

Advanced GIS technology powers smart grid success

MITNETZ STROM | Germany

German utility company MITNETZ STROM, part of the enviaM Group, is the largest regional distribution network in eastern Germany, responsible for the safe, reliable and eco-friendly supply of electricity to approximately 2.3 million people. The company's

high-, medium- and low-voltage network is managed in four regions — Brandenburg, Saxony-Anhalt, South Saxony and West Saxony — and covers almost 74,000 kilometers. To put that in perspective, a trip around the world comes in at 40,075 kilometers.



Directed by European Union (EU) policies, MITNETZ STROM has worked to create a smart power grid that uses digital information and communications technology to improve the efficiency, reliability, economics and sustainability of energy supply and demand. In 2002, MITNETZ STROM began a gradual corporate consolidation from four small energy utilities to one provider. As part of this process, MITNETZ STROM needed to aggregate, integrate and standardize existing technical and spatial data for operating equipment, conductors and facilities. The utility also had to capture insufficient or missing data.

Wanting to leverage the capabilities of a geographic information system (GIS) to better collect, visualize and manage its power grid data, MITNETZ STROM needed a platform that would be central to its operation, support long-term planning and enable smart grid capabilities. The utility selected Hexagon to implement a GIS that would meet the unique needs of utility providers.

Powered by Hexagon's HxGN NetWorks and electricity data model, MITNETZ STROM's technical and spatial data are integrated into an open, standards-based relational data warehouse. With Hexagon's solution, MITNETZ STROM shares its electrical network data across the enterprise and accesses it on the web. MITNETZ STROM also created different end-user types, securing data access and configuring workflows based on job roles.

HxGN NetWorks acts as a central data hub with central management of the assets, which provides needs-based data for any specialized applications and a wide array of work processes. There are around 10 million assets integrated into the system. These are enriched with data from other systems, such as financial data, and can be analyzed with business intelligence (BI) tools to monitor and control technical processes as well as to assess business opportunities and risks in a more informed manner.

Establishing a foundation for unified network data

Aggregating, integrating, standardizing and capturing technical and spatial data was no simple task for MITNETZ STROM. Bringing the electrical network data into Hexagon's system was a multi-year, three-stage project that involved multiple stakeholders and required considerable planning.

Before it could fully implement the solution or execute data support processes, MITNETZ STROM had to establish a network data foundation that was shareable companywide, with data integrity defined by up-to-date statuses and consistency. To do this, the utility held intensive user discussions on several key topics, including:

- Integrating and standardizing power grid data
- Identifying missing or insufficient data and defining processes and responsible parties for capturing that data
- Outlining processes to capture data on a continual basis
- Determining quality assurance measures to ensure data integrity
- Creating access rights for internal and external end users
- Considering future data requirements

MITNETZ STROM also used a multi-stage quality assurance process within the data capture framework to ensure there were no legal issues for internal and external users.





Implementing data support processes

With a data foundation and Hexagon's technology in place, MITNETZ STROM implemented key data support processes in the following areas:

Digital planning and documentation

Digital data inventory, network planning and documentation processes are crucial to smart grid development. MITNETZ STROM can monitor, modify and update all information and documentation processes. With information and procedures in place, the company can produce real-time downstream processes, create and link sub-processes through relevant data exchanges and install quality assurance measures.

Mobile data capture and editing

Field crews can capture and edit network inventory using a mobile system on tablets. The mobile solution collects and updates process-relevant technical data through a red-lining function. These features record absent operating equipment, maintenance and workforce management data. The solution captures and integrates data sets into the GIS during inspections and other activities, creating current, consistent and comprehensive network data inventory.

Secure online information

MITNETZ STROM's data inventory and spatial information set a foundation for use across the enterprise. Data sets are available through a secure intranet platform for dig permits, zoning and other issues. About 80% of asset location requests are now processed this way, without manual intervention.

Data and statistical evaluations

MITNETZ STROM's data inventory enables extensive structuring and automation of data evaluations for internal and external needs such as asset servicing and management. Automated data quality assurance measures ensure data processes meet standards.

Leveraging the smart grid

Central to MITNETZ STROM's information and technology landscape, Hexagon's technology is critical to capturing and standardizing power grid data. It helps the company strategically manage network assets, optimize network infrastructure, measure meter data and overcome the challenges of renewable energy resource integration.

