

Grid IQ™ Insight

Delivering Operational Insights for Utilities Globally



imagination at work

Putting Big Data into Action

Data analytics present utilities with the powerful opportunity to become more strategic, streamlined, and competitive than ever before. That's why you need a partner like GE, with decades of grid expertise and the technology to transform big data into personalized, timely and relevant insights that save money, increase grid reliability, and optimize your operations.

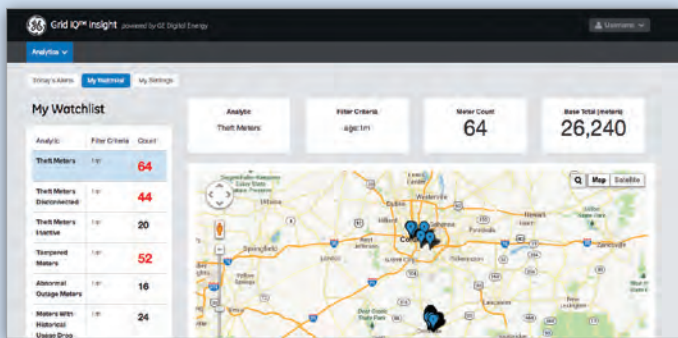
GE brings unparalleled utility expertise from our hands-on experience with the more-than 1,000 utilities using GE software solutions. With an unprecedented \$1 billion investment in Industrial Internet software, GE has the advantage of more than 10,000 software professionals expanding its cross-industry analytics solutions for asset and operations optimization.

- \$ \$1 billion+**
invested in software and counting
- 10,000+**
Predictivity software developers
- 1,000+**
utility software customers
- 100+**
years' experience with electric utilities

Grid IQ Insight combines GE's history of grid expertise with utility analytics solutions and services, built on a secure, reliable, and easy-to-use platform that allows utilities to grow their analytic capabilities iteratively.

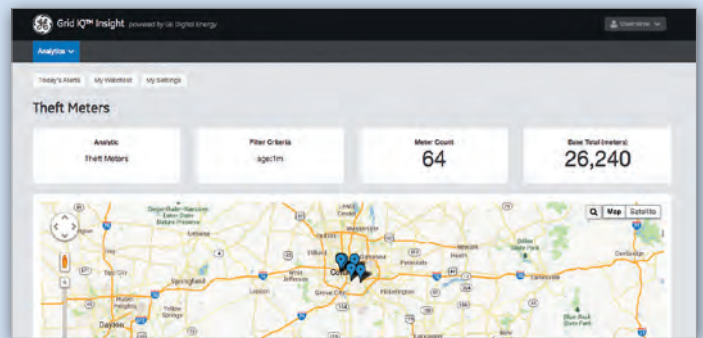
This scalable solution quickly identifies and solves utilities' most pressing challenges by extracting value from the new streams of operational data available to utilities.

Let GE be your partner as you create a new environment of data-driven decision-making that delivers significant savings.



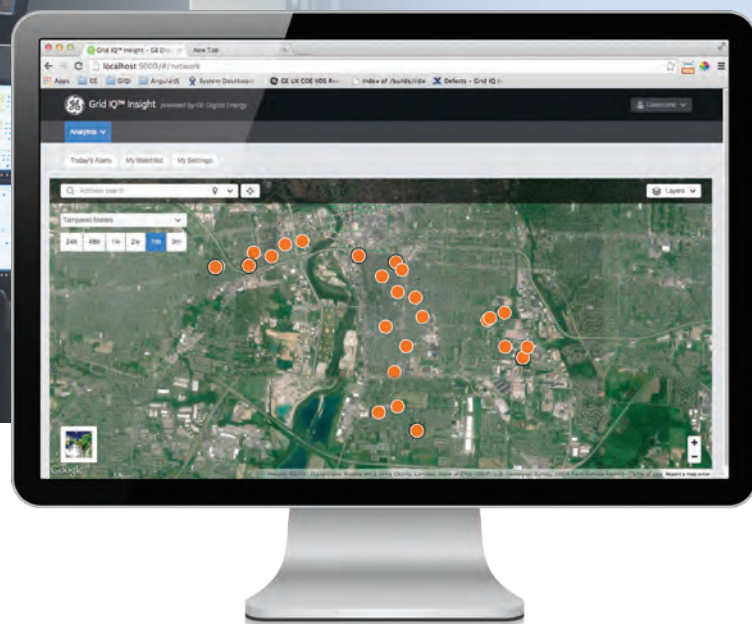
Handle Meter Events

Identify failed, defective, and damaged meters faster. Distill data into actionable insights and filter false positives to reduce truck rolls. Identify if events are a result of network or power grid errors to avoid sending field crews for network outages that IT can resolve. Location-aware, role-based analytics alert field crews when/what to investigate.



