

Bonn, 8 December 2015

Simulating the European electricity grid in 2050

Software optimises scenarios with the aim of minimising the overall costs

Similar to railway lines and motorways, the electricity grid provides one of the lifelines of industrial society in Germany. In both the national and European electricity grid, the power plant landscape is changing and the proportion of wind and solar power is growing. This requires a new and optimised grid infrastructure. The BINE Projektinfo brochure “Electricity grid with strong genes” (15/2015) presents a software program that simulates the most cost-effective electricity grid at the highest voltage level in 2050. The program evaluates the interim results and only continues the computation with the best variants.

Researchers and companies can enter their specific boundary conditions and calculate and evaluate scenarios. These results can be used, for example, to develop new strategies or help choose between different variants. The developers have provided the program with a base scenario that envisages a European electricity grid based on wind and solar power. In addition to the grid expansion, the program also depicts the requirements for short-, medium- and long-term storage.

The software works with genetic and evolutionary algorithms that are borrowed from biology. The system independently assesses the variants calculated from the basic data and only uses the respective most cost-effective variants for the subsequent period. The calculations depict several years in an hourly resolution. After several thousand passes, the results approach the optimum.

RWTH Aachen has developed this simulation program, which is called Genesys, and has launched it as freeware on the market. Genesys is aimed at scientists and companies.

The BINE-Projektinfo brochure, which can be obtained free of charge from the BINE Information Service at FIZ Karlsruhe, is available online at www.bine.info or by calling +49 (0)228 92379-0. The brochure cover and additional images can also be downloaded from this web portal in the press section.

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