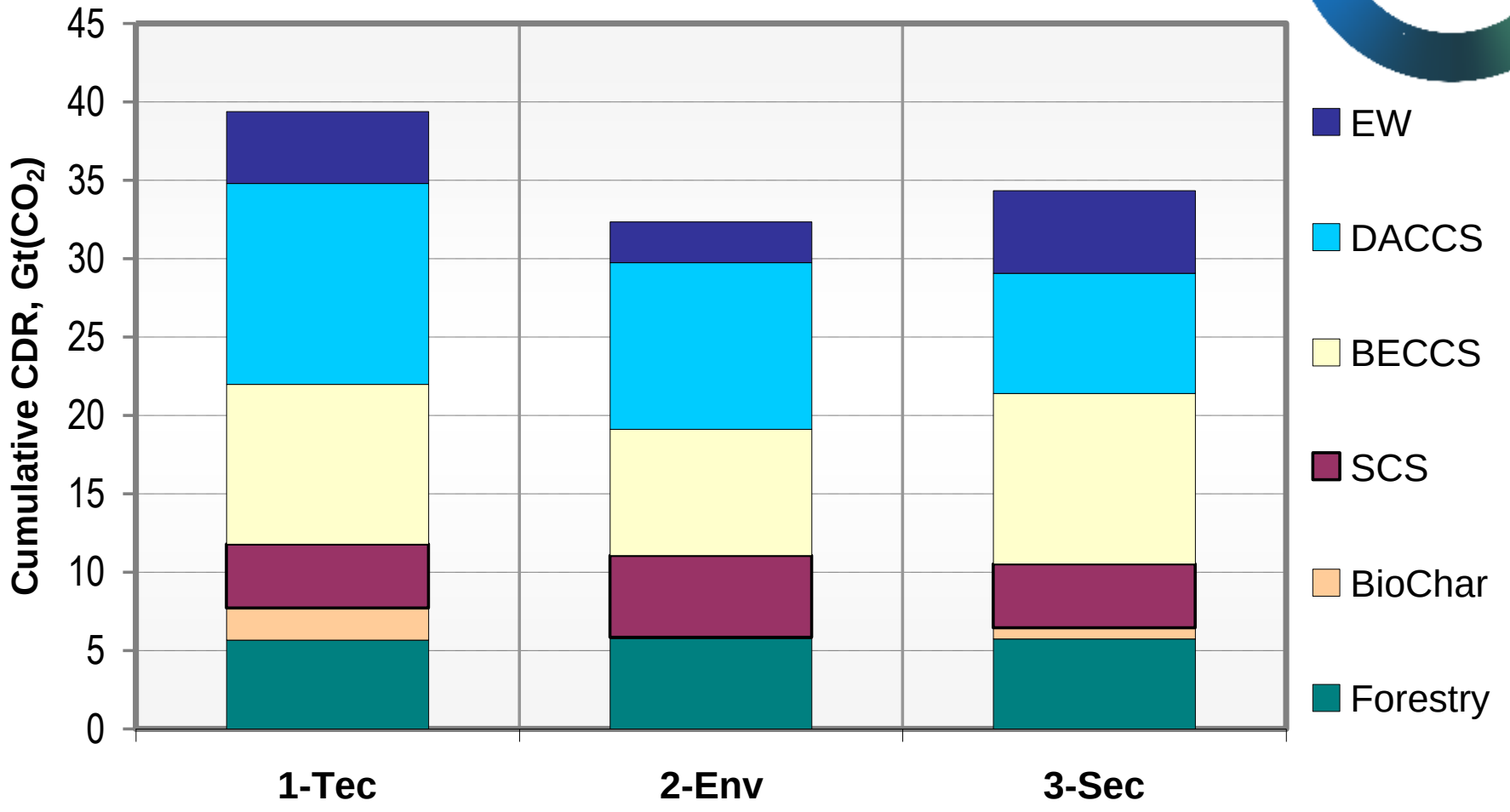
EU-31 scenarios: NETPs contribution

- Results indicate that DACCS may become cost-effective even when all other NETP options are used
- Total need for NETPs could be over 1 Gt/a by 2050, of which those requiring CO_2 geological storage 0.6–0.7 Gt/a
- Beyond 2050 DACCS would appear to become dominant



