Energy Modelling Platform for Europe 2018 (EMP-E 2018)

"Modelling Clean Energy Pathways"

Date: September 25, 2018
Venue: EC headquarters, Brussels 21 rue du champ de Mars – Marsveldstraat, 1050 Brussels

Time: 09:30 - 10:00

Welcome and Introduction

Gustav Resch (TU Wien) from SET-Nav project and Patrick van Hove from the European Commission (Directorate General Research and Innovation) open the EMP-E conference 2018. Gustav Resch welcomes all participants and gives a snapshot about all LCE21 projects (SET-Nav, REEEM, MEDEAS and REflex) and their general scope.

Patrick van Hove (DG Research) welcomes the audience and highlights the importance of such an important and interactive conference as the EMP-E 2018 it is. Energy system modelling is essential for policy making as policy is based on facts and evidence. Patrick van Hove says that most topics based on modelling concern energy, environment, and climate as well as transport issues. Research and innovation have a great impact on policy recommendations. Additionally, van Hove emphasizes the relevance of transparency and open source data to push forward research – as moreover do the LCE21-projects. DG RTD uses energy system models from inside as well as from outside of the European Commission.

Time: 10:00 - 11:30

Plenary session I: Innovation in the energy transition

Session chair: Konstantinos Sakellaris (EC, DG Clima)

Speakers:

- Emanuele Taibi (IRENA): 'The landscape of innovations for a renewable-powered future'
- Martin Junginger (Utrecht University): 'Riding down the experience curves: how technological learning may shape the energy transition'
- Tobias Fleiter (Fraunhofer ISI): 'Innovations for deep decarbonisation of industry'

The session chair Konstantinos Sakellaris from the European Commission (Directorate General Climate) welcomes the audience and introduces to the first plenary session about innovation in the energy transition. The European energy transition is characterized by decarbonisation pathways that will be realised due to the accelerated expansion of renewable energy sources and the deployment of energy efficiency. Hence, systemic innovations and technological breakthroughs are required. In the first plenary session experts as Emanuele Taibi from the International Renewable Energy Agency (IRENA) presents how innovation regarding renewables is supported by IRENA. Prof. Dr. Martin Junginger of the Copernicus Institute, Energy & Resources from Utrecht University will talk about modelling technological learning. New technologies are entering the energy markets and systems at

unprecedented rates. Experience curves are one possibility to assess the future cost of technologies. Furthermore, Dr. Tobias Fleiter Coordinator of Business Unit Demand Analyses and Projections of the Fraunhofer ISI in Karlsruhe will present his studies on process innovation in the industry sector. In all presentations, the importance of innovation technologies or processes in the European energy transition in different sectors will be discussed.

Emanuele Taibi (IRENA): 'The landscape of innovations for a renewable-powered future'

Emanuele Taibi presents the intergovernmental organisation IRENA and how the company promotes the widespread adaptation and the sustainable use of RES worldwide. The focus of IRENA is set on decarbonizing the energy-intensive industry, innovation in the transport sector as well as on the integration and operation of systemic innovation. Innovation in the power sector is driven by decentralisation, digitalism and electrification. Taibi emphasizes the following innovations that can facilitate wind and photovoltaic integration: enabling technological progress (e.g. regarding batteries and grids), business models (e.g. virtual power plants), and different market designs as well as system operation by TSO and DSO cooperation. Emanuele Taibi concludes his presentation with insights of the IRENA innovation week, which underline that the renewable energy transition is mainly driven in the power sector. Additionally, he points out that many solutions exist to integrate RES but only few solutions have been adopted widely. Further, Taibi says that energy system modellers shall deal with assumptions from different stakeholders and be aware of technical challenges. He emphasizes that policy makers are benefiting from having a lot of modelling groups and different energy system models even if that produces a large variety of results and different pathways. There does not exist only one solution. Taibi highlights that all models might be wrong, but some models can be useful, what means that models can answer some questions. Nevertheless, the question of the target achievability is still remaining and is not easy to answer.

Martin Junginger (Utrecht University): 'Riding down the experience curves: how technological learning may shape the energy transition'

Martin Junginger introduces the LCE21-project REFLEX and clarifies the role of experience curves for different technologies. At the beginning he sets the focus on photovoltaic cost degression. Currently, 402 GW of pv is installed worldwide, while in 2017 98 GW of new installed pv capacity has been added. It was added more pv capacity in 2017 than new fossil fuel and nuclear capacities have been installed together. Pv is becoming an economically electricity generation option for households without any subsidies. The costs for a pv-systems can be divided into two components: the module (80% of costs) and the balance of system (BOS) (20% of costs). These two components have different learning rates (LR). The module's costs are declining faster with a LR of 20%, as the costs of the BOS are decreasing less rapidly with a LR of 12-13%. Junginger briefly presents learning effect for wind onshore and offshore power plants, which are mainly dependent on the electricity demand and material prices. Wind onshore power plants will outcompete fossil fuel fired power plants by 2025. Life cycle costs of electricity (LCOE) of wind offshore is strongly dependent on the country and not following a standardized learning curve.

Tobias Fleiter (Fraunhofer ISI): 'Innovations for deep decarbonisation of industry'

Tobias Fleiter outlines different decarbonisation pathways in the industry sector driven by innovations. At the beginning he presents different GHG-emission reduction potentials analysed by several roadmaps. One conclusion of all roadmaps has been that CCS is anticipated to play a crucial role in future energy systems, but at the same time CCS is suffering of low acceptance, high storage and transportation costs as well as other constraints as CO2-storage availability. This leads to the question: "What are breakthrough innovations, which can decarbonise the industry sector?". Tobias Fleiter outlines some technological breakthroughs in the industry sector as cement which can absorb CO2 during the drying process as well as innovative materials as carbon concrete composite (C3) and innovative low-carbon industry processes as electric arc furnaces for electrical steel making via electrolysis. Additionally, Tobias Fleiter highlights the importance of the technology readiness level (TRL) and its integration into energy system models. Afterwards, Fleiter gives a brief overview and comparison of mitigation options in recent industry studies of Germany. The most important role in the industry sector are playing the following options: energy efficiency, biomass, power-to-heat, power-to-gas, carbon capture and storage technologies and process innovation. Further, he concludes that technical changes in production process and in the whole energy mix are needed, as the available technologies are not sufficient for decarbonisation. Ways forward to allow a better modelling of the industry sector are: 1) enabling endogenous technology diffusion in energy models, 2) improving treatment of uncertainties, 3) develop scenarios with mitigation options along the whole value chain and 4) improving assumptions on technology characteristics and costs estimations. At the end Tobias Fleiter emphasizes that the benchmark for the industry has to be more ambitious and that the regulatory framework is very uncertain. Nevertheless, Fleiter is convinced that the energy transition will reach the industry sector, but therefore the regulatory framework has to be improved e.g. CO2-prices have to be at a lower level for the energy-intensive industry.