



Grid Data Consulting

Higher-quality data, more flexible data management, and optimized workflows

SIEMENS

At a glance

Increasingly complex and constantly changing power grids need to provide actual and target state transparency based on valid data, including for dynamic operation. Experts from Siemens Power Technologies International (PTI) Consulting support grid operators in developing optimal data management concepts that permit more flexible grid planning based on substantiated data. Starting with existing systems and processes, our experts work with yours to analyze the available tools, data sources, and data flows, verify data quality, identify optimization potential, and recommend appropriate measures for improving data consistency and data management.

- Reliable data for well-founded grid planning and operational decisions
- Data consolidation and cross-department exchanges
- Efficient data handling
- Extreme flexibility when responding to changes in the grid

7x¹

increase in renewable power
generation expected by 2050



¹ Global Energy Transformation, IRENA, 2019

The challenge

The importance of renewable energies is growing worldwide along with the integration of bidirectional grid components known as prosumers. At the same time, industry and end users are demanding more and higher-quality electricity. In many countries, however, infrastructure designs often lag behind these developments due to time-consuming implementation processes. To guarantee a reliable power supply, grid operators require valid data for actual and planned energy flows. Among other things, this data enables them to efficiently use existing capacities and make optimal planning decisions.

80%²

of analyst time is spent finding
and preparing data

But for many utilities, data collection is an especially cumbersome task. Often components such as control systems, grid planning software, and protection software, are not yet linked. The exchange and consolidation of data is handled manually, commanding as much as 80 percent of the time spent on projects.

All these tools need a high-quality digital model of the grid and its equipment. This includes data from smart meters and other metering devices that generate an additional flood of data. How should utilities process these huge volumes of data? What data can be trusted? How should it be used and made available? Which grid model should be implemented?

To make optimal use of existing tools and data, it is necessary to analyze and optimize the data management system. The key here is to adopt a data-centric philosophy in which applications collaborate to create, manage, and leverage data as efficiently and seamlessly as possible. And, equally important, to ensure this data is accurate. Because decisions can only be as good as the data they are based on.

The solution

Every infrastructure is different. Based on the available tools, structures, requirements, and workflows, optimal approaches for managing grid data will differ. Regardless of whether utility companies are striving for higher data quality, operational flexibility, seamless collaboration across departments, or just simplified data handling – the result is always a data management concept that simplifies and optimizes the existing processes and workflows.

PTI Consulting is the Siemens consultancy for energy infrastructure. We pair technical expertise with a strategic mindset and a holistic view of power systems. Our Grid Data Consulting service supports you in identifying the optimal concept for your specific system landscape and needs.

² "What's Your Data Strategy?", Harvard Business Review, May 2017

Analysis of existing data and structures

Initially, experts from PTI Consulting work with you to gain a comprehensive overview of your current data infrastructure. What are the data sources and formats? Where is this data? What software tools are used and what data do they access? Which workflows need which data, and what tasks are performed? Is data used across departments, and do all stakeholders have access to potential data silos? What is done manually and what processes are automated? In collaborative workshops, you and our experts thoroughly investigate these points to make your current data management concept transparent. At the same time, we identify optimization potentials and clearly define all requirements.

Optimization of data management

Based on the results of the workshops, PTI Consulting develops a recommendation for optimizing your data management system. Among other things, the proposal includes specific technical recommendations for data exchange interfaces, data formats, and a potential overarching system – the “central source” – or general adjustments to the software architecture. If necessary, we determine whether additional software would facilitate the management and exchange of data. Should this be the case, we analyze appropriate tools and make vendor-agnostic recommendations. In the process, our experts draw on their knowledge of diverse software tools and standard data exchange formats like CIM, CGMES, and IEC61850 and their compatibilities. If your company has a digitalization strategy or you are in the process of developing one, our experts determine whether their proposed concept is compatible.

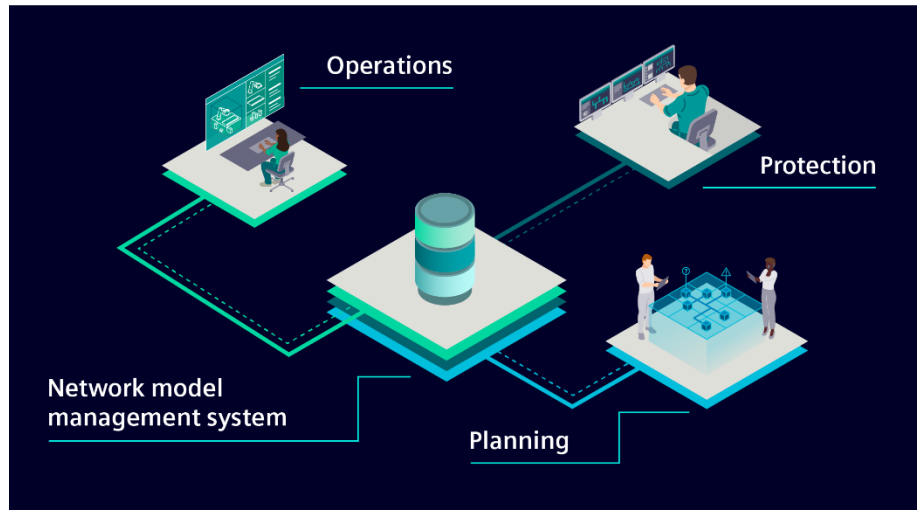
Establishing the GIS system as the central source results in more precise grid model and planning simulation based on real-time GIS data.