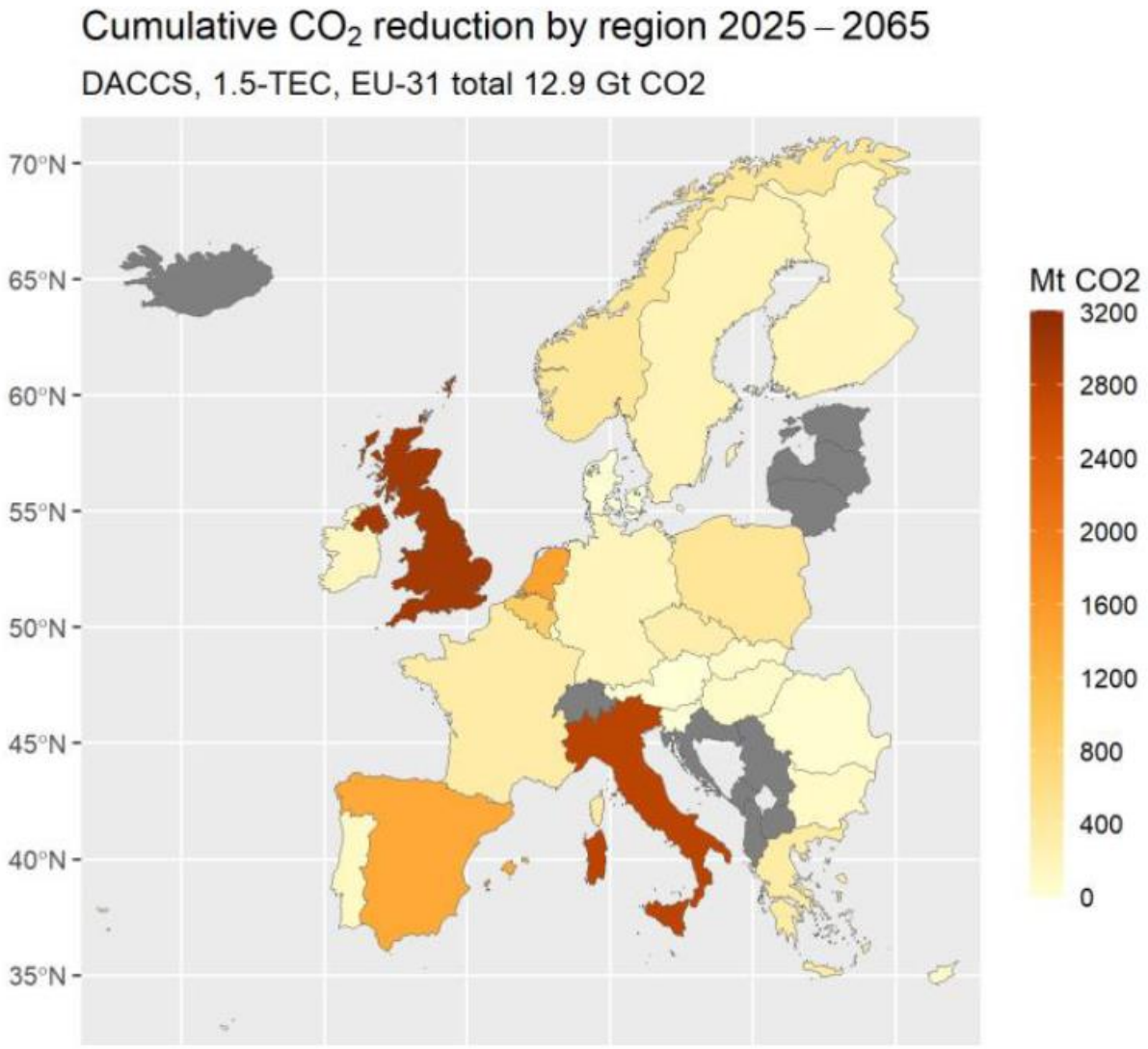
Results for the EU-31 NEGEM scenarios: Cumulative CDR

- Results indicate that DACCS deployment may become important for achieving the European targets cost-effectively, especially with strict criteria for biomass



Example of NETP-specific results

- From the report, you can find technology and country specific results as maps.
- E.g. DACCS deployed most in countries with cheap renewable electricity and with sufficient CO_2 storage potential (Italy, UK)
- We will continue analysis on the European country level results



Key conclusions for Europe

- The Pan-European TIMES provides more detailed results on the level of individual countries, which may be considered also more reliable for Europe.
- The marginal costs are notably higher in the European model than in the global model.
    - In the optimization, the global model allows the model to allocate the highest-cost mitigation measures to regions where the marginal costs are the lowest.
- The higher marginal costs in the European scenarios accelerate the penetration of the DACCS technology, which appears in the results on a small scale already in 2040
- Role of BECCS can be important especially up to 2050 but would stagnate thereafter
- Role of CCU would appear to remain small compared to NETs as long as storage is available

NEGEM Vision

Tiina Koljonen VTT

Aim of the NEGEM vision

The aim of the NEGEM vision work

- Set the ground for a clear, shared, medium-to-long term vision on NETPs.
- Focus on sustainable NETPs potentials and on their role in contributing to the climate targets.
- Relevancy for European policymaking is particularly targeted, but the context of the vision is global.

