Programme

Day 1 | 26th October | Policies & Targets

10:30-11:00	**Welcome & Opening Address**	with Jeroen Schuppers (DG Research & Innovation), Andreas Zucker (DG ENER), Stéphanie Bouckaert (International Energy Agency) & Anthony Patt (ETH Zurich, SENTINEL Project Coordinator)
11:00-13:00	**Plenary Panel I: Policies and Targets**	*Insights and strategies to meet our short- and medium-term targets* **Panel Chair(s):** Anthony Patt (ETH Zurich) & Stefan Pfenninger (TU Delft) **Presentations:** · Latest insights on why energy modelling is necessary in the context of EU climate neutral targets & how energy models are used in policy making (Diana Ürge-Vorsatz, Central European University, IPCC) · The modelling of Strategies for a fully decarbonized society (Henrik Lund, Aalborg University) · Achieving the EU 2030 targets - what level of carbon prices and enabling policies are needed? (Robert Pietzcker, Potsdam Institute for Climate · Impact Research) · Towards a net-zero emissions world: the Global Energy & Climate Outlook 2021 (Rafael Garaffa, JRC Seville)
13:00-14:00	*Lunch Break*	
14:00-15:30	**Parallel Session 1: Reaching our Targets**	*Making Europe fit for 55* **Session Chair(s):** Johannes Emmerling (European Institute on Economics and the Environment) **Presentations:** · Preparing for "Green Growth": Incorporating investment-led growth effects into climate-economy-energy models (J. Christopher Proctor, University of Technology of Compiègne) · Sufficiency policies: a systematic review (Benjamin Best, Wuppertal Institute for Climate, Environment and Energy) · Economic, social and environmental implications of revising minimum energy tax rates in the EU (Toon Vandyck, JRC Seville) · Alternative roads to achieve mid-century CO2 net neutrality in Europe (Renato Rodrigues, Potsdam Institute for Climate Impact Research) · EU carbon neutrality by 2050: What will be the impact of a revised RED II with a higher binding renewable energy target for the EU for the coming decades? (Gunhild Allard Reigstad, SINTEF Energy Research)
	Parallel Session 2: Making energy models more relevant for policy-making	*An increasing number of energy models is becoming more and more intertwined with the policymaking process: Models can help investigate policy options and ambitious target setting, but they can also be instrumentalised to justify already decided policies and targets. This session will take a deep dive to understand how and why models are used so differently and shed light on the factors that foster or hinder the use of energy models in policymaking processes.* **Session Chair(s):** Andrzej Ceglarz (Renewables Grid Initiative), Diana Süsser (IASS) & Vassilis Stavrakas (TEESLab UPRC) **Presentations:** · Modelbased policymaking or policybased modelling? How energy models and energy policy interact (Diana Süsser (IASS) & Vassilis Stavrakas (TEESLab UPRC) · Discussants: Andreas Zucker (DG ENER), Jörg Mühlenhoff (CAN Europe), Alessia De Vita (E3-Modelling) & & Olivier Lebois (ENTSO-E)

hosted in cooperation with the European Commission

Parallel Session 3:
Capacity Planning amid Uncertainty

Session Chair(s): Alban Kitous (DG CLIMA)

Presentations:

- Using DESSTINEE model for forecasting nationally granular energy demand and emission scenarios, compatible with newly announced EU and UK decarbonisation targets (Gabriel Oreggioni, Imperial College London)
- Understanding and taming climate risk for the energy transition: a century of European renewable variability (Jan Wohland, ETH Zurich)
- Discount and hurdle rates: the dark horses of capacity expansion planning (Smaranda Sgarciu, BTU Cottbus-Senftenberg)
- Strategic Development of the Pan-European Power Network Considering Long-Term Uncertainties (Stefan Borozan, Imperial College London)
- Sufficiency aspects in transport modelling (Johannes Thema, Wuppertal Institute for Climate, Environment and Energy)

Parallel Session 4:
Improving Integration and Efficiency

Session Chair(s): Zenaida Mourão (INEGI - Institute of Science and Innovation in Mechanical and Industrial Engineering)

Presentations:

- Disclosing the heat density of centralized heat networks in Austria 2050 under the 1.5°C climate target (Sebastian Zwickl-Bernhard, TU Wien)
- Converting PRIMES results into EnergyPLAN - towards modeling of a Smart Energy Europe (Jakob Zinck Thellufsen, Aalborg University)
- Apples with apples and pears with pears? Design of intercomparison experiments and database for different energy models in the SENTINEL project (Mark Roelfsema, Utrecht University, Copernicus Institute)
- Solar photovoltaics is ready to power a sustainable future (Marta Victoria, Aarhus University)
- Modeling the transition of the multimodal pan-European energy system including an integrated analysis of electricity and gas transport (Dieter Most, Siemens AG)

15:30-16:00 *Coffee Break*

16:00-17:30 *Parallel Skills Workshops:*

Skills Workshop 1:
Energy System Models: Basic principles and concepts

This session is open to researchers, experts and students who have an interest in modelling energy systems and climate policies. In addition to learning how energy systems operate, participants will gain expertise in different ESMs used by decision makers, analysing the most important modelling paradigms, and identifying linkages between climate policy and energy system developments.
Organized by E3 Modelling and Renewables Grid Initiative

Skills Workshop 2:
High resolution time series processing

This session is designed for data scientists in the energy field. The objective is to present a methodology to assess high-resolution time series from smart meters. Participants will gain a general understanding of the basic steps to process big datasets and signify different behaviours of household electricity consumption.
Organized by University of Deusto and GoiEner

Skills Workshop 3:
What Energy System Modellers should know about [open] data and software licences

This session is accessible to anyone interested in the legal aspects of open and closed modelling, including datasets and licenses, and the potential benefits of open models for facilitating transparency, inclusion and collaboration. Finally, this session discusses public interest analysis to gain insights on open models for public policy development.
Organized by Robbie Morrison (open energy modeling community)

Day 2 | 27th October | Linking Sectors & Technologies

09:00-10:30 *Parallel Skills Workshops:*

Skills Workshop 4:
How to set up a scenario for energy system modelling?

In this session we will discuss how to set up scenarios for energy system modeling. We will cover different topics, such how to build a consistent set of storylines, how to choose which parameters to vary, and how scenario-design can be optimized so as to establish a strong link between model outcomes and policy.
Organized by Netherlands Organisation for Applied Scientific Research

Skills Workshop 5:
Technical possibilities vs. Economic Feasibility: The issue of viable business models for innovative technologies - a modellers approach

This session is geared toward researchers, experts and students from a technical background who are interested in how business models can be applied to technical simulation or optimisation models to gain a bigger picture. Participants will be able to gain knowledge about business model development, using the business model canvas, value chains and their application to techno-economic simulation models.
Organized by 4ward Energy Research

Skills Workshop 6:
Communicate and inspire: How to convince with a pitch

This session is aimed at young professionals who wish to improve their presentation skills and show the importance of research results to target groups ranging from potential investors, future collaborators and peers, or project leadership. Participants will learn how to effectively communicate their latest results in a concise and comprehensible way.
Organized by Climate Alliance

10:30-11:00 **Welcome & Summary of Day 1** Hans Auer (TU Wien) & Daniele Poponi (DG Research & Innovation)

11:00-13:00 **Plenary Panel II:**
Modelling Policy Targets to Implementation

Successful decarbonization of the European economy will have to rely on the use of electrons and molecules. In this session, we discuss Europe's energy infrastructure needs and the various trade-offs between competing and complementary energy technologies and network infrastructure portfolios to achieve Europe's climate targets by 2050.

Panel Chair(s): Hans Auer (TU Wien)

Presentations:
- Can a Hydrogen Network Replace Electricity Transmission Network Expansion in a Climate-Neutral Scenario for Europe? (Tom Brown, TU Berlin)
- Future Energy System - towards a decarbonised Europe (Jonas Lotze, TransnetBW)
- What energy infrastructure to support 1.5°C scenarios? (Tobias Bossmann, Artelys)
- Infrastructure needs of an optimized European energy system compatible with the Paris Climate Agreement (Alexandre Oudalov, Hitachi Energy)

13:00-14:00 Lunch Break

14:00-15:30

Parallel Session 5:
The role of hydrogen in net zero power systems

We will explore the role and importance of hydrogen in a net-zero future from a variety of angles: electrolysis as a flexible electricity consumer that can facilitate the integration of wind and solar and stabilize their market value; hydrogen pipelines as a substitute for transmission lines; and integrated electricity-hydrogen expansion planning.

