Workshop hosted by co-organized by

NAVIGATE/ENGAGE expert workshop

Modelling and assessment of impacts, adaptive capacity, and interactions with Sustainable Development Goals in IAMs

20-22 September 2021, Zoom workshop

Global decarbonization and the NAVIGATE project

Rapid decarbonization of societies around the world is required to meet the Paris goals to hold global warming well below 2°C and to pursue efforts to limit warming to 1.5°C. This rapid decarbonization needs to be embedded in a broader agenda of sustainable development as defined by the 17 Sustainable Development Goals (SDGs) of the UN 2030 agenda.

Integrated assessment models (IAMs) of climate change are popular models that quantify climate change mitigation pathways on how industrialized, emerging and least developed countries can work towards the Paris climate goals. IAMs account for the evolution of coupled systems of economy, energy, land, water, and climate in the short term (2020-2030), medium term (2030-2050), and long term (2050-2100). Due to their integrative nature, IAMs play an important role in the assessments of the Intergovernmental Panel on Climate Change (IPCC) as well as regional decarbonization strategies, e.g. in the EU, China, and Brazil.

The European Union's Horizon 2020 project NAVIGATE (grant agreement no. 821124) aims to develop the next generation of IAMs. The project targets major advancements in several areas:

- Improving the representation of *transformative change* in interlinked social, technological and economic systems;
- Developing new capabilities for assessing *distributional implications* of climate change impacts and climate policy, and the interactions with other SDGs;
- Improving *robustness, legitimacy, and usability* of IAM results.

The ENGAGE project

The European Union's ENGAGE project (grant agreement no. 821471) will use IAMs to produce a new generation of pathways incorporating cutting-edge social science knowledge to reduce social and political challenges to achieving the Paris Agreement. This will be done via iterative stakeholder dialogue processes to address social, political, and technological constraints often to supplement IAM-based pathways. The project main objectives include:

- Building a legitimate, transparent, and iterative knowledge co-production process rooted in *stakeholder dialogue*.
- *Conceptualizing* and *operationalizing* multidimensional feasibility of decarbonization policies and pathways.
- Quantifying national avoided impacts of climate change and identifying decarbonization policies that *maximize co-benefits* and *minimize trade-offs*.
- Developing a new generation of decarbonization pathways which *represent multidimensional feasibility* and reflect all characteristics of the Paris Agreement

ENGAGE will quantify avoided climate change impacts through analysis of the exposure and associated costs for individual sectors and regions to climate change at different levels of and timing for global peak temperature. A particular focus will be on quantifying the benefits (or trade-offs) of climate policies on biodiversity, food, poverty, water, air quality, health, and employment, particularly for vulnerable populations.

Background of the workshop

The NAVIGATE project includes a series of activities to sustain an exchange between NAVIGATE and key groups of academic experts, policy makers, and other stakeholders. The aim is to gather feedback on the design of the project's research activities, the scope of analysis, the choice of the relevant IAM outputs and policy-relevant scenarios, and the needs for documentation and communication. This exchange is primarily supported by a series of three workshops. The first NAVIGATE stakeholder workshop was organized in May 2020 and focused on the robustness and legitimacy of models for climate policy assessment, bringing together 99 participants from 49 organizations in a 2-day virtual event.

To reflect on remaining challenges and guide future research, the NAVIGATE expert workshop will address three guiding questions:

- How to improve the representation of climate impacts and adaptation dynamics in IAMs?
- How to assess the results of joint climate impact-mitigation modeling studies?
- What are best practice policies that minimize trade-offs and maximize co-benefits between climate mitigation and sustainable development goals and how can these be represented in IAM scenarios?

The workshop will bring together international experts and NAVIGATE/ENGAGE researchers for in-depth discussions around these questions. Each of the guiding questions will be the theme of one half-day virtual session. The two first sessions on the first two questions will combine presentations and plenary discussions to assess recent advances and further challenges for joint climate impact-mitigation modeling and assessment. The third session, organized together with the ENGAGE project, will evaluate the representation of the Sustainable Development Goals (SDGs) related policies in Integrated Assessment Models (IAMs) identify examples best practice policies from around the world and discuss whether and how to include these policy representations in IAM scenarios.

Session 1: Representing climate impacts at a sectoral and regional level in IAMs

Monday September 20, 16:00-19:00 CEST

16:00 - 16:10. **Opening of the workshop** with introductory presentations

- Massimo Tavoni (RFF-CMCC European Institute on Economics and the Environment)
- Marc Jaxa-Rozen (University of Geneva)

16:10 - 17:15. **Expert presentations and Q&A** on advances and remaining challenges in climate impact estimation and modeling. *Moderator: Johannes Emmerling.*

- Marshall Burke (Stanford University): *Empirical evidence on the aggregate impacts of warming*
- James Rising (University of Delaware): *Challenges and pathways to constructing sectoral empirical damage functions*
- Frances Moore (University of California, Davis): *Importance of damage persistence for climate change costs: New evidence from lower-frequency temperature variability*
- Juan-Carlos Ciscar Martinez (European Commission – Joint Research Centre): *Climate risk and adaptation assessment: bottom-up, biophysical integrated modelling experience and lessons from the PESETA suite of projects*