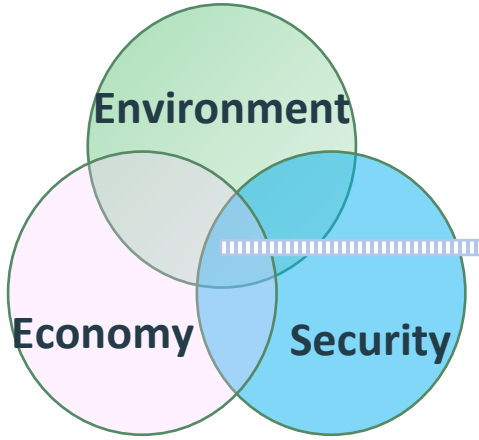
Format of the vision

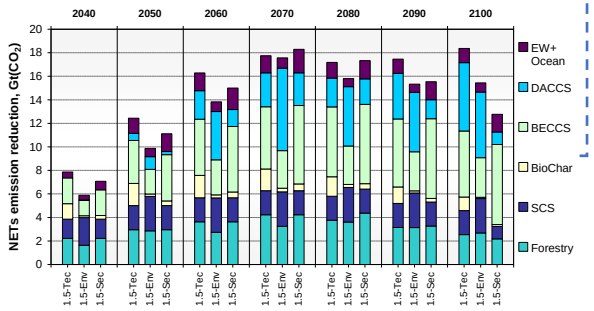
- A short vision statement + a longer version
- A vision report summarizing the NEGEM key findings which impact the vision

Creation of medium-to-long term vision of responsible deployment of NETPs

- Technological
- Commercial
- Environmental
- Social

Realistic NETP potentials





External experts

Vision criteria

- Acceptability
- Evidence-based
- European policy exploitation
- Climate change mitigation & SDGs

Initial NEGEM vision

Realistic NETPs potentials

- "Filtering" of theoretical potentials in light of real-world constraints

NEGEM scenarios

- Capturing trends and possible NETP futures emphasizing policy targets
- Co-creation
- IAM modelling with quantified assessments

NEGEM vision

- Robust conclusions
- Sustainable implementation
- Exploitable format
- Shared statements

Steps in NEGEM vision work

Start of project June 2020

End of project May 2024

External inputs

First vision workshop (Dec 2020)

Literature analysis (Jan 2021)

Second vision workshop (Nov 2023)

Initial NEGEM Vision (Jan -21)

Updated NEGEM Vision (Nov -22)

Final NEGEM Vision (Jan -24)

NEGEM inputs

Internal workshops (June 2021, October 2022, September 2023)

Results on NETPs

Technological potentials

Cost development

Scenario modelling

Environmental impacts

Stakeholder views

Policies and regulation

Formulation of the NEGEM vision in the beginning of the project has steered the NEGEM research across all the WPs

There is a risk that climate goals of Paris Agreement (PA) will not be met without NETPs. NEGEM should increase the holistic understanding of NETPs, including co-benefits and trade-offs, and eventually enlarge the portfolio for NETPs. **NEGEM will consider techno-economics and commercialisation pathways, environmental impacts, social aspects and risks in its analysis of "realistic potentials" of NETPs to reach the PA goals. NEGEM will make those accountable for decision-making beyond only looking into negative CO_2 emission balance accounting**.

Changes adapted for the final vision:

- Latest IPCC report further highlighted the role of NETPs
- Key conclusions enabled by NEGEM results

NEGEM vision for climate neutrality based on NEGEM results to answer the questions on realistic potentials: what, when, how

To meet the climate goals of the Paris Agreement, **drastic and immediate greenhouse gas emission reductions** are needed. To keep the warming in 1.5-2 °C, **cardon dioxide removal (CDR)** technologies and practises are needed but should only be relied on as a **complementary measure** to emission reductions. The smaller the residual emissions are, the lower the demand for CDR. **Nature-based CDR** methods provide strong **synergies between climate change mitigation and international targets for nature restoration** and broader sustainable development goals. **Technical solutions with geological-timescale provide permanent CDR, which is needed to reach climate neutrality**. To respond to the environmental and social challenges, a **portfolio of CDR methods** is needed to balance the impacts. A large portfolio of CDR methods together with international co-operation will enable cost-effective mitigation pathways.