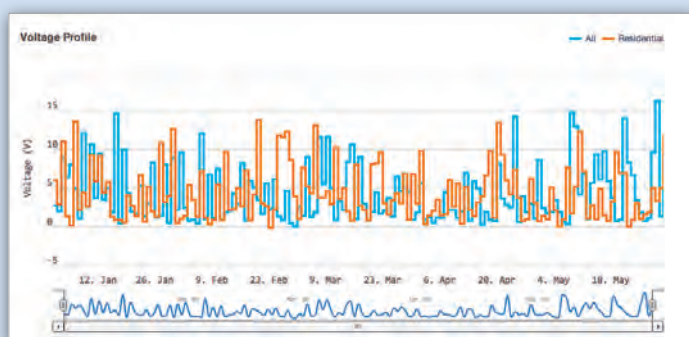
Identify Theft

Pinpoint diversions in real time. Easily identify jumpers installed in a meter socket. Prioritize high-value and repeat offenders for the most cost-effective recovery. Filter false positives to reduce truck rolls. Identify theft or errors in net metering bills.



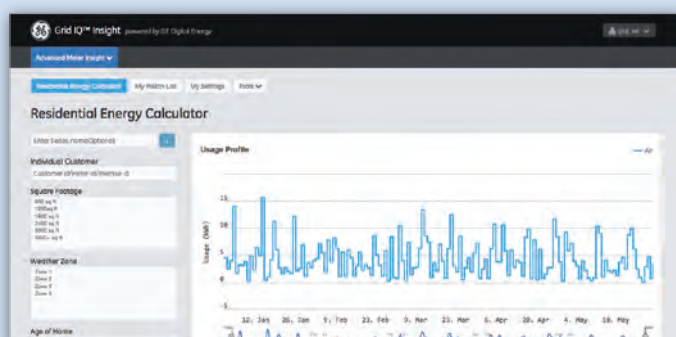
Key Benefits

- Improve grid reliability, customer satisfaction and regulatory compliance by preventing outages and improving the speed of emergency restoration
- Optimize expenditures with more accurate and accountable plans for load balancing, Volt/VAR programs, and equipment and vegetation maintenance
- Extend the life of equipment by predicting and preventing failures
- Improve workforce productivity and the speed and accuracy of decision-making with analytics that correlate and filter internal and external data
- Reduce the cost to manage and evaluate the results of customer programs for energy efficiency and demand response
- Reduce the duration and frequency of theft with targeted analytics for quickly pinpointing diversions, identifying repeat offenders, and targeting the highest-value accounts for recovery



Voltage Profiling

Identify faulty equipment and locate momentary and sustained outages using analytics that aggregate, filter, correlate, and report sags/swells and distorted customer waveforms. Track voltage by feeder segment, meter, and customer to support Volt/VAR optimization by ensuring voltage stays within thresholds. Optimize energy delivery through real-time tracking of transformer loads.



Manage Demand Response Programs

Track load shifts in customer energy usage to measure the effectiveness of energy efficiency programs. Segment customers based on consumption and load profiles to target for energy efficiency programs, rate-schedule changes, and demand response.

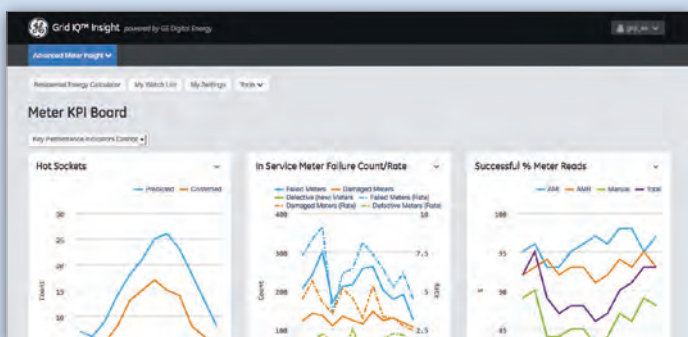


Get Started with Grid IQ Insight

GE's Grid IQ Insight empowers utility employees—in the control room, board room, and the field—to get the right information at the right time to make faster, more accurate decisions with state-of-the-art dashboards that adapt to a user's role and grid conditions.

