Smart Grid

PSS®SINCAL

At a glance

The integration of distributed generation on one hand makes it more challenging for utilities to adequately design their systems, but on the other hand opens up new options for the improvement of power supply while respecting environmental protection aspects and even allows an optimized influence on the energy consumption with the help of smart meters.

In order to evaluate the influences of these new technologies, simulation software is required which appropriately reflects the special features of smart grids. This is why PSS®SINCAL offers the following features which especially focus on this field.
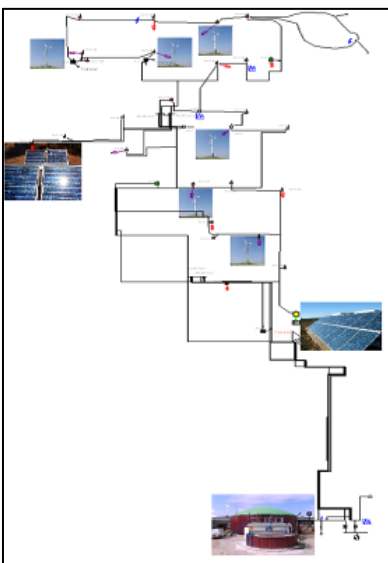

Figure 1: Example of distributed generation in a MV distribution network

Specific modeling of distributed generation units

The simulation of system elements (such as photovoltaic units, fuel cells, batteries and wind farms) requires special features for new technologies. PSS®SINCAL caters these needs in covering load flow and short circuit calculation as well as reliability calculations and dynamic simulation.
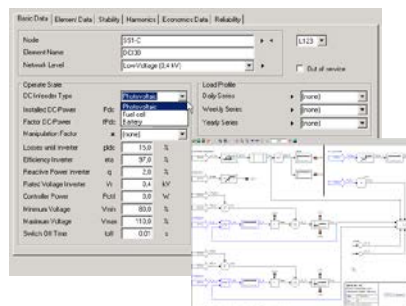

Figure 2: Specific modeling of distributed generation units

The network model simulation is enhanced with single-phase loads and generators including energy profiles for generation and consumption.
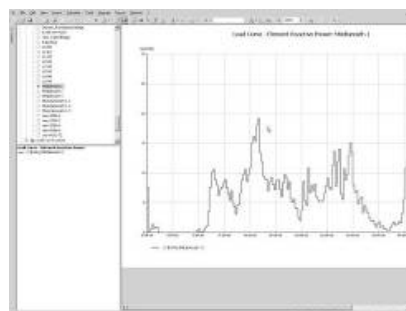

Figure 3: Single-phase loads and generators

Quasi-dynamic simulations

The quasi-dynamic simulation methods enable PSS®SINCAL to consider changes, such as sun radiation or wind speed profiles, during the course of the day.

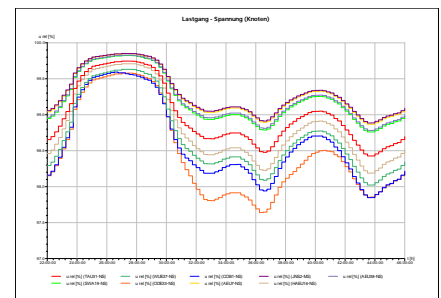In diagrams the results of variants with or without photovoltaic units can be compared with each other.

Figure 4: Comparing results of different scenarios

Integration of smart meter data

The Integration of measuring data (single or aggregated) is available from existing smart meters and / or directly from AMI systems. The data can automatically be updated on a regular basis (e.g. every 15 minutes).

This allows an exact timing for influencing the customers participating in demand side management schemes, or the decision whether, and how, batteries of electric vehicles should be used as flexible energy storage. Also the better utilization of equipment (dynamic line capacity) is possible once the real, actual utilization of the lines is known.
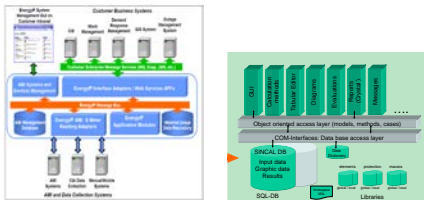
Figure 5: Integration of smart meter data

Impact on the protection system

Considering the effects of distributed generation on the tripping behavior of the protection devices is also a special feature. As the short circuit current of the distributed generation units is usually limited to load current, it cannot be solely used for tripping decision any longer. Alternatively, user-defined voltage dips are used for tripping. A high number of generators in the distribution system can also result in

back-feeding energy via the distribution transformers. For this case PSS®SINCAL offers the opportunity to iteratively shut-down these transformers and carry out appropriate simulations.
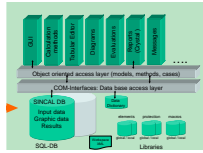

Figure 6: Advanced analysis of MV feeders with installed distributed generation

Stability analyses

PSS®SINCAL enables the user to carry out stability analyses even in unbalanced systems. The disturbances can be balanced as well as unbalanced. As such the sudden breakdown of a wind generator at the end of a long supply line could impact the stability of the system.