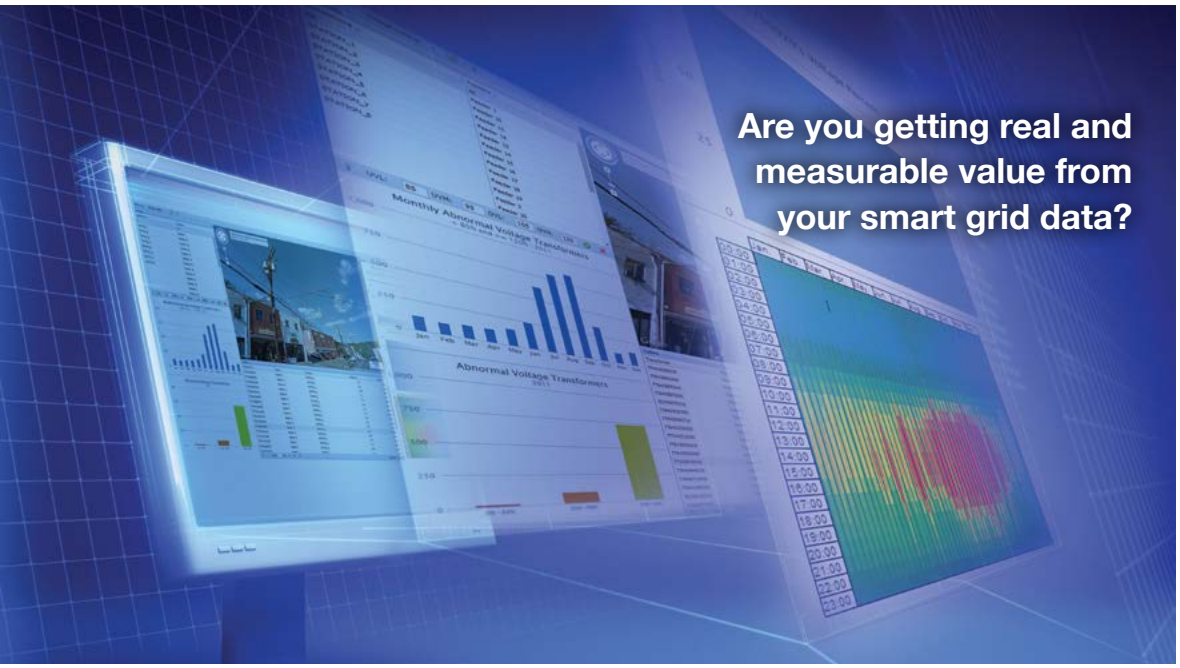
Advanced Grid Analytics

Landis+Gyr
manage energy better

Transform smart grid data into actionable insights that help improve reliability, power quality, cost, safety and support distributed energy resource integration.



Landis+Gyr's Advanced Grid Analytics (AGA) solution enables the utility's network operations, planning, asset management and customer service organizations to ensure safe and efficient grid management. By leveraging data from grid edge devices such as meters, sensors and other utility enterprise systems, AGA helps utilities improve:

- **Reliability**
  - Minimize outages
  - Improve reliability indices
- **Power Quality**
  - Detect abnormal flows and voltages
  - Alarm planners and operators of operational limit violations
- **Cost**
  - Maximize capital spending for capacity and asset condition
  - Optimize circuit configurations to fully utilize existing capacity
  - Reduce technical and non-technical losses
  - Optimize asset investments and placement
  - Extend asset life
- **Safety**
  - Identify abnormal system conditions in near real-time
  - Prevent hazards to equipment and personnel through early detection of equipment failure
- **Distributed Energy Resources Integration**
  - Analyze impact of renewables
  - Recommend right sizing and siting of renewables and energy storage systems

By utilizing the power of data, the distribution network model and advanced physics-based algorithms, utilities can now have accurate, dynamic monitoring and actionable intelligence for improving grid reliability, safety and network performance while reducing costs, meeting regulatory compliance and enhancing customer satisfaction.

Modular and user-friendly, AGA features web-based, geospatial and system-wide visualization of the distribution grid. AGA's powerful algorithms have been proven in real-world deployments over the past decade.