With HxGN NetWorks, MITNETZ STROM leverages this information for smart grid planning and development:

Network load analysis

Renewable energy sources supply MITNETZ STROM's high- and medium-voltage grid. Previous approaches to effectively calculate and evaluate load flow from renewable sources were incomplete. The utility can now develop a network load analysis with data from traditional and renewable energy scenarios, taking the underlying network topology into account at different time intervals. The extensive calculations – especially in the medium-voltage network – are initiated by batch processes. The resulting data is stored in a data warehouse for analysis.

Solar power register

The company's service territory includes many residential and commercial solar panel installations. MITNETZ STROM maps energy usage within the network and triangulates the data with information on solar panels, creating a solar power register within Hexagon's solution. It uses the register to determine the viability of solar panel installation in certain grid areas based on projected energy supply and demand needs.

Low-voltage grid evaluation

To accurately evaluate the low-voltage grid, MITNETZ STROM uses its Hexagon system to collect and analyze existing network and topological information, supply and consumption data from meters and utilization potential from the solar register. MITNETZ STROM later presents the information in a visual format to assist personnel when evaluating feed-in requests.

Network object prioritization

Knowing the working state of network objects in all voltage levels is critical to evaluating and prioritizing implementation or replacement needs. With Hexagon's system, MITNETZ STROM can visualize and evaluate network topological data, master data for operating equipment, lifecycle and maintenance data and load analysis results. Having data sets available ensures efficient equipment use and workforce management for maintenance planning and renewal projects.

Web map services

Spatial information from government authorities and private utility providers is constantly growing. MITNETZ STROM analyzes this information – which includes area utilization, environmental protection, economic development and population growth data – for strategic network planning purposes. Incorporating these data points with web map services creates potential for more efficient and cost-effective grid planning.



Innovative BI projects to assess opportunities and risks

MITNETZ STROM pursues an innovative, open and interdisciplinary approach. A large amount of data from other systems is linked to the geoinformation system. The “Netzit” project uses a new way of looking at the management of assets. There is no longer a traditional separation of the ERP, GIS, SCADA and other systems. HxGN NetWorks becomes a data warehouse with the focus on assets, enriched with information from other systems via Hexagon’s flagging tools, which, along with Hexagon’s Rating BI applications, make it possible to analyze vast amounts of multi-layered data and thus quickly and effectively identify where investments should be made.

Other BI applications are also used to support the control of technical processes and the monitoring of grid stability. The weather portal can be used to forecast expected grid bottlenecks and the power generation of renewable energies from wind and solar. The Energy Analyzer is used to analyze, among other things, the utilization of transformers in substations and local grid stations, taking into account feeders and consumers.

“We rely on geospatial solutions from Hexagon for this. We wouldn’t be where we are today without the intelligence of the geoinformation system — its continuity from the database to the connected systems — for analytics and applications. The heart of many of our processes beats in the GIS,” said Roberto Löffler, IT project manager at MITNETZ STROM.



We rely on geospatial solutions from Hexagon for this. We wouldn’t be where we are today without the intelligence of the geoinformation system — its continuity from the database to the connected systems — for analytics and applications. The heart of many of our processes beats in the GIS.”

Roberto Löffler
MITNETZ STROM

More than a decade of success

MITNETZ STROM’s commitment to a modern, utility-specific GIS solution resulted in a positive return on investment. Since implementing the initial technology more than a decade ago, MITNETZ STROM has established performance monitoring and failure systems, assuring power grid inventory and data integrity through regular maintenance work. Technical and process requirements for network development are also evaluated and prioritized in a functional atlas. And BI applications help the company assess business opportunities and risks in a more informed way.

The entire process from energy generation to consumption is changing. Through advanced, intelligent technology and the realization of forward-looking projects for networking and evaluation of information, the company is equipped to meet the many challenges posed by the energy transition and can ensure flexible, stable grids and a secure supply of electricity for millions of customers.

Contact us



www.hexagon.com/company/contact-us

Hexagon is a global leader in digital reality solutions, combining sensor, software and autonomous technologies. We are putting data to work to boost efficiency, productivity, quality and safety across industrial, manufacturing, infrastructure, public sector, and mobility applications. Our technologies are shaping production and people-related ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon’s Safety, Infrastructure & Geospatial division improves the resilience and sustainability of the world’s critical services and infrastructure. Our solutions turn complex data about people, places and assets into meaningful information and capabilities for better, faster decision-making in public safety, utilities, defense, transportation and government. Learn more at hexagon.com and follow us [@HexagonAB](https://twitter.com/HexagonAB).

© 2022 Hexagon AB and/or its subsidiaries and affiliates. All rights reserved. Hexagon is a registered trademark. All other trademarks or service marks used herein are property of their respective owners. 12/22