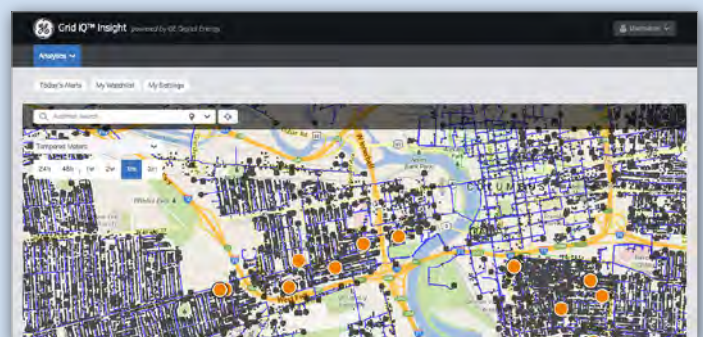
Utilities can expect rapid integration and adaption of Grid IQ Insight, which provides the foundation for quickly adding more analytic applications while satisfying IT's requirements for security, extensibility, scalability, performance, and interoperability. Grid IQ Insight works across all available systems and infrastructure to pull in data from business silos, and to provide the right answers to the right people with results delivered in months, not years. Based on a secure hosting model, it can be implemented on premise behind your firewall, or deployed as a software-as-a-service (SaaS).

Grid IQ Insight offers a library of turnkey analytics based on GE's deep industry expertise for meters, outages, asset and system reliability, renewables, and consumers. With real-time insight into every corner of your business, you can improve operations, extend the life of your equipment, improve the speed of emergency restoration, and boost customer satisfaction.



Predict Hot Sockets

Identify and predict hot sockets using analytics that track and correlate data, including abnormal- temperature readings, power downs, and weather. Track meters at potential risk of failure, and filter false positives. Detect problems prior to equipment failure or damage to a customer's premise.



Manage Distribution Transformer Loads

Monitor load on distribution transformers, understand the health of low-voltage transformers using meter data, and evaluate transformers based on their failure risk and replacement cost. Identify overloaded distribution transformers to prevent equipment failures.

Predix™ Powers Predictivity

Grid IQ Insight is part of GE Predictivity, a portfolio of Industrial Internet solutions that combines big data, predictive analytics, and GE's expertise to put real-time intelligence in the hands of customers. These solutions are built on an integrated stack of technologies for distributed computing, called Predix, that scales across machines, on-premise systems, and in the cloud. GE's first-of-its-kind industrial-strength platform provides a standard way to capture, organize, and secure data for analytics and asset management across operational silos.



Maximizing Data Sources

Grid IQ Insight enables utilities to expand the volume, variety, variability, and velocity of data used for analytics, building on GE's decades of experience in utility systems including OMS, DMS, and GIS. It works in concert with all underlying systems, aggregating data that allows IT and OT professionals to deploy personal, timely, and relevant analytics.

