



Sentient Energy Grid Analytics System™

Sentient Energy's Grid Analytics System makes the grid safe, reliable and solar ready. It combines intelligent sensors with powerful management and analytics software. Utilities can preempt power reliability and quality problems by detecting faults and disturbances, delivering dependable power, while accommodating growing levels of grid-connected DER.

The Challenges Facing Power Delivery

Public utility commissions are demanding that utilities reduce outages and restore power quickly while extending the life of aging assets, safely integrating ever more rooftop solar, and cutting O&M costs at the same time. Delivering on these objectives requires a new approach to managing the distribution grid that is based on a detailed understanding of real-time operational conditions on every feeder and lateral, and the ability to predict and preempt problems before they occur.

The Grid Analytics System Meets the Need

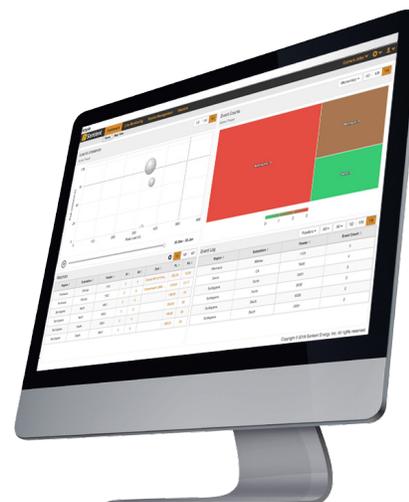
Sentient Energy's MM3™ ZM1™ and UM3+™ intelligent grid sensors are like oscilloscopes attached to feeders, laterals and underground power lines collecting high-resolution load, fault, disturbance waveforms and power direction measurements. These sensors capture and process detailed data at many points along the grid and communicate alerts and analyses to SCADA or Ample™ Analytics modules. This decentralized approach maximizes the amount of information gathered in the field while minimizing the amount of data transmitted. All sensors are multi-communications capable and connect reliably over the utility's RF Mesh (SSN, L+G) or 3G/4G field area network and send the collected sensor data to the Ample™ software platform and other utility backend systems including SCADA and DMS.

Configured to Your Requirements and Scale

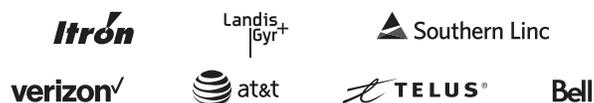
The Grid Analytics System™ is modular, highly flexible and scalable. It can manage very small numbers of MM3s per feeder for initial use cases such as targeted monitoring just as well as system-wide, high density deployments with 75,000+ sensors in overhead and underground feeders and laterals. The system can function as a fleet management and monitoring tool, or provide sophisticated analytics that allow prevention of future problems before they arise.

Capabilities that Evolve with the Grid

Sensor firmware, communications software, data concentrator gateway integration APIs and backend machine learning based analytics are the software building blocks of the Grid Analytics System. Sentient Energy engineers add new capabilities to



Ample™



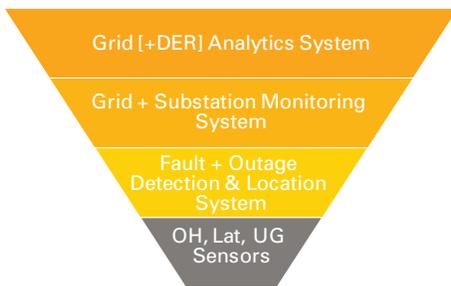
Sentient Energy Grid Analytics System™
MM3™ ZM1™ and UM3+™ intelligent grid sensors,
distributed apps and the Ample@ Analytics.

these components as the distribution grid changes and the understanding of resulting needs matures. Through Sentient Energy's unique, patent-pending multi-communications data transfer technology, all software components of the system can be upgraded remotely at the utility's convenience. Once in place, the system's capabilities can be enhanced to meet the utility's evolving needs for years or decades to come.

