2nd Press Release

The increased integration of variable renewable energy sources, like solar and wind, into modern and future energy systems promotes the need to develop better tools for operation planning and decision-making. The stochastic nature of variable energy sources and the introduction of new energy markets to balance the new energy mix further complicate the problem of finding the optimal course of action – both from a system perspective and from the perspective of a single actor.

Predicer is a tool developed for **energy system operation optimization** and **decision-making** from the perspective of a single actor interacting on multiple simultaneous energy markets. The goal of the tool is to provide information on how to optimally operate the assets of the actor and how to trade on different energy markets.

The **Predicer model** is built around user-defined data. Few pre-determined structures, as well as a possibility to create various user constraints result in a flexible and adaptable model structure. Grids in the modelled energy system are represented by nodes, with the possibility to add storage functionality, timeseries-based supply or demand, reserve functionality, etc. Energy conversion between the nodes is represented by processes, with the possibility to model different process functionalities, such as online-offline functionality, capacity factor-based functionality, reserves, etc. These features allow the user to create detailed models imitating real-world systems and phenomena. The basic structure of an imaginary energy system is shown in Figure 1.

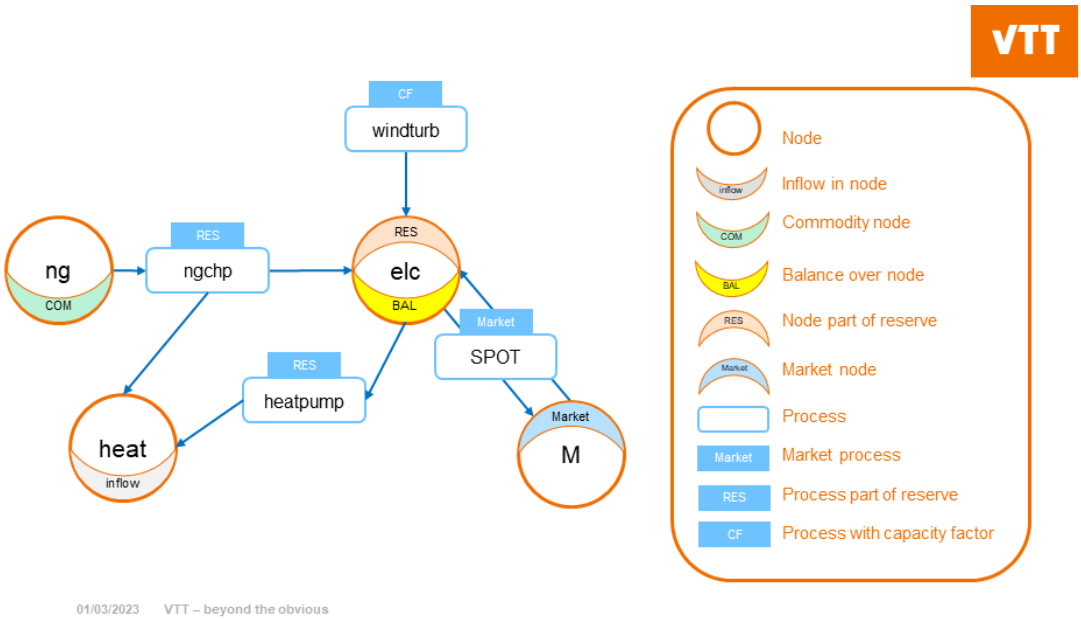

Figure 1 : Model structure depicting an imaginary energy system.

The role of different balancing markets will increase as the share of variable energy sources in power systems grow. Being able to make the right decisions on how to interact with these markets is of essence. Diverse markets and market functionalities can be implemented in Predicer. Forecasts for weather, market prices, energy demand, etc. can be combined in different stochastic scenarios to imitate potential futures. The different scenarios are linked together to form bidding curves for the markets included in the model.

The objective of the model is to minimize the costs, or maximizing the profits, of operating the modelled energy system while considering the uncertainty and risks of the stochastic scenarios. Optimizing the model results in the course of action with the lowest expected value of costs, will provide the optimal course of action regarding operation of processes and interaction with available markets.

In the last six months of ELEXIA project, Predicer has been made more flexible. It is now possible to define arbitrary constraints between different parts of the model. For example, it is possible **to limit the combined electricity use of heat pump and electric vehicle charging** in order to stay within the limits defined by a grid connection contract. The same functionality can also be used to specify operational areas for energy conversion devices that have such limitations.

Predicer is an open-source tool developed by VTT Technical Research Centre of Finland Ltd and it is freely available in GitHub (https://github.com/vttresearch/Predicer).

ABOUT THE PROJECT

ELEXIA (Demonstration of a digitized energy system integration across sectors enhancing flexibility and resilience towards efficient, sustainable, cost-optimised, affordable, secure, and stable energy supply) is anchored under the EU Green Deal & the EU Strategy for Energy System Integration. It is in line with the Paris Agreement and the UN's 2030 Agenda for Sustainable Development.

ELEXIA contributes to establishing concrete pathways to achieve fossil fuel independence by harnessing the energy system's latent flexibility through integration across sectors, data intelligence, and planning towards 2050 European goals.

CONSORTIUM

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