Danish Energy Agency

Balmorel Lite

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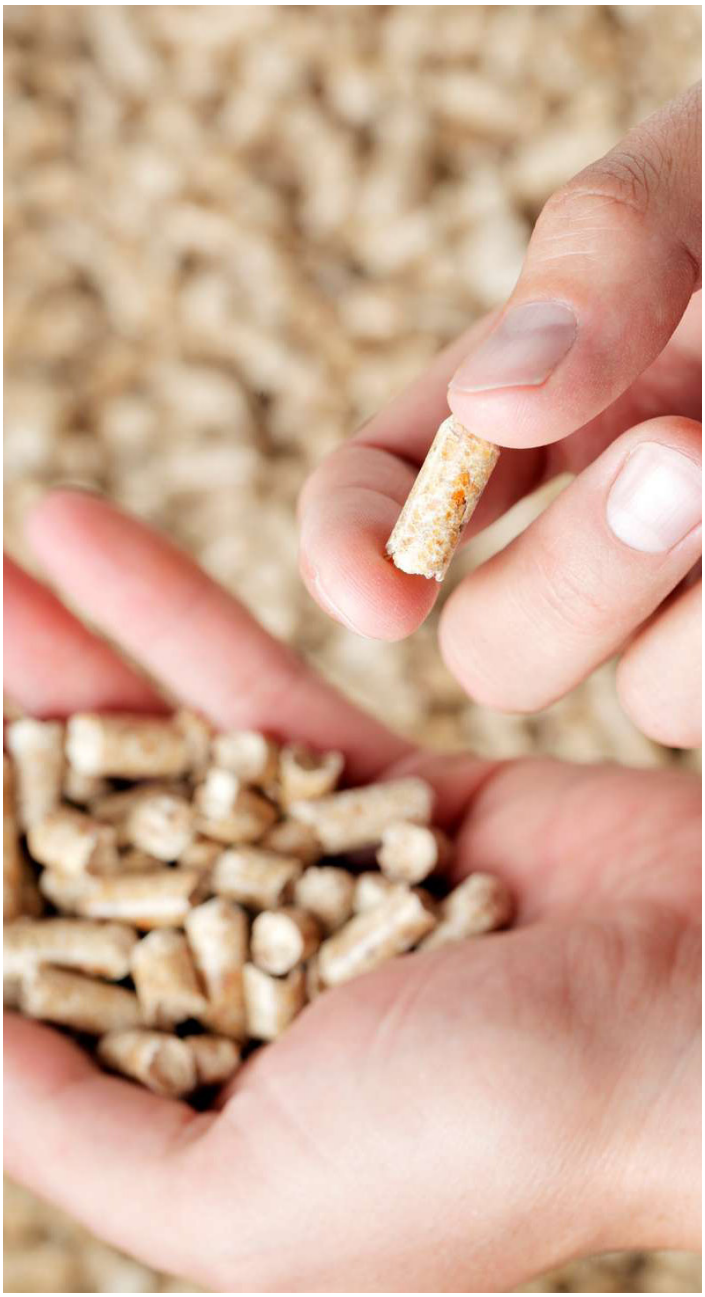
The Balmorel Lite makes it possible to quickly investigate, how increasing shares of variable renewable energy impacts the power system in a region, a country or a province. With only little information and by entering data in predefined screen displays, quick answers regarding system impacts can be provided by this model. Balmorel Lite can perform analyses that are normally performed in huge and complicated power sector models requiring very detailed data inputs.



Objective

Balmorel Lite is a web based tool and a simplified version of the energy model Balmorel. It has been developed for the Danish Energy Agency in cooperation with EA Energy Analyses. It is a tool for assessment of the value of renewable energy in different electricity systems. Based on existing data on the fuel and the technology mix of the power system and the expected fuel prices, scenarios can be simulated to analyse the transformation of the power systems and provide a better understanding on how increasing shares of renewable energy affects the power systems, the power markets and the electricity prices.