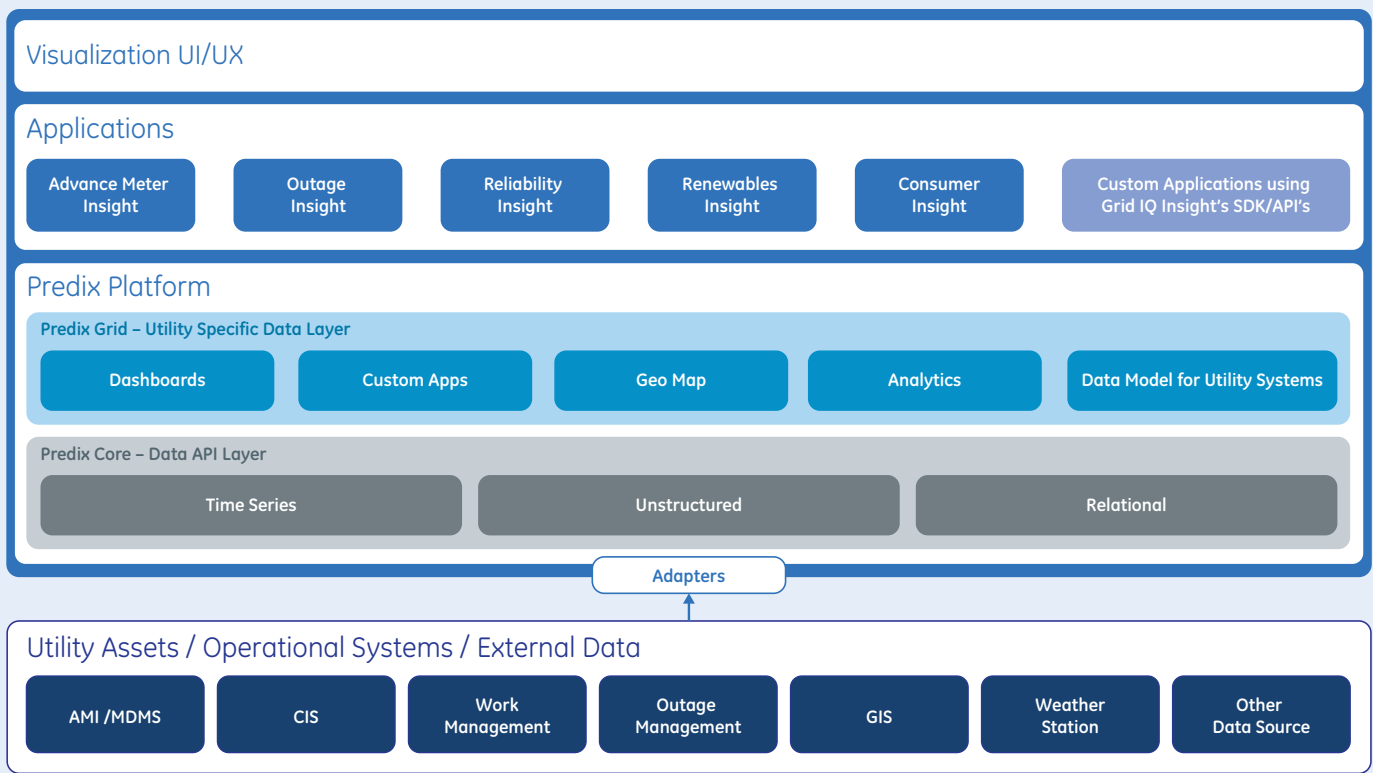
Robust, Powerful Analytics

GE's powerful combination of software and analytics innovation, machine engineering expertise, and deep industry experience provide customers with the insight and tools to take performance to the next level.

Personal, Actionable Visualizations

From its long history in utility operations, GE has learned what utility operators, executives, and field teams need to see, and what they don't, to do their jobs most effectively. GE's analytics work behind the scenes to monitor grid conditions, while role-based dashboards display the most critical information to help operators prioritize workflow.

Grid IQ Insight – Typical Implementation



How GE Can Help



Revenue Protection

Quantify system loss, technical and non-technical losses to prioritize actions.



Meter Health

Avoid revenue loss by minimizing meter installation errors and malfunctions.



Vegetation Management

Improve feeder reliability through targeted vegetation management.



Power Quality

Make cost-effective decisions for preventative maintenance and asset management.



Load Research & Forecasting

Optimize the spend for energy supply and programs through better segmentation of customer loads

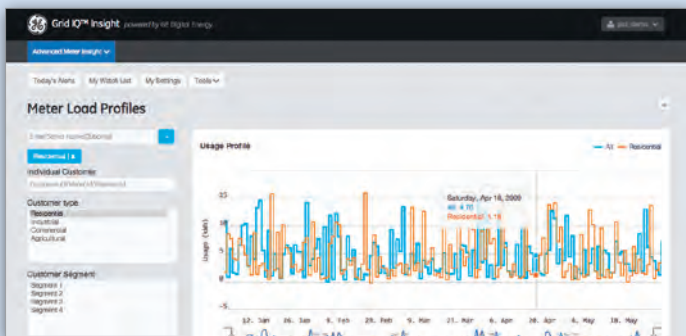
Product Offerings

Advanced Meter Insight

Drive new cost efficiencies with tools to prioritize, validate, and predict problems by analyzing data from AMI networks, CIS, MDMS, OMS, DMS, and GIS.