Session Chair(s): Lion Hirth (Hertie School)

Presentations:

- The benefits of hydrogen electrolysers on the market value of variable renewable energy in the context of the European hydrogen strategy (Wolfgang Meyer, r2b energy consulting)
- How flexible electricity demand stabilizes wind and solar market values: the case of hydrogen electrolyzers (Oliver Ruhnau, Hertie School)
- Expansion planning for electrical and hydrogen assets in the context of a scenario with high shares of variable renewables (Alexandre Oudalov & Pedro Pereira, Hitachi Energy)
- The role of hydrogen in the openENTRANCE lowcarbon scenarios for Europe (Pao-Yu Oei, University of Flensburg)
- Powering Europe with North-Sea Offshore Wind: Impact of Hydrogen Deployment on Grid Planning and investment challenges (Pedro Crespo del Granado, Norwegian University of Science and Technology)

Parallel Session 6:
De-Carbonising the Building Sector

The building sector accounts for 36% of the global final energy demand and 39% of energy-related CO2 emissions, making them pivotal to achieve climate neutrality. This session aims to provide quantitative evidence on different pathways to decarbonize the building sector by 2050. With the help of different scenarios, this session will highlight the role of energy-efficiency, net-zero energy building constructions and renovations, and co-benefits to achieve climate neutrality by 2050.

Session Chair(s): Souran Chatterjee (Central European University) & Vassilis Stavrakas (TEESlab UPRC)

Presentations:

- Policy scenarios towards carbon neutrality in the European residential sector (Alessio Mastrucci, IIASA)
- Reducing carbon emissions of households through monetary incentives and behavioral interventions: a meta-analysis (Tarun Khanna, Hertie School)
- How far can building energy efficiency bring us towards climate neutrality within EU? (Souran Chatterjee, Central European University)
- Assessment of regional differences of electrical load profiles (Carlos Quesada Granja, University of Deusto)
- Efficiency First in the European building sector: Investigating least-cost pathways for net-zero emissions (Tim Mandel, Frauenhofer ISI)

Parallel Session 7:
Offshore energy system integration

The energy transition presents both challenges and opportunities for offshore energy. On the one hand, the Oil and Gas sector faces the challenges of decarbonising existing operations in the short term, as well as decommissioning retired infrastructure in the longer term. On the other hand, the offshore renewables sector is expanding at a rapid rate, with challenges relating to logistics, maintenance and energy transmission. Both sectors employ similar approaches, technologies and skills, meaning there are many synergies that may lead to mutual benefits if energy system integration opportunities are exploited. This session will provide cutting-edge modelling insights and discussion of current and future developments in offshore energy system integration.

Session Chair(s): Russell McKenna (University of Aberdeen)

Presentations:

- Hybrid energy systems to decarbonise the offshore O&G sector (Luca Riboldi, Norwegian University of Science and Technology)
- Synergies in offshore energy: a roadmap for the Danish sector (Russell McKenna, University of Aberdeen)
- Modelling the North Sea energy system: benefits of an integrated power and hydrogen offshore grid (Rafael Martínez Gordón, University of
- Groningen)

Parallel Session 8:
Cross-sectoral linkages and integration

In this session it will be presented how five different research communities are building cross-sectoral energy models. The presentation will tackle both general aspects like the problems of high spatial and temporal resolution and robustness of solutions and particular use cases for demand response, autonomous vehicles and multi-vector energy systems.

Session Chair(s): Bryn Pickering (ETH Zurich)

Presentations:

- Solving the puzzle of European cross-sectoral energy system decarbonisation at a high spatial and temporal resolution (Bryn Pickering, ETH Zurich)
- Modeling Indirect Price-Based Control for Demand Response in Energy System Models Using Frigg (Amos Schleddorn, Technical University of Denmark)
- Broad Ranges of Investment Configurations for Renewable Power Systems, Robust to Cost Uncertainty and NeaOptimality (Fabian Neumann, TU Berlin)
- Economic and employment Impacts of Connected and Autonomous Vehicles Deployment Scenarios (Marie Tamba, JRC)
- Facilitating local multi-vector energy systems: Integrated investment and operational planning (Martha M. Hoffmann, Reiner Lemoine Institut & Sergio Herraiz, University of Girona)