17:15 - 17:30. Coffee break

17:30 - 18:20. **Short talks from NAVIGATE teams.** *Moderator: Marc Jaxa-Rozen.*

- Kaj-Ivar van der Wijst (PBL Netherlands Environmental Assessment Agency)*: Damage curves and uncertainty assessment*
- Aurélie Méjean (Centre International de Recherche sur l'Environnement et le Développement): *Modeling climate impacts on labor productivity*
- Johannes Emmerling (RFF-CMCC European Institute on Economics and the Environment): *Modeling within-country inequality and impacts*
- Nicole van Maanen (Climate Analytics): *Modeling adaptation dynamics*

18:20 - 19:00. **Moderated plenary discussion** around the following guiding questions (*Chair: Johannes Emmerling*):

- *What can we learn from empirical research on damage functions? To what extent are they useful for modeling?*
- *Integrating economic impacts in IAMs: how to comprehensively cover impact channels and categories, and capture their impact on growth?*
- *What are practical entry points for representing adaptation dynamics in IAMs?*

Session 2: Designing assessment frameworks for joint impact-mitigation studies

Tuesday September 21, 16:00-19:00 CEST

16:00 - 16:05. **Welcome and housekeeping remarks**

- Massimo Tavoni (RFF-CMCC European Institute on Economics and the Environment)

16:05 - 16:20. *Session 1 continued:* **Expert presentation and Q&A** on advances and remaining challenges in climate impact estimation and modeling. *Moderator: Massimo Tavoni.*

- Leonie Wenz (Potsdam Institute for Climate Impact Research): *Towards a better understanding of global temperature impacts on economic performance: subnational effects & day-to-day variability*

16:20 - 16:30. **Introduction to the second session** of the workshop

- Elmar Kriegler (Potsdam Institute for Climate Impact Research))

16:30 - 17:25. **Expert presentations and Q&A** on joint impact-mitigation assessment. *Moderator: Elmar Kriegler.*

- Julie Rozenberg (The World Bank): *Joint impact-mitigation tools for climate and development studies*
- Jarmo Kikstra (International Institute for Applied Systems Analysis): *The need for mitigation and adaptation: evidence from the social cost of carbon under partial growth effects*
- Francis Dennig (Yale-NUS College and The World Bank): *In praise of differential carbon prices*

17:25 - 17:40. Coffee break

17:40 - 18:20. **Short talks from NAVIGATE teams.** *Moderator: Marc Jaxa-Rozen.*

- Franziska Piontek (Potsdam Institute for Climate Impact Research): *A conceptual framework for cost-benefit decomposition*
- Mathijs Harmsen (PBL Netherlands Environmental Assessment Agency): *Assessment of climate impact scenarios in the IMAGE framework*
- Laurent Drouet (RFF-CMCC European Institute on Economics and the Environment): *Net zero-emission pathways reduce the physical and economic risks of climate change*

18:20 - 19:00. **Moderated plenary discussion** around the following guiding questions (*Chair: Elmar Kriegler*):

- *How can climate impacts be integrated in mitigation pathway analysis to provide a comprehensive multi-dimensional picture on the costs and benefits of mitigation?*
- *Can cost-effective analysis, cost-benefit analysis, risk analysis, and analyses of the social costs of carbon be combined to a coherent economic assessment of climate action pathways?*
- *What is the role of reference scenarios and baselines in joint impact-mitigation studies, and are revisions needed to the SSP-RCP framework?*
- *How should assessment frameworks represent the distributional aspects of climate impacts and mitigation?*

Session 3: Bringing best practice policies of climate mitigation and SDGs to IAM scenarios

Wednesday September 22, 13:30-17:00 CEST

13:30 - 13:35 Introduction to the third day of the workshop

13:35 - 14:30 SDGs and related policies in IAMs

- Overview of tradeoffs and synergies between climate policy and SDGs in IAMs (Volker Krey/Jarmo Kikstra, IIASA) (15 minutes)
- SDG policies in the IMAGE model (Detlef van Vuuren, PBL) (10 minutes)
- Modeling SDG interventions (Bjoern Soergel, PIK) (10 minutes)
- Discussion: 10 minutes

14:20 - 14:30 Coffee Break

14:30 - 15:30 Expert overviews of policies that minimize trade-offs and maximize co-benefits between climate mitigation and SDGs (10 minutes each)

- Energy access (Francis X Johnson and Rob Bailis, SEI)
- Health (Pauline Scheelbeek, LSHTM)
- Biodiversity (Simon Buckle, OECD)
- Food (Herman Lotze-Campen, PIK)
- Water (Josh Weinberg, SIWI)

15:30 - 15:40 Coffee Break

15:40 - 16:30: Breakout groups discussing policies and whether/how to represent these in IAMs and scenarios

Breakouts in two groups:

- Biodiversity/Food/Water (chair: Volker Krey, recording/notes: Jennifer MacDonald)
- Health/Energy (chair: Bas van Ruijven, recording/notes: Jarmo Kikstra)

16:30 - 16:50: Plenary reporting (3-5 min. per BOG) and final discussion

16:50 - 17:00 Wrap-up of the full workshop

The NAVIGATE consortium partners

The ENGAGE Consortium Partners