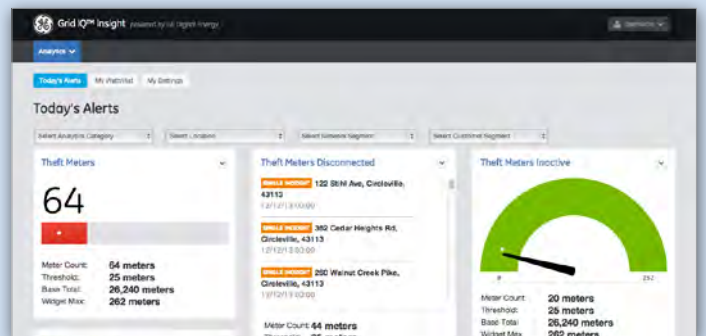


- Revenue Protection**
 Quantify and reduce technical and non-technical losses with tools to prioritize actions and reduce false positives that generate unnecessary truck rolls. Speed identification of theft from an average of 30 days to one day.
- Meter Health**
 Avoid revenue loss by minimizing meter installation errors and malfunctions. Streamline workflow with intuitive and role-based dashboards for grouping and drilldown of meter events.
- Load Research & Forecasting**
 Optimize the expense to balance supply/demand of electricity with accurate, timely, and granular load forecasts that segment and predict customer loads. Research load profiles to align energy efficiency programs with optimal candidates.
- Power Quality & Reliability**
 Make cost-effective decisions for preventative maintenance and asset management. Identify and predict equipment failure, momentary outages, and sustained outages. Reduce energy loss by optimizing voltage.



Forecast Loads

Aggregate and filter data from multiple sources to create load profiles. Estimate revenue based on load forecasts for each rate base, forecast load demands for the ISO, plan transmission and distribution operations, and implement demand response programs. Evaluate revenue impact of current and future tariff options by class.



Monitor and Visualize KPIs

Visualize, monitor and view reports of KPIs by region/substation/feeder/customer. Conduct economic impact analysis with data validation and correction.

Outage Insight

Minimize the cost of outages using predictive, real-time and historic analytics to optimize restoration and prevention efforts.



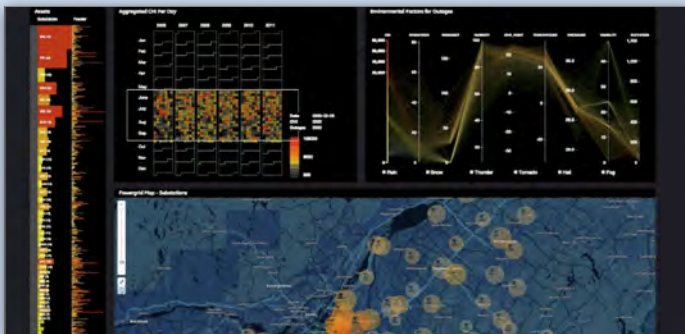
- **KPI Monitoring and Dashboards**
Historic and dynamic monitoring, reporting, and business intelligence of KPIs by region, substation, feeder, and customer. Accurately analyze the economic impact of events with data validation and correction tools.
- **Outage Event Recorder**
Monitor changing KPIs during an outage. Playback time-stamped data, and view comparative analytics based on similar events. Interactive reports detail storm damage.
- **Interruption Management**
Improve communication with non-utility service resources to minimize the interruption impact of planned network de-energizing.
- **Predictive Outage Analytics**
Predict failure and impact for incidents, and proactively optimize and stage resources. Monitor and rank key causal events, and use triage analysis to optimize restoration sequence.

Reliability Insight

Optimize expenditures by improving grid reliability through vegetation, asset, and system health and lifecycle analysis.



- **Asset and System Lifecycle Analysis**
Predict, prevent, and identify ways to extend the life of selected assets and systems by optimizing cost and reliability. Determine optimal maintenance program for single asset classes, and inspection cycles for systems of assets.
- **Vegetation Analytics**
Minimize spend to meet a desired reliability and safety target for vegetation management using predictive analysis for assignment of risk factors. Target resources to high risk line segments, and measure ROI for vegetation management program.
- **System Health Analysis**
Optimize maintenance, repair, and replacement for entire portfolio of assets, using a health assessment based on historical data. Determine probability of failure analysis and assess replace versus repair costs.



Predict Outages

Monitor and rank key causal events. Predict failure and impact for incidents, with triage analysis to optimize restoration sequence. Proactively optimize and stage resources.



