For a digital twin of the grid

Siemens solution enables a single digital grid model of the Finnish power system

Single digital grid model used for planning, operating and maintaining

The Finnish transmission system operator Fingrid runs a project, the aim of which was to build a new information system that supported asset and operation management and was based on product-based solutions. Eight software products were integrated into each other so that the master data of the grid assets are only located in one application. Today this data system supports asset and operation management goes by the name of ELVIS (Electrical Verkko Information System).

One leading part belonging to the system, which basically consists of an asset management system, a geographic information system and a network planning solution, is a Siemens model management and network analysis solution. IBM awarded the main contract of this project. As the system integrator IBM worked with several vendors to deliver an overall solution to Fingrid. Siemens was one of these vendors and delivered its grid data management system PSS ODMS for model management and PSS E for network analysis and simulation. In addition, the Siemens scope consists of software customization and engineering services.

Leading part belonging to the system
Siemens model management and network analysis solution supports Finnish transmission system operator Fingrid to create a digital twin of the Finnish power grid.

The "single source of truth"

The Siemens grid data Management solution as well as the network analysis and simulation solution

- connects a variety of IT systems enabling most efficient data utilization in one integrated solution,

- improves processes and reuses data to optimize system planning,

- realizes end-to-end protection asset data management and relay coordination by linking network and protection models and

- establishes the "single source of truth" for all data across operations, planning, protection, and market domains.

So the Siemens solution enables Fingrid's solution for creating a digital twin of the Finnish power grid as a single digital grid model. The Key benefits of this single digital grid model are:

- reduced time for developing software and creating study models. Hence follow saving resources for analyzing the grid itself: 80 percent manual work and 20 percent automated work for grid simulations turns into 20 percent manual work and 80 percent automated work for grid simulations,

- same data used for different purposes. It follows that the model is up to 100 times more detailed than the old one, and data quality is continuously tested and if needed, corrected for all users. Hence follows e.g. the possibility of ensuring electrical safety when planning/operating the grid,

- standardized interfaces for the data: It follows that it is easier to utilize the data for new purposes, e.g. creating a pan-European, real time grid model becomes possible,

- grid model is linked to asset management data as well as real time and past measurements. Hence follows that big data are providing huge possibilities for improved decision making, e.g. visualization, optimizing grid investments each worth of tens of millions euros.

Calculation results on a map as a digital twin of the real grid

Network analysis is performed to study how power transmission grid behaves in different operating situations and disturbances. Such analysis is used to ensure the safe operation of the grid and reliability. Network analysis is also used to evaluate the pros and cons of investments, the technical transmission limits of power transmission, the loading of components and hazardous voltages.

With the ELVIS system it is possible, through an interface, automatically to connect a network model with real-time and stored measurement data. This is a significant improvement, which enables the real-time updating of the visualization of a network model's calculation results on a map like a digital twin of the real grid.

Further information

siemens.com/innovationday
siemens.com/press/inno2017
siemens.com/pss-oms
Video on YouTube:
Fingrid's new data system ELVIS:
youtube.com/watch?v=
OwXrqIIBLzE