POWER GRID STUDIES FOR YOUR ELECTRIC POWER SYSTEMS

Adapting Electrical Grids

More and more distributed sources and loads are prompting changes in grids. Power grid studies and simulations based on adapted static and dynamic models of grids are necessary to reliably assure certainty of supply. The Fraunhofer IFF can complete power grid studies for you. Its researchers identify vulnerabilities and fitting countermeasures, thus helping you operate your grid reliably.

Acting Strategically with Power Grid Analyses

In our power grid studies, we analyze the current state of electrical grids in your purview, reveal potential vulnerabilities and identify actions in order to assure a dependable and reliable supply of energy. We factor in performance data on equipment and lines, expected diurnal cycles of input from renewable energies and, where necessary, existing plans to expand the grid. Grids are modeled and simulated on the basis of new static and dynamic models. Our findings and recommendations for action facilitate your decision making.

Technology Partner for Electrical Grids

Variable power flows make questions about grid utilization and power reserves difficult to answer. We do the substantial work entailed in grid analysis for you, analyzing both grids currently in operation and grids in planning as well as assessing the impacts of future scenarios. In the process, we incorporate the latest research findings, trends, standards and guidelines. We also incorporate current technical solutions for electrical grids and smart grids, power storage systems and electric vehicle networks.
as well as new grid metering and monitoring technologies. Our power grid studies will help you identify fields of action and plan and implement actions.

Ultimately, this will enable you to optimize your electric power systems, i.e. to minimize losses in the grid, to reduce expenditures and to utilize electrical equipment optimally. Exploit power reserves to integrate renewable energies reliably in existing grids or derive measures against grid instabilities. These studies identify vulnerable equipment and weak points in the grid, compile information on grid stability in the event of faults, and define and model protection plans.

**Optimizing Electric Power Systems**

**Symmetrical and Asymmetrical Power Flow Studies**
The power flow study is an important method for the planning and static analysis of electrical grids. The power flow conditions and initial conditions they identify are prerequisites for further power grid studies and analyses. Using professional grid planning software, we perform not only three-phase symmetrical but also asymmetrical power flow studies. This enables us to analyze steady state conditions of a grid realistically in different scenarios.

**Dynamic Analysis and Stability Analysis through Time Domain Simulation**
Taking the power flow study as the starting point, we perform dynamic power grid analyses and stability analyses in the time domain. We use dynamic models of grid elements such as generators with voltage regulators and speed governors or voltage and frequency-dependent loads to analyze and assess power system dynamics and stability, e.g. voltage stability, by simulating the grid in different scenarios. This enables us to assess grid stability. We additionally derive potential countermeasures for such stability problems.

**Development and Evaluation of Simulation Models**
In addition to static and dynamic power grid analyses, we also develop simulation models and evaluate new grid components in simulations. Using flexible block programming, we model grid components in our simulation system. This enables us to seamlessly connect the model developed with the existing grid model and to test it in different scenarios by simulation. We also validate and optimize models.

**Future Scenarios**
We factor in the expected expansion of distributed sources of energy from renewable energies as well as new grid metering and monitoring technologies and analyze the use of storage solutions on different levels of a power system. Potential grid expansion scenarios are evaluated for their impact on the certainty of supply and grid stability.

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**Our Expertise – Your Edge**

We utilize the latest simulation software on the market and employ state-of-the-art simulation systems and methods in power grid studies. What is more, we have experience studying the power flow of grids with several thousand nodes.

Would you like to learn more about our range of services for power grid studies? Contact us. Our experts would be glad to help you.