Analyze Vegetation Management

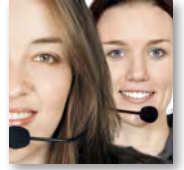
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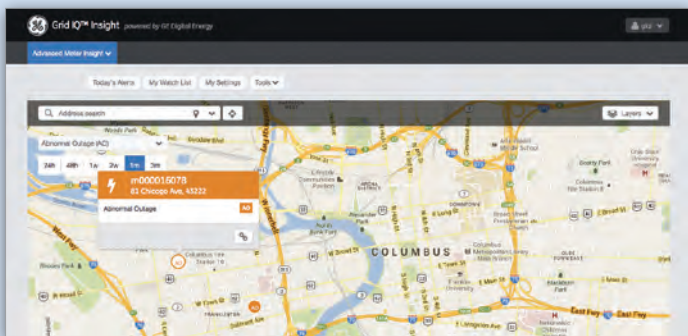
Product Offerings (cont'd)

Customer Insight

Improve the effectiveness of customer initiatives and satisfaction with tools for consumer segmentation, targeted engagement, and behavior analytics

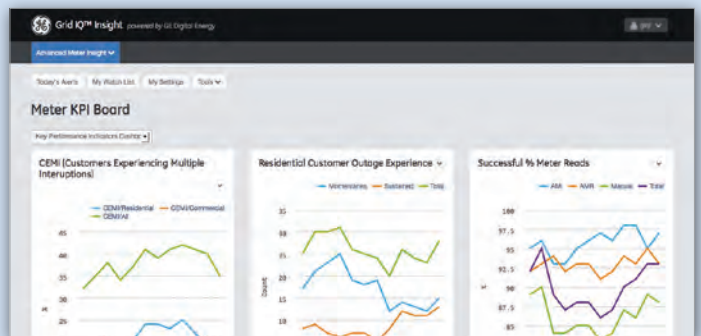


- Social Media Integration**
 Asses the cost/benefit result of using various forms of media (SMS, calls, social) to effectively engage with customers. Correlate social media activity with customer satisfaction metrics.
- Customer Segmentation**
 Analyze load elasticity and correlate with weather events based on disaggregated views of residential/C&I load by meter, transformer, feeder, substation, and territory. Aggregate view of yield based on elasticity, rates, engagement, and responsiveness.
- Customer Engagement**
 Analyze the impact of customer engagement and satisfaction with TOU and other metrics. Aggregate view of bad debt metrics by customer segment.
- Sentiment Analysis**
 Asses and predict the impact of weather and other reliability events on customer behavior and satisfaction. Monitor and rank events that affect customer satisfaction, and aggregate views of commercial, industrial, and residential sentiments.



Record Outage Events

You can play back time-stamped data, with comparative analytics based on similar events. Interactive reports for storm damage, and monitoring changing KPIs during an outage.



Manage Interruptions

Effectively communicate with non-utility service resources to minimize interruption impact of planned de-energizing of network based on scheduled work.

Renewables Insight

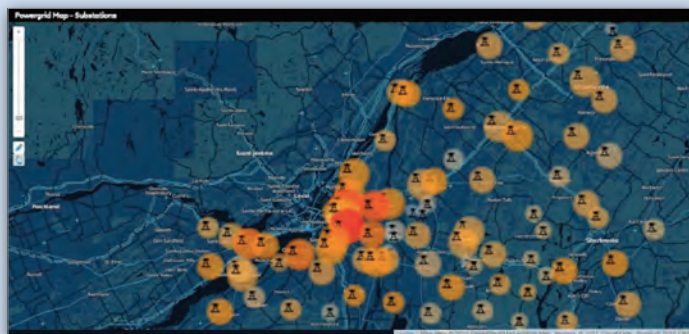
Optimize the use of the load of distributed energy resources based on reliability and availability of PV, wind, and EV resources.



- **Photovoltaic and Wind Analytics**
Analyze the reliability of PV and wind loads, and correlate events with weather conditions. View wind and PV loads separately from residential and C&I loads, and segment PV and wind production by meter, transformer, feeder, substation, and territory.
- **Electric Vehicle Analytics**
Analyze the impact of EV load on infrastructure and detect EVs on the grid. View EV load separately from residential and C&I loads, and segment EV load by meter, transformer, feeder, substation, and territory.
- **Load Orchestration**
Optimize the load of distributed energy resources based on reliability and availability of PV, wind, and EV resources. Aggregate views of EV, PV, and wind, and assess the weather impact on the combined DER load. Monitor and rank events related to PV, EV, and wind loads that affect reliability, and predict failures based on reliability events.