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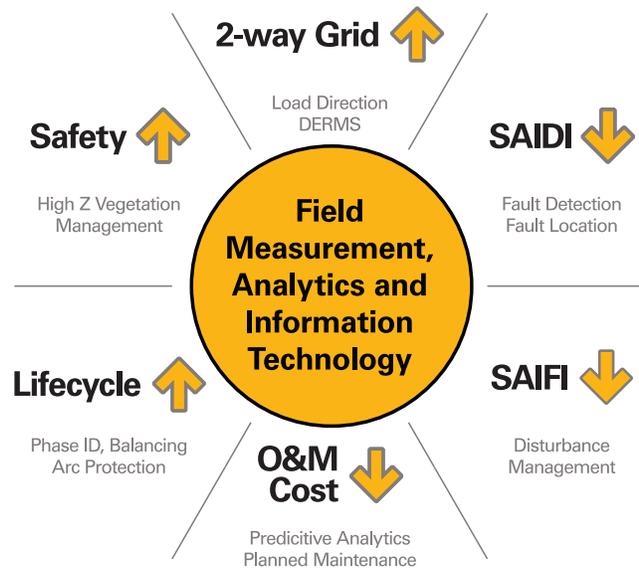
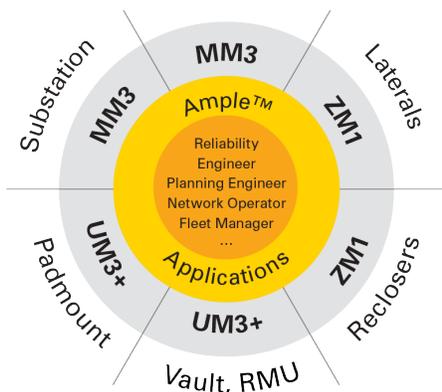
A Complete Grid Analytics System

Sentient Energy's Grid Analytics System™ consists of the MM3,™ ZM1,™ and UM3+™ line sensors, and the Ample Analytics Platform. Our flagship sensor, the MM3, is an intelligent, high-performance sensor featuring substation class measurement, computing, and processing capabilities. The ZM1 sensor complements the MM3, making intelligent sensing and high-resolution data capture capabilities available at grid locations with low or no amperage. The UM3+ sensor further extends high-resolution sensing and distributed computing capabilities to the underground grid. These three sensors are designed to maximize the amount of system data gathered while transmitting only the necessary information.



Ample® Analytics

Ample Analytics provides everything needed to manage field monitoring devices and the data that they collect. Ample's modules extract essential insights from complex data, empowering operators, planners, and protection engineers to make timely and accurate decisions while managing the distribution grid.



System Components	Intelligent sensors, communications software, analytics
Measurements Supported	Load, direction, faults, oscillography, temperature, others
Deployable Grid Locations	Overhead feeders, laterals, underground, risers, substation
Software Deployment Options	Utility data center or private cloud
Client	Browsers: Chrome, Internet Explorer; direct DNP to SCADA
Scalability	50,000+ endpoints
Communications Support	Cellular (LTE/4G,3G,2G,GPRS/GSM, CDMA fallback), Landis+Gyr Gridstream, Itron/SSN
Communications Security	Transport Layer Security (TLS) with managed PKI, DNP3 SA v5
Protocols	DNP3, IPv4, IPv6, Latency Tolerant Protocol™
Sensor Operating System	Linux, CentOS
Server Operating System	Redhat, Linux, CentOS

Visibility, Analytics, and Control for a Better Distribution Grid

Sentient Energy®, a Koch Engineered Solutions company, is the premier provider of intelligent sensing, data analytics, optimization, and control technologies for the distribution grid. Sentient Energy's hardware and software solutions help electric utilities make data-driven decisions to enhance the delivery of safe, reliable, and efficient power. With the industry's only Grid Analytics System™ that covers the entire distribution network, Sentient Energy leads the global market with the largest network of line sensor deployments in North America, gathering rich data in real time for predictive insights and strategic grid management. Sentient Energy's Grid Edge Control solutions enable utilities to reduce energy costs at the grid edge through Volt-VAR optimization, conservation voltage reduction, and peak demand reduction. Sentient Energy partners with leading communications network providers. For more information visit www.sentientenergy.com.

© Sentient Energy, Inc., 15815 Executive Drive, Suite 300, Frisco, TX | info@sentient-energy.com



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