Use case example

GIS-based grid planning

When grids are expanded rapidly – for example, as more distributed renewable energy sources are integrated – the underlying grid model and data should be as precise as possible. Up-to-date data from the GIS system significantly enhances the accuracy and quality of the planning model. However, if this data must be manually requested, exchanged, and updated, work is delayed, increasing the probability of errors. A better alternative is a seamless integration of the GIS system with the grid planning and simulation software. Smart data management and processing makes the data automatically accessible to both tools. This synchronization saves time and ensures that the data is consistent, of high quality, and up to date.

Data quality and efficiency are significantly improved by defining a central source and by automating synchronization processes and data consistency checks.



Data verification and consolidation

On request, our experts evaluate whether the data being processed is consistent and valid – in other words, whether there are conflicts with physical, technological, or standards-related limits. We use rule-based procedures that provide access to concentrated expert knowledge from a variety of disciplines. Predefined KPIs serve as the starting point. Various standards such as DIN VDE, IEC, and ANSI are also incorporated in the procedures and are supplemented by a wealth of experience gained from our decades of work in the field of system studies.

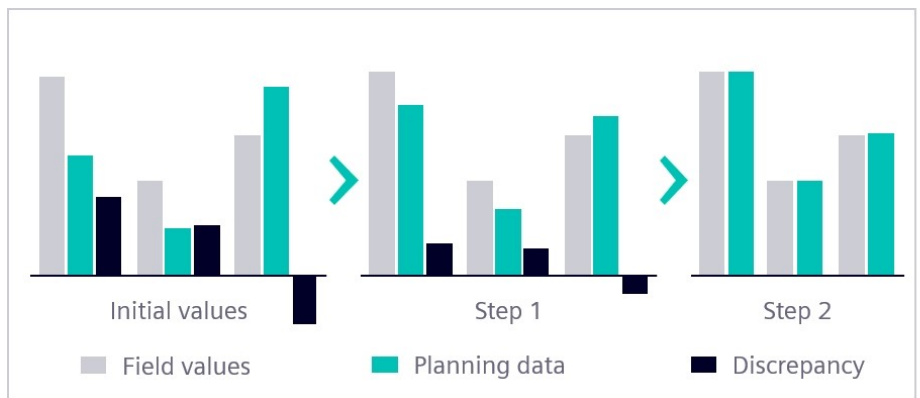
Whether located in the domain of primary or secondary technology, our experts automatically identify data that appears suspect and consult with the data owner to determine the cause of the discrepancy. A check is then run to determine whether there are technical solutions that can prevent data errors in the future. In the case of data that is intrinsically important for grid planning or operation, a final determination is made about the limit values that apply, then recorded in a guideline so data quality can be assessed in the future. The goal is to ensure that decisions are made only based on verified data. One possible solution might be to consolidate data in a central source that can be simultaneously accessed by different departments, such as grid planning and operation.

Use case example

Stability despite high grid utilization

To increase its utilization capacity, a grid needs to be operated closer to its physical stability limits. Yet dynamic grid operation is possible only on the basis of high-quality operational data. Data inconsistencies between actual measured values and status assessments need to be eliminated in the SCADA system and in grid planning. One solution is to perform an automated verification to determine whether the state estimation complies with physical, technological, and regulatory limits as well as customer-specific rules. This also enables one to identify and reduce discrepancies in the simulation model of the physical infrastructure and consolidate operational and planning data. This transparency provides the confidence needed for making operational decisions. When verified data is available to analytic tools, utility companies are well on their way to creating a digital twin of their infrastructure – which in turn enables them to simulate operating scenarios comprehensively and in advance.

Discrepancies between data values can be minimized or even eliminated through rule-based data verification and alignment with customer-specific rules.

**What you get from Grid Data Consulting**

PTI Consulting provides vendor-agnostic analyses and consulting based on global experience. Our Grid Data Consulting service provides utilities with a revised, flexible, and cost-effective data management concept that makes optimal use of existing structures and processes. Our core objectives are to simplify data handling, improve data quality, and define a roadmap for implementation. If desired, our service package can also include consulting and support during the implementation phase.

Your added value:

- An optimized, revised data management concept
- Improved data quality and automated consistency checks
- Reduced software interfaces
- Greater flexibility and resilience in the face of structural changes

Published by:

Siemens AG
Smart Infrastructure
Grid Software
Humboldtstrasse 59
90459 Nuremberg, Germany

For the U.S. published by

Siemens Industry Inc.
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Alpharetta, GA 30005
United States

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Article No. SIDG-B10085-00-7600

AL=N, ECCN=N

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