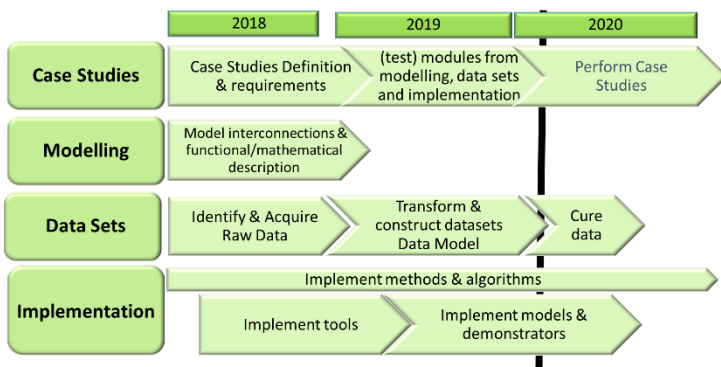




The 2030 and 2050 EU's carbon reduction targets are calling for significant changes in our energy system: more flexibility, more active involvement of all stakeholders and more collaboration to enable least-cost integration of higher deployment of variable renewable energy sources. The **plan4res** Consortium aims at filling the gaps between the increasing complexity of the future energy system planning and operational problems, and the currently available Energy Systems Modelling tools, by implementing:

- An **end-to-end planning and operation tool**, composed of a set of optimization models based on **integrated modelling** of the pan-European Energy System;
- An **IT platform** for providing seamless access to data and high-performance computing resources, catering for flexible models (easily replacing submodels and the corresponding **efficient solution algorithm**) and workflows;
- A **database of public data** and 3 **case studies** highlighting the tool's adequacy and relevance.

Where we are



plan4res Jan'20 meeting in Brussels



plan4res recent output released

The project reports are available to download on our website www.plan4res.eu/results/deliverables/

Key recent outputs include:

- [D5.4 Improvement of the decomposition-based primal heuristic framework](#)

This document aims to describe the basic algorithmic ideas of the decomposition-based primal heuristic and how specific capabilities of the SMS++ framework allow it to be implemented in a flexible and general, yet efficient, way.

- [Development of a Modular Framework for Future Energy System Analysis](#)

This paper gives an overview of the modelling framework that is being developed within the Horizon2020 project plan4res. In the context of the energy transition, integration of high shares of renewable energies will play a vital role in achieving the proposed climate targets. This brings new challenges to modelling tools, including data construction, implementation and solution techniques. In order to address these challenges, plan4res aims to create a well-structured and highly modular framework that will provide insights into the needs of future energy systems. An overview of the central modelling aspects is given in this paper. Finally, three case studies are presented that show the adequacy and relevance of the proposed optimization framework.

There is also a range of technical documents with state-of-the-art methods to solve problems addressed in the project, including:

- [Standard Bundle Methods: Untrusted Models and Duality](#)

The paper presents a survey of the state-of-the-art of Bundle methods for convex nondifferentiable optimization, with a focus on the efficient solution of large-scale structured problems utilizing decomposition methods.

- [Large-scale unit commitment under uncertainty: an updated literature survey](#)

The paper presents an updated survey of algorithmic approaches to Unit Commitment problems under uncertainty, that are the basis of the hierarchy of models in plan4res case studies.





Participation in EMP-E 2019

plan4res, together with nine other H2020 funded projects involved in the organization of the 3rd EMP-E conference, in Brussels Oct.8-9, "Modelling the implementation of A Clean Planet For All Strategy". The conference was hosted by the European Commission DG Research & Innovation in Brussels. The Energy Modelling Platform for Europe (EMP-E) is an annual conference, bringing together scientists and policymakers on current and innovative energy modelling issues. Due to the active involvement of EC representatives and leading researchers, the aim is to bridge the gap between modelling and policymaking at European, regional and local level. Stakeholders are provided with a peer-reviewed digest of model and policy insights for the transformation of the European energy system. Here, there are some highlights of the conference (from the top left corner):

[i] Dr Dieter Most (Siemens) was chairing the plenary session 1: Achieving ambitious RES deployment in a multi-coupled European energy system – techno-economical, financial and societal challenges.

[ii] Dr Most also presented the modular framework for Future Energy System Analysis in the poster session.

[iii, iv] Dr I. Yueksel-Erguen (ZIB) presented the gas network modelling. She quoted: "In EMP-E 2019, we presented our approach to integrating the gas transport network to the European multi-energy system in terms of its connection to the electricity grid via Power-to-Gas (P2G). This is one of the steps of Case Study 1 of plan4res. The approach has been shaped by the challenges of the sparse availability of European gas transport network data from various publicly available data resources, and the temporal interconnection of the gas network optimization and the electricity grid models. We are implementing the approach in the time being and plan to present our first results in the upcoming EMP-E Conference in 2020."

[v] Dr D. Pudjianto (Imperial) co-chaired the session on the uncertainty, and Dr P Falugi (Imperial) discussed the modelling of transmission planning under uncertainty problems and shared some initial studies.

[vi] Dr W. van Ackooij (EdF) explained the state-of-the-art solution techniques for solving optimization problems with uncertainty.





Other highlights

We also participated in a number of events including (i) European Utility week, on 12-14 November 2019 in Paris, France. Dr A Moreira (Imperial) and Dr S Charousset (EdF – project coordinator of plan4res) in front the booth; (ii) Sandrine also presented the project and took part in the panel discussion towards a low-carbon Europe; (iii) Another event was the INEA clustering workshop on Energy System Modelling in Brussels on the 22 Nov

2019. Sandrine presented the plan4res storyline and took the initiative to co-lead the EMP-E 2020 together with OpenEntrance.

Dr D Pudjianto (Imperial) also presented the plan4res project at ENTSO-E workshop on Innovation uptake for System operation, on 26 Nov 2019 in Brussels. His presentation can be found [here](#).

Several interesting journal and conference papers can be found on our website. Please visit this [link](#).



EMP-E 2020

plan4res, together with seven other H2020 funded projects is organizing the 4th EMP-E conference, in Brussels Oct.6-8'20, "Modelling Climate Neutrality for the European Green Deal". Plenary sessions (Oct.6-7) will deal with:

- ◆ Impact of COVID-19 on the energy system: what happened during the crisis? What consequences for future energy modelling?
- ◆ Climate-neutral pathways, scenarios and storylines: Useful lessons learned and strategies for the European Green Deal

To know more

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<http://www.energymodellingplatform.eu/emp-e-2020.html>