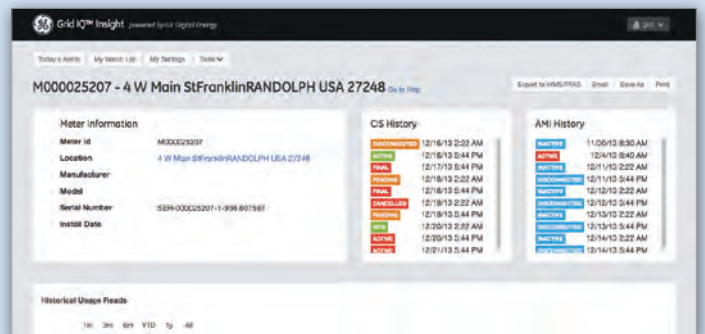
Digital Energy Services

GE Digital Energy offers an array of comprehensive services to help successfully deploy and maintain your analytics solutions. Customized or standardized services support every stage of the technology life cycle and every piece of equipment in operation. We believe in a partnership approach where we can work with our customers to find the right solutions that suit their specific needs. Our customers require a solution partner who understands their business challenges and can develop, deliver, and support the solution. We can provide the benefit of deep expertise in our technology, considerable domain experience, and the commitment that comes with selecting GE.



Manage Asset and System Lifecycles

Predict, prevent, and identify ways to extend the life of selected assets and systems by optimizing cost and reliability. Determine optimal maintenance program for single asset classes, and inspection cycles for systems of assets.



Manage System Health

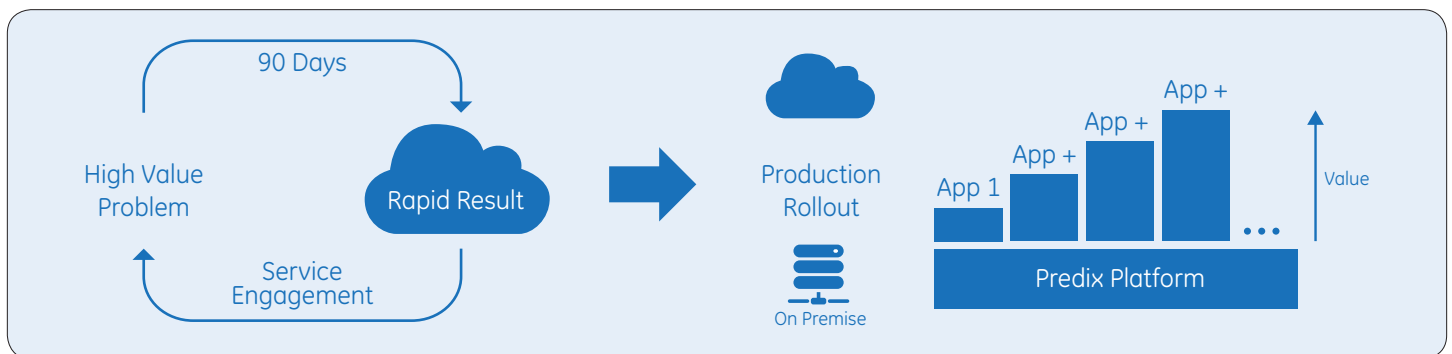
Optimize maintenance, repair, and replacement for entire portfolio of assets, using a health assessment based on historical data. Determine probability of failure analysis, and assess replace versus repair costs.

How It's Deployed

GE's commitment to utilities and data analytics has changed the way we work with you. Gone are the days of multi-year deployments done in isolation or with third parties. Instead, GE is partnering with utilities to identify, test, and scale high-impact analytics iteratively that will shape an information-driven culture.

Rapid Results

A cornerstone of the Grid IQ Insight solution is GE's Rapid Results program that identifies a specific initial use case in order to deliver measurable outcomes within 90 days. You can quickly quantify the value of your investment and use the results to shape your analytics roadmap, while minimizing utility resources, risk, and disruption. GE draws on the expertise of its data scientists, industry consultants, and software development teams to identify the highest-value solutions.