15:30-16:00 *Coffee Break*

16:00-17:30 **Poster Session and Virtual Drinks Reception**

Session Chair(s): Sandrine Charousset (EDF)

Presentations:

- Assessment of the global wind energy potential considering technical and sustainable boundaries (Alexandros Adam, Centre for Renewable Energy Sources)
- Flexible integration of data centres in energy systems (Juan Jerez, Technical University of Denmark)
- Integration of sufficiency into energy system modelling (Luisa Cordroch, University of Flensburg)
- GHG-55% compatible pathway for the Polish power sector with socio-economic RES potentials (Paweł Czyżak, Instrat Foundation)
- SEEDS: Stakeholder-Based Environmentally-Sustainable and Economically Doable Scenarios for the Energy Transition (Stefan Pfenninger, TU Delft)
- A Multi-Stakeholder Model of Energy Systems (Weiqi Hua, Cardiff University)
- The plan4EU model (Sandrine Charousset, EDF)
- The H2020 project openENTRANCE (Ingeborg Graabak, SINTEF Energy Research)
- Optimizing the transition of the multimodal pan-European energy system - max limit of small PV as a decisive factor manifesting either a 'central' or a 'decentral' world (Dieter Most, Siemens AG, Technology)
- New pathways to reach the Climate Change: European citizens' challenge for a more carbon-friendly life (Panagiotis Fragkos, E3 Modelling)
- Energy Community Model FRESH:COM (Theresia Perger, TU Wien)
- Transport sector flexibility in low-carbon energy systems with local constraints (Philipp Härtel, Fraunhofer Institute for Energy Economics and Energy System Technology IEE)
- Macroeconomic Analyses of openENTRANCE scenarios (Paolo Pisciella, NTNU)
- openENTRANCE Case Study 3: Need for Flexibility Storage (Erik Francisco Alvarez Quispe, Universidad Pontificia Comillas)
- A platform with open data and models for analyses of the energy transition (Sarah Schmidt, SINTEF Energy Research)
- A Monte Carlo-based Framework for the Techno-Economic Analysis of Green Hydrogen Production in Poland (Pablo Benalcazar, Mineral and Energy Economy Research Institute of the Polish Academy of Sciences)
- HYPEMLIFE: Predictive Control System to Maximize Lifetime of Hybrid Fuel Cells (Walter Castagna, Genport srl)
- WHY: Climbing the causality ladder to understand the energy demand of the residential sector (Carlos Quesada, Univsersity of Deusto)
- GENeSYS-MOD Turkey: Quantitative Scenarios for Low Carbon Futures of the Turkish Energy System (Emre Çelebi, Kadir Has University)
- What is redundant and what is not? Computational trade-offs in search strategies to generate alternatives for renewables deployment (Francesco Lombardi, TU Delft)

Day 3 | 28th October | Collaborative and Transparent Modelling

09:00-10:30 *Parallel Skills Workshops:*

Skills Workshop 7:
Hands-on session with the Calliope ESM Framework

This session is hands-on for participants to learn the basics of high-resolution energy system modelling to explore energy planning and policy decisions. Participants will interpret inputs of the Calliope model, create a model based on energy supply and demand datasets, compare model outputs, and understand how energy system models balance demand and supply in a complex system.
Organized by ETH Zurich and TU Delft

Skills Workshop 8:
How to model citizens' behaviour?

This session is geared for researcher who are interested in learning about causal models from qualitative and quantitative aspects. Participants will learn how to build and use practical causal models to extract knowledge from experts and exploit a causal diagram to improve decision making.
Organized by University of Deusto

Skills Workshop 9:
EnerMaps: Open-access Energy Data and Calculation Modules

This session is aimed at energy researchers, energy industry and public administrations with varied levels of modelling experience, including students. Participants will learn how to find open-access publications, FAIR data, and quality-checked datasets, on the EnerMaps Gateway, and re-use them in open-access Calculation Modules on the EnerMaps Data Management Tool, the Hotmaps Toolbox or on own modelling systems.
Organized by e-think for the EnerMaps project

10:30-11:00 **Welcome & Summary of Day 2** with Sebastian Busch (EC JRC) & Pao-Yu Oei (University of Flensburg)