Each AGA application can be deployed individually or as part of an enterprise solution. AGA provides the flexibility to deploy the solution in multiple ways – deployment within the utility's own infrastructure, deployment in the cloud or by delivery as a service offering. Utilities of any size can harness the power of AGA and realize rapid benefits. AGA applications integrate into a single user-friendly interface to help utilities quickly achieve maximum benefits.

Modular, Flexible and Scalable Applications for the Utility Enterprise

Asset Loading

AGA's Asset Loading application provides system-wide visualization, and performance analysis of the distribution assets and their connectivity by using data from meters, sensors and GIS. Load profiles of substations, feeders, feeder sections, underground cables, fuses, switches, DA equipment and distribution transformers are monitored and displayed geospatially and dynamically. Areas of system overloading are highlighted for remedial action in order to minimize outages due to equipment failure. The application helps size and plan for transformer and other asset upgrade programs, calculate transformer loss of life, prioritize locations for instrumentation and develop improved preventative maintenance strategies.

Reliability Planner

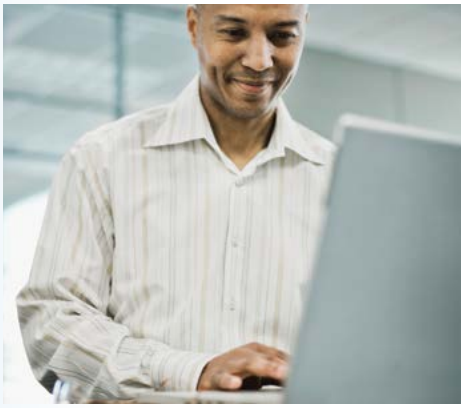
AGA's Reliability Planner application leverages OMS and GIS data for network outage visualization and analysis. It provides planning and upgrade recommendations to improve system reliability, enable targeted preventative maintenance and maximize capital improvement for planning and budgeting processes. The application helps utilities strategically improve network reliability in a cost-effective manner as measured by key performance indicators such as SAIDI, SAIFI, cost per outage event, revenue lost per outage event and kW unserved. The application also recommends various remedial actions including optimal placement of automated switches and line sensors.

Voltage Visualization

AGA's Voltage Visualization application provides utility's system planners and distribution engineers with system-wide visualization of voltage performance on the utility's electric network. The users can leverage the visualization tools and interactive drill-down capabilities to quickly and effectively assess voltage profiles along a feeder and identify voltage conditions outside of target ranges. The application uses data from GIS or planning tools to display the network connectivity model, as well as interval voltage and usage data from AMI or MDMS, geospatially on web-based Google MapsTM. This allows users to choose various viewing options in multiple layers and provides selections such as zoom in/out, satellite view and street view. AMI meter interval usage and voltage data are imported from head-end systems or MDMS and updated periodically. System-wide analysis is run to determine and display locations with voltage violations both above and below nominal voltage.

Revenue Protection

Revenue Protection displays system-wide power theft and technical losses. The module uses data from meters and GIS to geospatially and dynamically display, identify and monitor the losses on the distribution network connectivity model. Power theft is detected via analysis of individual meter profiles and can be enhanced by incorporating additional sensor data, if available. Inactive meter consumption, zero consumption and missing load profile intervals to locate slow, stopped or spiking meters are identified.



Capacity Contribution

AGA's Capacity Contribution application utilizes meter data to locate, rank and analyze customers that significantly contribute to daily, monthly and yearly peaks. Identified customers may be priority targets for demand response or energy efficiency initiatives. Utilities can also use this information to determine strategic placement and dispatch of distributed resources for peak load reduction. Leveraging AMI assets for strategic planning of demand response and distributed energy resource programs ensures utilities maximize the value of their investment. Utilities can also leverage the capacity contribution data to design demand response tariffs and allocate revenue requirements in a rate case to customer classes.