Innovative Utility Program

GE's Innovative Utility Program (IUP) brings together industry-leading utilities to combine ideas and share expertise in big data, visualization, and advanced analytics. Participants can help shape GE's suite of applications to best address their pain points while embarking on a low-risk, low-cost path to predictable and successful deployment of advanced analytics.

Extensibility

The iterative process helps you adapt and adjust as the needs of the utility, or your customers, change. Grid IQ Insight gives you the flexibility to easily add new analytics applications and data sources as they become available. In addition to the solutions on GE's roadmap, IT professionals can extend the analytics capabilities of Grid IQ Insight with your own in-house analytics.



Software Solutions Portfolio Overview

GE's portfolio of software operation systems designed for utilities around the globe provide a suite of software, ranging from asset management and control to advance analytics and hosted and consulting services, to improve operator situational awareness, reduce operating costs and enhance electric reliability.



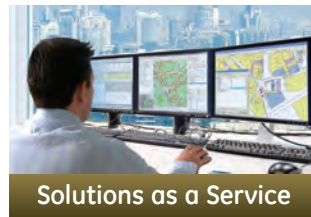
Geospatial Systems

Design and planning services, field automation and workforce management



Utility Operation Systems

Real time control systems for the management of transmission and distribution networks



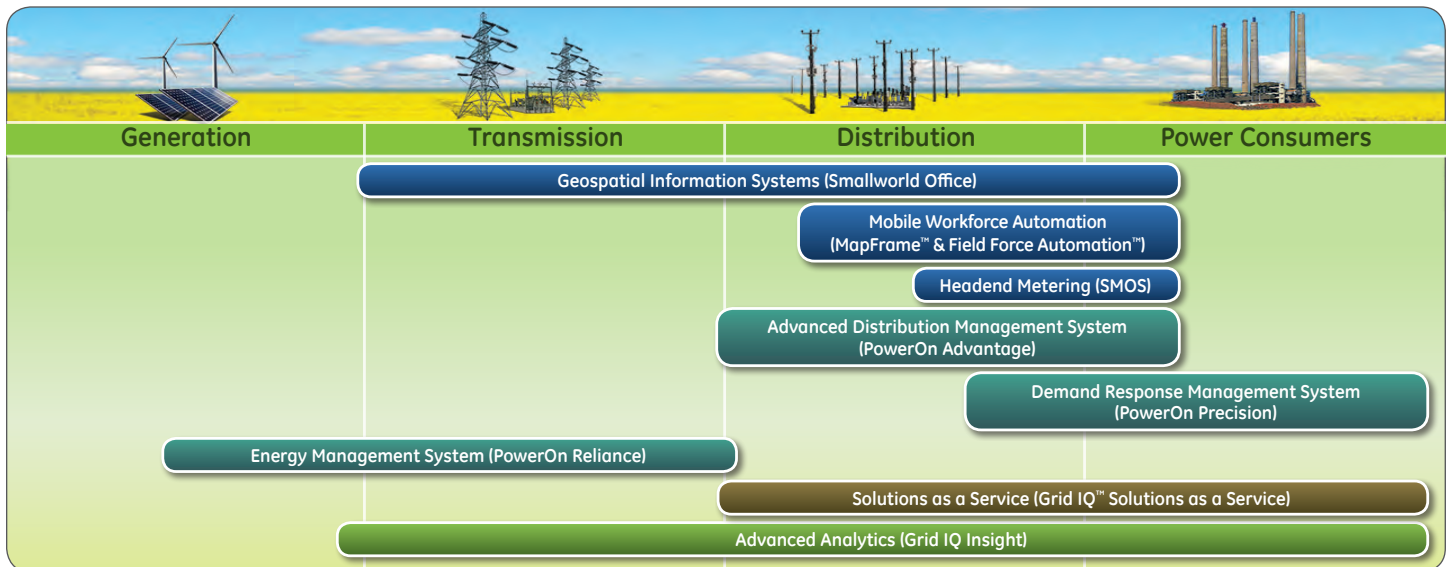
Solutions as a Service

Hosted services to shift integration, financial and deployment risks



Advanced Analytics

A flexible, real-time, scalable platform that enables utilities to put big data into action



For more information about Advanced Analytics visit
GEDigitalEnergy.com/Analytics

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 youtube.com/gedigitalenergy





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