Responsible CDR implementation, balancing between the targets for climate change mitigation and protection of other planetary boundaries, should be guided by a **clear and transparent policy framework**. Continuous interaction between different **stakeholders**, as well as **systems perspective in regulation design**, will enable a **social licence to operate for CDR methods**. A growing number of regions, countries, businesses, and other stakeholders need to form their own CDR visions for climate neutrality.

Key points from the longer version of the vision

- **Separate policy targets for greenhouse gas reductions, land use sector (LULUCF), and technical CDR** that leads to geological storage are needed to guarantee the balanced contributions for climate change mitigation.
- The carbon dioxide (CO_2) **storage time** and **vulnerability** to intended and/or unintended **release of CO_2** is essential.
- A **cost-efficient CDR implementation** is enabled by a **large portfolio of CDR** methods and by **international cooperation** on CDR regulation, and CO_2 storage and transport.
- An **equitable and fair allocation of CDR targets** between countries is needed.
- According to the NEGEM scenarios, **by 2050 around half of the removals could be provided by nature-based solutions**, and thus their **implementation should accelerate immediately**. **Technical solutions** such as BECCS, DACCS and EW **start to scale up from 2030-2040's**, their highest deployment taking place in the 2060-2070's.

Implementation gap: how NETPs fit existing climate frameworks

Fabiola de Simone, Carbon Market Watch

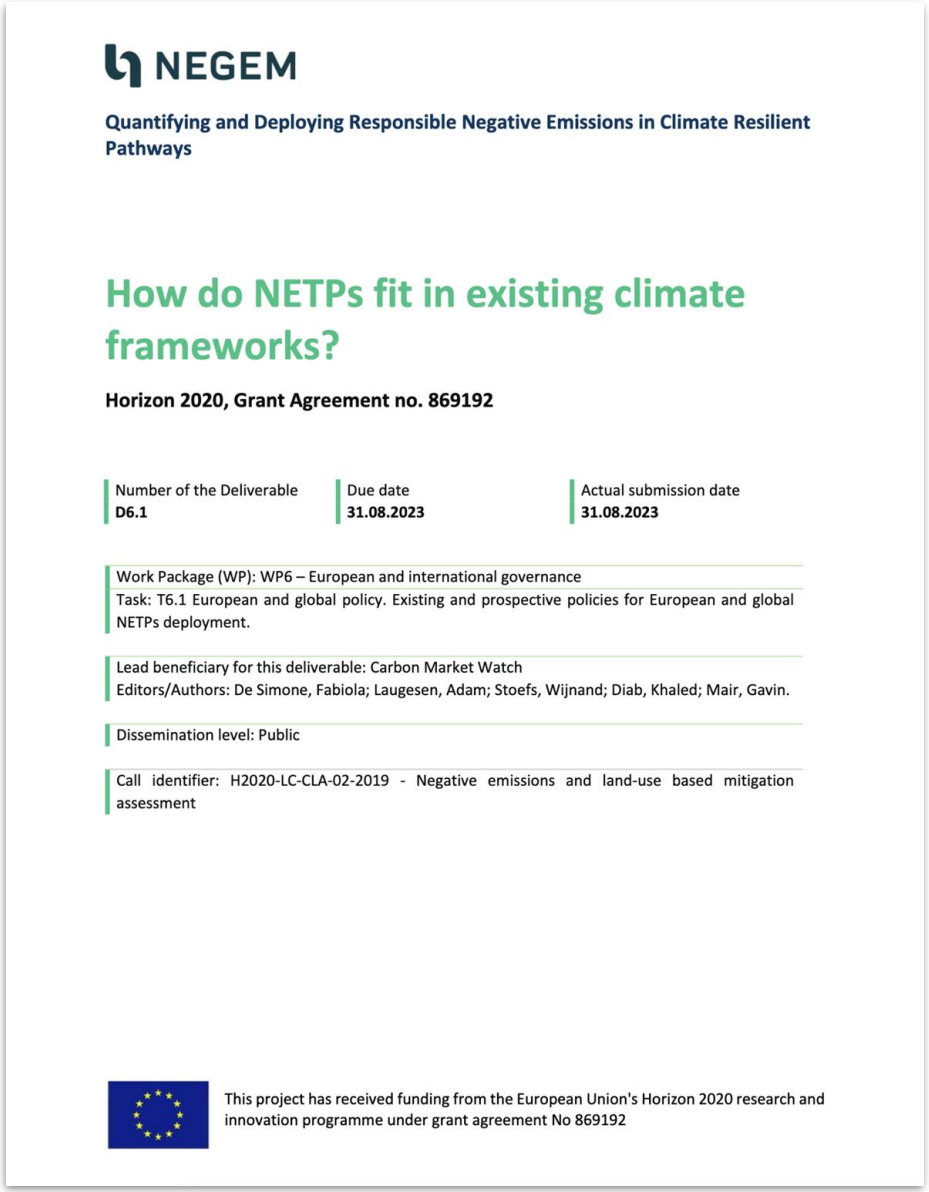
CARBON MARKET WATCH

Implementation gap: how NETPs fit existing climate framework

NEGEM 2° vision workshop, 28 November 2023

Introduction

- Increasing interest in CDR methods and their potential.
- CDR deployment comes with both opportunities, constraints and risks.
- Are existing policy frameworks adequate to govern CDR?



NEGEM

Quantifying and Deploying Responsible Negative Emissions in Climate Resilient Pathways

How do NETPs fit in existing climate frameworks?

Horizon 2020, Grant Agreement no. 869192

Number of the Deliverable	Due date	Actual submission date
D6.1	**31.08.2023**	**31.08.2023**

Work Package (WP): WP6 – European and international governance

Task: T6.1 European and global policy. Existing and prospective policies for European and global NETPs deployment.

Lead beneficiary for this deliverable: Carbon Market Watch

Editors/Authors: De Simone, Fabiola; Laugesen, Adam; Stoefs, Wijnand; Diab, Khaled; Mair, Gavin.

Dissemination level: Public

