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European Researchers Unveil Innovative Tool to Decode Energy and Climate Models

A team of European Climate and Energy Modelling Forum researchers has unveiled a new method to decode intricate energy and climate models. In a recent publication in *Nature Energy*, they introduce "model fingerprints," a visual tool simplifying the comprehension of complex models' key features.

Energy models are crucial to understand emission mitigation pathways and the feasibility of climate targets. They provide us with long-term scenarios of how humanity may consume and produce energy in the future. However, many differences among these models remain, making it difficult for policymakers and stakeholders to understand the pathway to climate neutrality.

To understand these differences, a team of European researchers have developed a method to decode these models using model fingerprints. The fingerprints are a visual tool which allow users to – in a single glance – obtain an overview of a model behaviour.

The researchers ran a set of extreme mitigation scenarios to fully explore the behaviour of eight models: for example, scenarios where biomass is suddenly highly limited, or electrification strongly enhanced.
They measured model behaviour using diagnostic indicators across 5 categories: model responsiveness, mitigation strategies, energy supply, energy demand and mitigation costs and effort. The visual comparison of these diagnostic indicators provides the "model fingerprints".

Project coordinator **Will Usher** says, "Model fingerprinting fosters transparency and collaboration between policymakers and researchers. We invite interested groups to join the model comparison exercise run by ECEMF and create their own model fingerprint."
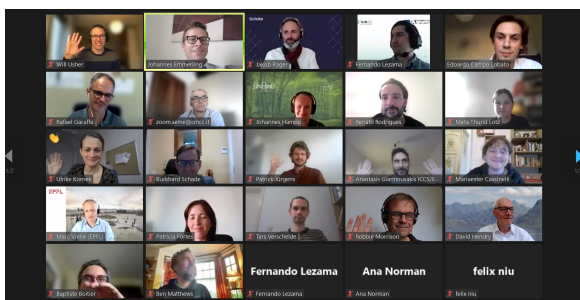
"Computer models are complex to grasp for the wider public, while everyone is affected by the energy transition. This paper marks a step towards understanding these models a bit better. In particular, this paper indicates that studies with only single models should always be perceived in the context of the larger model ensemble." says lead author **Mark Dekker** of PBL.

The ECEMF consortium, led by KTH Royal Institute of Technology, comprises 15 partners from 9 countries, including CMCC, IIASA, PIK, TU Wien, e-think, TNO, Fraunhofer ISI, E3M, PBL, Artelys, Comillas, TU Delft, University of Melbourne, and IOS-PIB. ECEMF has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 101022622.

For more information, please visit the following links:

- Paper published in Nature Energy: https://www.nature.com/articles/s41560-023-01399-1
- European Climate and Energy Modelling Forum (ECEMF): www.ecemf.eu
- Code Repository: https://github.com/MarkMDekker/IAMfingerprints
- Zenodo (Fixed Publication Release): https://doi.org/10.5281/zenodo.8220167
- ECEMF Model Comparison Protocol: https://doi.org/10.5281/zenodo.6811317
- ECEMF Scenario Data @ IIASA: https://data.ece.iiasa.ac.at/ecemf/
- Zenodo (v1.0 Scenario Data): https://doi.org/10.5281/zenodo.7634845

European Climate and Energy Modelling Platform 2023

On Oct. 5-6, ECEMF organized the **ECEMP 2023 "Net Zero, intermediate targets, and sectoral decarbonization facing geopolitical and macroeconomic challenges"**. It was an online event with 2 plenary and 15 parallel sessions. For the second year in a row, the ECEMP Conference was organized by ECEMF.

The organization committee received 115 submissions (93 last year) from 27 countries. 60 presentations are invited to the parallel sessions and over 240 people participated. Same as the previous year, the conference also invited colleagues from 14 EU projects to co-organize the parallel sessions, at the beginning of which the session participants will receive a short introduction to the projects.

The presentations can be found on the website, while the plenaries and skills workshop were recorded and shared on YouTube. Publications resulting from the conference will be collected in a special issue in *Environmental Research Energy*.

Download the full programme on the website!

Policy Brief: ECEMF/PRISMA Workshop on 2040 targets

On the 13 September 2023, **ECEMF co-hosted a joint workshop with the PRISMA workshop at Bruegel's headquarters in Brussels**. The EU must declare its 2040 climate targets by the beginning of 2024, as required in the European Climate Law. To inform, justify and communicate the targets, policymakers will rely on energy, climate and economic modelling of the impacts of various emission mitigation pathways. The main type of models used to assess the trade-offs related to different pathways are detailed-process Integrated Assessment Models (IAMs), contributing to IPCC and other scientific reviews.

ECEMF researcher **Robert Pietzcker** from Potsdam Institute for Climate Impact Research presented the main insights gained from the ECEMF model intercomparison on climate neutrality scenarios about the

state of transformation achieved by 2040.

Miguel Gil Tertre, Chief Economist of DG Ener, stressed the importance of doing this complex undertaking and exploring what needs to happen between 2030 and 2050. Especially relevant would be to better understand and represent the role of innovation and analyse national policies and the ensuing distributional effects.

Vicky Pollard from DG Clima, who is leading the team that is currently preparing the impact assessment underlying the upcoming 2040 target proposal, highlighted how important the knowledge about what is needed after 2030 is for the decisions that need to be taken now. Further disaggregation of scenario data to provide national and sectoral details is needed to engage more people and bring the various stakeholders into the debate about how to achieve the deep transformation to climate neutrality.

The audience, consisting of representatives from NGOs, industry associations, central banks, and researchers, raised a number of questions about the scenarios and the 2040 targets including topics such as carbon dioxide removals, concrete policy mixes, climate change impacts, individual sector strategies.

[You can read here the ECEMF policy briefs launched at the workshop on Zenodo](#)