

Summary of the JPI Climate and CTNTE dialogue *supported by the MAGICA project*  
**“Equinox Dialogue on Modelling the Economics of Climate Change”**  
11<sup>th</sup> and 12<sup>th</sup> December 2025  
WTC III, Boulevard Simon Bolivar 30, 1000 Brussels, Belgium

This dialogue was arranged by JPI Climate and by the Cambridge Trust for New Thinking in Economics (CTNTE) and supported by the MAGICA project to informally consider the current economic norms and how these are reflected in Integrated Assessment Models (IAMs) and in other models including any underlying assumptions, what can be adequately assessed and what are their current limitations with respect to informing the required low-carbon transition and transformation. In addition, the dialogue aimed at enhancing policy makers understanding of IAMs and their capabilities. The meeting was held under the Chatham House Rule.

There were eight presentations covering different modelling approaches and research areas and one guest presentation highlighting ECMWF collaboration with EIB and ECB. All presentations are available [here](#).

The dialogue was arranged around four topics:

- IAM modelling assumptions, advantages and limitations - representation of climate change impacts, adaptation and mitigation policies and measures
- Addressing equity and justice in IAMs - critiques and emerging approaches
- Technology developments and transfer and CDR in IAMs
- Finance and financial flows in IAMs

The dialogue started with a welcome address by *Sir Jim Skea, Chair of IPCC* (see the video [here](#)). He highlighted that models are very important to IPCC working groups 2 (climate change impacts and adaptation) and 3 (mitigation) but they and their outputs needed to be considered carefully. He indicated that IAMs are seen by many as black boxes and hence the assumptions need to be clearly presented. He also suggested that IAM are aids to thinking but are not “truth machines”. Jim Skea welcomed the discussion around the four dialogue topics as these are where the main criticisms lay.

Below are brief summaries of the discussions.

### **IAM modelling assumptions, advantages and limitations**

*Presentations by Christian Lutz, Managing Director, GWS and Elmar Kriegler, Head of Research, PIK followed by discussion.*

IAMs are complex and there is a need to understand the models and their outputs, inputs and assumptions need to be better explained to scientists from other disciplines and policy makers to help bridge the science-policy interface. There are different types of models, it depends on the model as to which time period they consider – most run up to 2050, some up to 2100 noting that the impact of mitigation is low on the economy. There is a desire for models to cover as many factors as possible but unsurprisingly the more detail is introduced, the more complex the models become. Integration of finance into models is difficult but models combining economics and climate change impacts are being increasingly developed. Models do not always appear to follow reality and seem to struggle with incorporating external (political) intervention, especially as the consequences of any intervention are not always predictable and can have positive or negative economic impact or different impacts on different sectors. Moving toward consensus amongst the economic community would be a positive move.

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During the discussion it was also highlighted that there was a need to improve modelling capacity for the global south given that economic growth is a priority in developing countries. Adapting models to suit different economics, move their application from global north to global south may not be always practical. It may be easiest to develop “new” models rather than adapt existing ones as local people need to be involved in developing local models – local specificity

is very important. This is essential when applying models from global north to global south. With respect to data, it was confirmed that there was good data availability in Europe though not in many other regions.

### **Addressing equity and justice in IAMs - critiques and emerging approaches**

*Presentations by Johannes Emmerling, Senior Scientist, CMCC and Marc Vielle, Senior Scientist, EPFL*

The assumption of perfect foresight was explained, and it was confirmed that this means that modellers assume that everything in the model will not change over the time period covered by that model. There are drawbacks of grouping countries as it reduces the applicability of the results to a particular country. Feasibility of including Solar Radiation Modification (SRM) into models is questionable since the costs are not known as well as the wider impacts. IAMs can assess job creation from the ‘new industries’ such as renewable energy or electric vehicle industry. These are counterbalanced with job losses in the industries they replace. Burden sharing between countries that have different data availability can raise some challenges and ethical considerations. It is extremely difficult accurately model people and population as well as incorporate societal components. For example, incorporating those within a population who have made the transition or predicting how different people will react given their different personal circumstances.