Call identifier: H2020-LC-CLA-02-2019 - Negative emissions and land-use based mitigation assessment

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869192

Available: https://www.negemproject.eu/wp-content/uploads/2023/09/NEGEM-D6.1-NETPs-in-existing-climate-frameworks.pdf

Methodology - Assessment criteria

Four environmental integrity criteria:

1. Clear vision of CDR climate function
1. Separate CDR target by law
1. Robust definition of CDR
1. Robust accounting, MRV and certification rules

Methodology - Selected sample

20 case studies, based on maturity and visibility

- Global: CDM, Art. 6, CORSIA
- EU: ETS, ESR, RED, LULUCF, CAP, CRCF
- National: Australia, California, Denmark, Finland, France, Germany, New Zealand, Sweden, Switzerland, the UK and the US.

Assessment - Summary

- Only FR, DE, SE, CH and the UK acknowledge the climate function of CDR in non-legally binding strategies
- No comprehensive, separate and legally binding targets for CDR
- Trend about using CDR to offset emissions or to comply with emissions reduction obligations
- Robust definition missing, inclusion of potentially very short term and vulnerable carbon sequestration methods
- No robust, comprehensive accounting and MRV methodologies

Assessment - Focus on EU policies

- No CDR dedicated policy in the EU, except for the CRCF which remains problematic
- Policies dedicated to emissions reduction:
  - EU ETS does not include CDR, but possibility actively discussed;
  - Loopholes in ESR and RED to use land sinks to offset emissions.
- LULUCF Regulation and CAP more direct ramifications for land-based sequestration deployment and sustainability

Recommendations

- Clarify the supplementary climate function of CDR
- Introduce specific, legally binding targets for CDR (separate tech and LULUCF)
- Incorporate a robust definition of CDR
- Launch robust accounting rules, MRV methodologies, sustainability requirements and liability criteria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Thank you for your attention.
Any questions?
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Conclusions and next steps

- **Final NEGEM vision will be formulated based on the feedback**
  - **Published in the beginning of February 2024**

- **NEGEM stakeholder survey is ongoing, please respond**
  - https://cambridge.eu.qualtrics.com/jfe/form/SV_9tsrs3WZ5ylc17M

- **NEGEM final event 18th of April in Brussels, stay tuned!**

- **NEGEM website:** https://www.negemproject.eu/
- **NEGEM Linkedin:** https://www.linkedin.com/company/negemproject/posts/

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Thank you!

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