Distributed Energy Resource (DER) Optimizer

DER Optimizer combines meter and sensor data to analyze DER integration, while taking into account network safety, compliance, reliability and business economic objectives. The application examines the impact of sudden loss of DER generation on power flows, voltages and voltage flicker. It also looks at the impacts of DER on the distribution system at different penetration levels. The module determines the optimal amount of DER to integrate on the distribution system, as well as the maximum DER a feeder or substation can handle without adversely affecting power quality or reliability. In addition, the application recommends optimal placement of energy storage.

Voltage Monitor

Voltage Monitor delivers a geospatial display of real-time voltages, leveraging bellwether meter readings (5–15 minute intervals) and historical voltage profile throughout the distribution network. The application offers a complete system-wide voltage performance and identifies areas where voltages violate utility and regulatory limits. The application monitors voltage on important areas of the grid on a 24x7 basis and notifies the operators about power quality issues by raising alarms and sending notifications. Additionally, the application recommends bellwether meters for each distribution circuit and then interfaces with AMI head-end systems to reconfigure certain meters as bellwether meters.

Network Model Validator

AGA's Network Model Validator tool can inspect, validate and fix imported network model issues. The solution provides utilities the opportunity to correct and maintain accurate GIS and connectivity models. It includes advanced algorithms that perform meter to transformer mapping, topology analysis to correct asset mapping and connectivity. The tool also runs voltage correlation tests for detecting issues with meter-transformer connectivity issues and phase mismatch issues. Network Model Validator performs parameter validation to verify and correct electric parameters and asset characteristics, identify circuit model errors and suggest corrections. Network Model Validator performs load flow tests to identify abnormal voltages that are calculated for the network model. The tool also offers recommendations to correct the voltage issues and provides the option to approve and apply recommendations.

Network Model Editor

Network Model Editor allows utility engineers to perform extensive 'what-if' scenario analysis. Users can modify the master network model extensively to perform forward looking planning studies, without impacting the master model. The solution includes the ability to add new assets to the distribution system, remove assets and change properties of assets for growth studies, new construction and other advanced planning activities.

Leverage the Power of the Platform, People and Pathway

Landis+Gyr's Advanced Grid Analytics enables utilities to expedite achievement of their business goals while delivering maximized performance and efficiency.

Platform

The grid analytics solution consists of a powerful enterprise platform and modular, web-based, user friendly applications. The platform enables utilities to leverage data integration, visualization and advanced algorithms for multiple analyses and benefits. Given the modular nature of the applications, as needs change or grow, the same platform and data can be utilized, leveraging economies of scale and eliminating data silos and the need to manage multiple vendor systems.

Key platform components include:

- **Dynamic Connectivity Model:** Web-based, geospatial visualization of the electric distribution network and assets that provides a single view of data and analysis for all users by role. Capable for dynamic updates and automated integration to GIS systems and planning modeling tools, e.g., CYMDIST, Synergi™ and other MultiSpeak® compliant system models. .
- **NoSQL Database:** Scalable storage of structured and unstructured data with extremely fast processing and retrieval of data imported from multiple sources.
- **Analytics Engine and Algorithms Library:** Unique and patented engine powering the grid analytics application suite. It uses nonlinear optimization technology, developed and enhanced over 13 years, and leverages the dynamic connectivity model to provide advanced analysis. The library of algorithms include: Powerflow, Loss Minimization, DER Optimization, Switching Optimization, Revenue Protection, Voltage Management, DA Placement, EV infrastructure, Reliability Optimization and Outage Detection.
- **Integration Layer:** Pre-developed set of standards compliant adapters for off-the-shelf integration with utility data sources such as AMI, MDM, OMS, GIS, DMS, SCADA, CIS and Sensor head-end systems, thus minimizing the need for extensive interface development. It uses standards such as CIM, Multispeak, JMS, SOAP, DNP3 as well as other API's.

People

Landis+Gyr's professional services team offers a unique combination of data scientists, power system engineers, subject matter experts, software and technology architects and integration specialists. By leveraging Landis+Gyr's proven and best in class implementation methodology and standard-based adapters, utilities can start realizing benefits quickly.

Pathway

Landis+Gyr provides multiple deployment options that are cost-effective, robust, and scalable, and that meet service levels now and in the future. The solution can either be deployed at the utility's data-center or hosted at Landis+Gyr's cloud-based, secure Network Operations Center.

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