In addition, it is a visual and interactive tool analysing power systems and power markets. The model is developed with the specific purpose of assessing the economic value of renewable energy in different power systems. Various scenarios can be modeled to analyse relevant issues for the energy sector, for instance the cost of integrating wind power in different energy systems and the resulting changes in CO2 emissions.

"What is Balmorel?"

Balmorel is a model developed to support analyses of the enegy sector with emphasis on electricity and combined heat and power systems. It is a least-cost optimisation energy model for investments in generation and transmission, as well as economic dispatch at the same time.

If you wish to learn more, go to:
http://www.balmorel.com/

The Danish Energy Agency assists a number of countries through government to government cooperations, conducting scenario analyses with the objective of contributing to a cost efficient green transformation of the energy sector. The integration of renewable energy sources into power systems is a challenge in many of these countries. As a result the Danish Energy Agency developed this simplified tool for scenario analyses to improve the understanding of how large shares of wind and solar energy affect the power systems and the power markets.

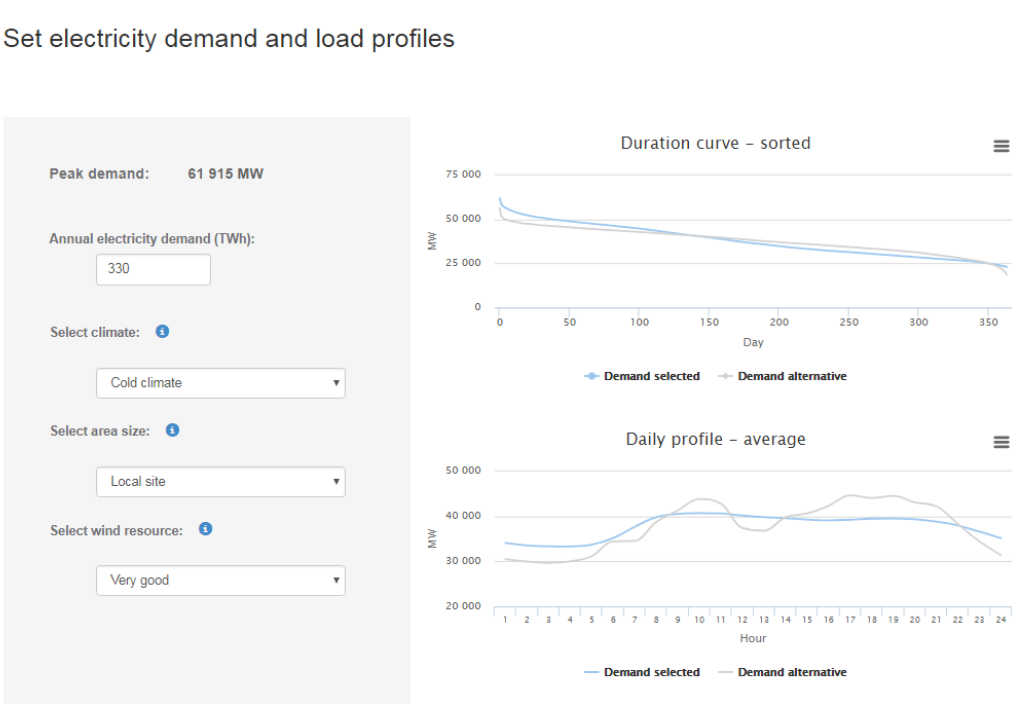
Characteristics

Balmorel Lite can simulate the electricity sector and dispatches the power plants according to their short run marginal costs. Hence, capital costs and fixed operation and maintenance costs for existing capacity are not considered in the simulations of dispatch. All the simulations are performed in an hourly time resolution for one year.