### **Technology developments and transfer and CDR in IAMs**

*Presentations by Dirk-Jan van der Ven, Research Fellow, BC3 with Theo Rouhette, Researcher, BC3, and Jay Fuhrman, NPPL*

Price assumptions for Carbon Dioxide Removal (CDR) in IAMs are subject to uncertainty and sets limits of using CDR in modelling exercises. Models can show that afforestation is not a good idea due to competing land uses such as for bioenergy. It is not always possible to differentiate between re-planting and planting. The ambition for CDR in the presented scenarios was extremely high and included approaches, such as Direct Ocean Capture, that are not at an implementation stage. CDR in the models appeared to assume that it would be low cost due to modelling assumptions that, with widescale rollout, the cost reduces significantly over time. It was further noted that at the current carbon price, CDR will not be viable, but the assumption is that the price will rise noting that uptake of carbon had decreased under climate change. Policymakers would need to know the realistic scale of CDR required to achieve 1.5°C and 2°C as soon as possible. They need to know whether net zero is attainable and what would be politically acceptable. It was reaffirmed that IPCC definitions should be used noting that the term “Climate Neutrality” has been withdrawn.

Several models may be required to answer complex questions – such as food security – and parameterization may be difficult. There should be caution about using outputs from one model to draw conclusions as well as using inputs to a subsequent separate model. Different models lead to differences in outputs. The reasons for differences can be due to inputs, assumptions or the approach adopted. It was noted that it is essential to fully understand the actual research questions that are responding to and therefore other queries they should be considering. It should also be understood what models can, and most importantly can’t, do and it was acknowledged that sometimes models provide more questions (i.e. aspects that need further investigation) than answers.

## Finance and financial flows in IAMs

Guest presentation by Jörn Hoffmann, Application Partnerships Lead, ECMWF

This talk presented the collaboration between ECMWF and banks – EIB and ECB. Focus on portfolio assets and risk from climate change. It was noted that there were differing timescales for the climate change data needed from ECMWF – EIB up to 2100, ECB up to 2050. Models are client determined – for EIB focus is on high emission scenarios whereas ECB focuses on less extreme scenarios.

*Presentations by Irene Monasterolo, Professor of Climate Finance, Utrecht University's School of Economics, IPCC AR7 WG3 Lead Author (Finance chapter) and Philip Summerton, CEO, Cambridge Econometrics*

Most IAM do not include finances, or if they do then this is only in a very rudiment fashion. In the best case, the cost of capital gets coupled/fed from the existing finance models back to the process based IAMs using interest rates on Capital Expenditure (CAPEX) and varies according to investor sentiment with respect to the technology and climate change scenario. Financial flows in IAMs need more research. There is limited understanding of how this works in terms of goods and services. Rather than making models more complex it would be better to integrate with existing financial models of banks/financial institutions.

### General discussion

Models are complex and that the complexity increases depending on the scope of the research question posed. The more complex the models become and the more difficult they become to explain to others, in terms of their approach and the assumptions made. There is a definite need to more simply explain what is happening inside any “black box” model.

On the other hand, models should not be so simple that people are not convinced of their integrity or their ability to provide the requisite information for policymakers. History-matching (back-casting) is very important for model validation, but it was acknowledged that this could be difficult if the requisite data is not available.

It is essential to ask the appropriate question to the relevant model that is focused at the correct scale - from international, continental, national down to local level. It could, however, be argued that IAM will never reach the level of granulometry required and that consistent scaling for application at the local level remains challenging. IAM will always be imperfect and will be continuously evolving. Both modellers and end-users of models' outputs need to fully aware (or briefed) on the limits (or proper application) of any model outputs and therefore awareness raising / capacity building / training is very important.

### Wrap-up of the dialogue, next steps

It was noted that the Global Stocktake will start in 2027 and conclude 2028 and that models would be utilised as part of this process. As such, in the interim, it would be good to ascertain if IAM can assist with such aspects as financial flows, what indicators can it provide with respect to debt and wealth and clarity on what IAM can (and can't) deliver. This summary will feed into Equinox 2026 process.