11:00-13:00 **Plenary Panel III:**
Collaborative Modelling in Practice

Insights and lesson learned from the EC Projects

Panel Chair(s): Sebastian Busch (EC JRC) & Pao-Yu Oei (University of Flensburg)

Presentations:

- Developing tools for model linkage and cross-sectoral scenario analysis: lessons learned in the openENTRANCE project (Daniel Huppmann, IIASA)
- *Plan4RES: outcomes and results* (Sandrine Charousset, EDF)
- Embracing the open science concept: experiences from the WHY project (Cruz Enrique Borges, University of Deusto)
- Unlocking Flexibility Potential of Multi-Energy Systems: Main Results and Lessons from the MAGNITUDE European Project (Regine Belhomme, EDF)

13:00-14:00 *Lunch Break*

14:00-15:30 **Parallel Session 9:**
Data and Model Transparency

Transparency of data and models is crucial - in this session we will discuss how fair and open data and models can be achieved and application examples will be shown.

Session Chair(s): Frauke Wiese (University of Flensburg)

Presentations:

- Open data for energy system modeling: data paradigms, semantics, metadata, systems, buses, and licensing (Robbie Morrison, open energy modeling community)
- Implementing FAIR through a distributed data infrastructure (Carsten Hoyer-Click, German Aerospace Center)
- Open-data based carbon emission intensity signals for electricity generation in European countries" (Mirko Schäfer, INATECH, University of Freiburg)
- plan4res SMS++, an open modelling library for evaluating long term electricity system costs and flexibilities (Antonio Frangioni, University of Pisa & Sandrine Charousset, EDF)
- Comparison and cross-validation of energy system models (Matteo Giacomo Prina, EURAC Research)

Parallel Session 10:
Social and Behavioral aspects

Promoting social fairness in the energy transition

Session Chair(s): Charlie Wilson (University of East Anglia)

- **Presentations:**
- How do different social storylines impact the European energy system? Results from linking QTDIAN and Euro-Calliope (Diana Süsser, IASS & Bryn Pickering, ETH Zurich)
- Causal modeling of households investment decisions on the energy transition (Ane Irizar, University of Deusto)
- Assessing the impact of individual behavioural changes and social norms on building deep energy dynamics (Leila Niamir, Mercator Research Institute)
- Urban energy systems' digital twin for multi-objective optimization as a basis for collaborative decision making (Julien Marquant, Urban Sympheny AG)
- A cooperative energy management system in a citizen-driven energy community (Arghavan Taleghani, Iran University of Science and Technology)

Parallel Session 11:
Modelling renewables

Session Chair(s): Pedro Crespo del Granado (Norwegian University of Science and Technology)

Presentations:

- Is a solar future inevitable? (Femke Nijsse, University of Exeter)
- Estimation of future solar energy supply for European buildings using a GIS-based model (Gergely Molnár, Central European University)
- Balancing Intermittency with Ancillary Bioenergy in 100% Renewable European Energy Systems in 2050 (Fei Wu, ETH Zurich)
- Accounting for the climate change effect on hydropower in a highly renewable European energy system (Ebbe Kyhl Gøtske, Aarhus University)
- Water-energy nexus in African power pools - The Dispa-SET Africa model (Matija Pavičević, KU Leuven)

Parallel Session 12:
Environmental assessment for energy modelling and policy

Administrations use energy system models (ESOMs) for prospective energy scenario design. Since ESOMs often fail to include sustainability constraints other than emissions, there are a few initiatives that work in the development of environmental assessment modules that complement ESOMs. The aim of this session is to introduce three of those efforts (PREMISE, GLUCOSE and ENBIOS) and discuss synergic work lines with energy models in the midterm.

Session Chair(s): Laura Talens Peiro & Cristina Madrid Lopez (Autonomous University of Barcelona)

Presentations:

- The Global Least-cost User-friendly CLEWs Open-Source Exploratory model: GLUCOSE (Agnese Beltramo, KTH Royal Institute of Technology)
- Coupling global energy system models with life cycle assessment (Romain Sacchi, Paul Scherrer Institut: Technology Assessment group)

15:30-16:30 **Official conference closing session and selection of key themes for 2022**

with Andreas Zucker (DG ENER), Alban Kitous (DG CLIMA), Jasna Resic (CINEA), William Usher & Johannes Emmerling (ECEMF) & Anthony Patt (SENTINEL)

16:30 *End of the Conference*

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