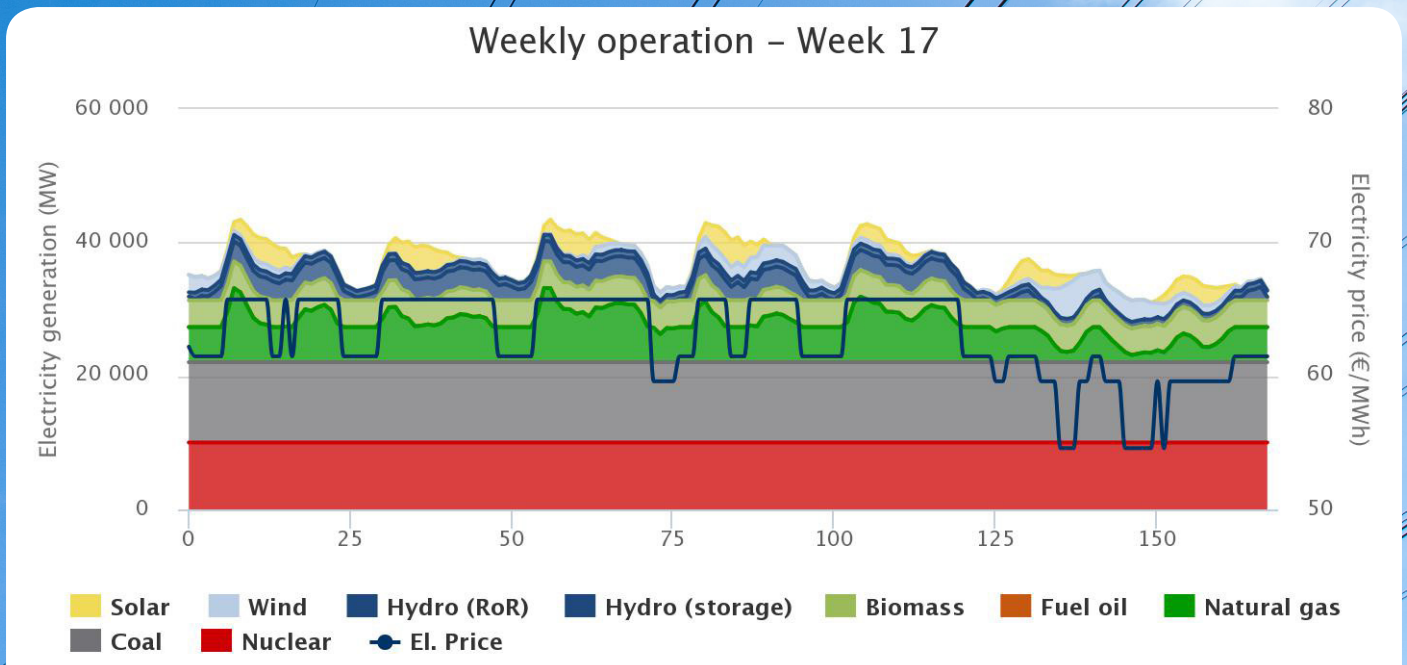
In addition, the new set of features allows the model to make optimal investments on different generation technologies, namely wind, solar, biomass, coal, natural gas and oil. Nuclear and hydro investment options are excluded in the current version.

It is also possible to simulate a closer to reality operation of the power plants by enabling the unit commitment option and by enhancing the flexibility of power plants. If the option for flexible power plants is enabled, the minimum production level is reduced, representing power plants with enhanced flexibility to reduce their output level to periods with higher RE generation. Finally, it is possible in the simulation to set the minimum level of capacity factors for dispatchable technologies, i.e. nuclear, coal, natural gas and biomass.

The model has a high speed calculation time. The solving time may vary depending on the settings but it has a time limit of two minutes, where the best found solution will be returned. It is possible to choose between a cold or a warm climate and three different profiles, representing a local site, a country or a bigger region, which have a direct effect on wind and solar profiles.



Example of input options in Balmorel Lite



Example of the weekly electricity generation of an energy system in Balmorel Lite

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