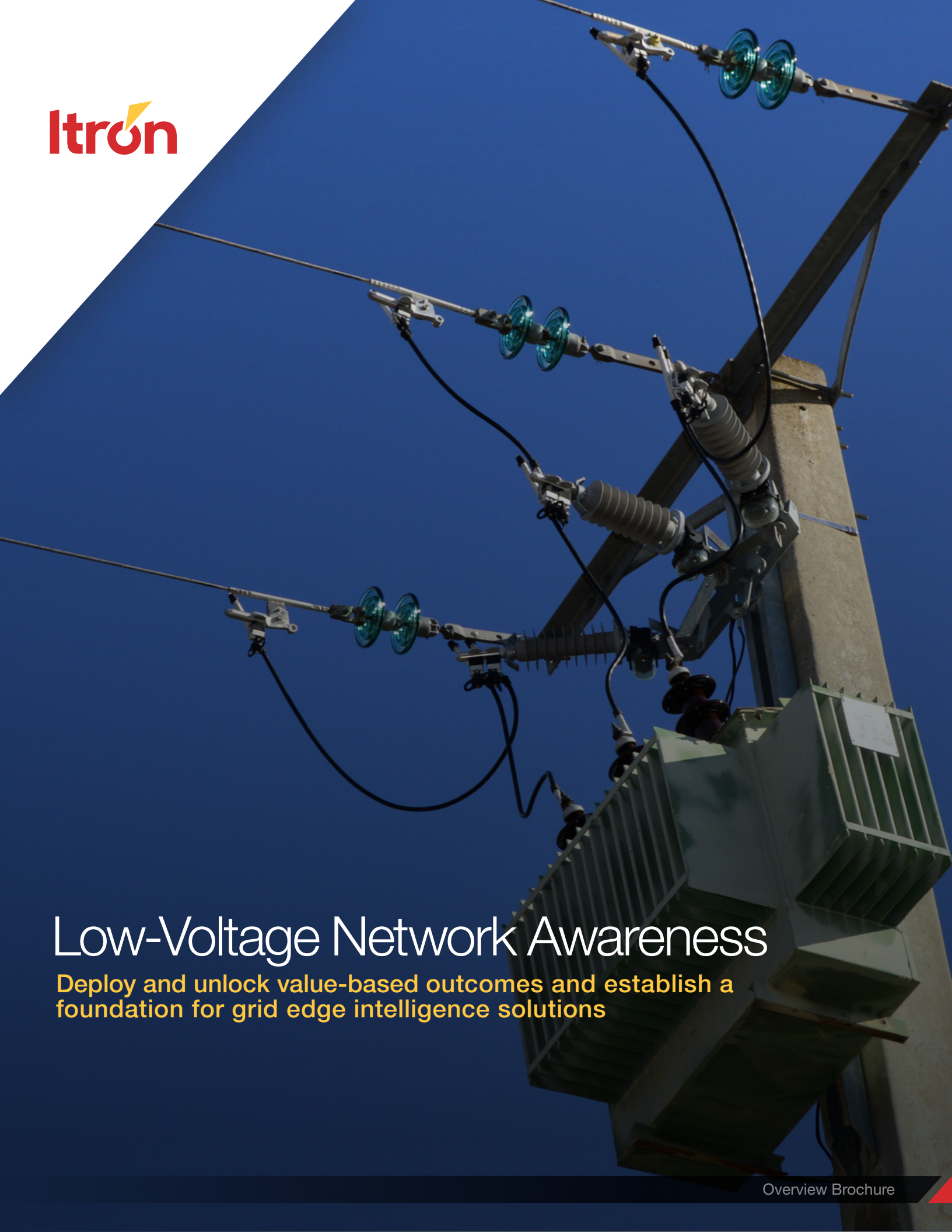
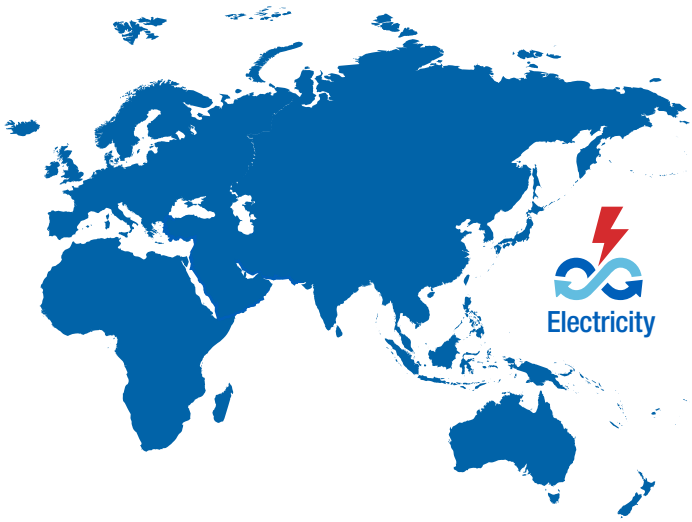
Itron



Low-Voltage Network Awareness

Deploy and unlock value-based outcomes and establish a foundation for grid edge intelligence solutions

Overview Brochure



As utilities move toward climate adaptation and sustainability, managing distribution system assets becomes critical to address energy challenges arising from population growth, the increase on energy demand, extreme weather conditions and the influx of new distributed energy resources (DERs) connected to the distribution system. Utilities need a unified, highly reliable system that provides a strong foundation to deploy grid operations and management solutions.

Itron's Low-Voltage Network Awareness (LVNA) solution, part of the Grid Edge Intelligence portfolio, helps you manage your distribution system capacity and reliability, and sets a strong foundation to meet new industry challenges. We provide an integrated solution that is designed to address grid capacity and reliability challenges, minimise losses and integrate to deliver an easy path forward to adopt new industry energy models necessitated by the energy transition. With Itron, you will benefit from a strong, well-known, worldwide platform that enables high data quality and granularity, high-performance data collection, data unification, management and advanced grid edge analysis. This easily enables you to adopt key applications that address your current challenges by enhancing LVNA with solutions like forecasting, demand response planning and DER management.

The Value of Low-Voltage Network Awareness

Low-Voltage Network Awareness provides multiple benefits for utilities. It plays a crucial role in ensuring the effective and efficient operation of power distribution networks. LVNA offers value that is multi-faceted:

1) **Economic:** Proper asset management can lead to cost savings. Predictive maintenance, for example, can identify potential issues before they cause significant damage, preventing costly replacements or repairs. Optimized replacement scheduling based on the transformer's condition, instead of its age, can further save costs. This also ensures that investments are directed toward the transformers that need it most.

2) **Operational Efficiency:** With effective asset management, organizations can maximize the use of their low-voltage (LV) assets, thereby increasing operational efficiency. This includes load management to prevent overloading of LV cables and transformers combined with condition monitoring to keep them operating at optimal levels.

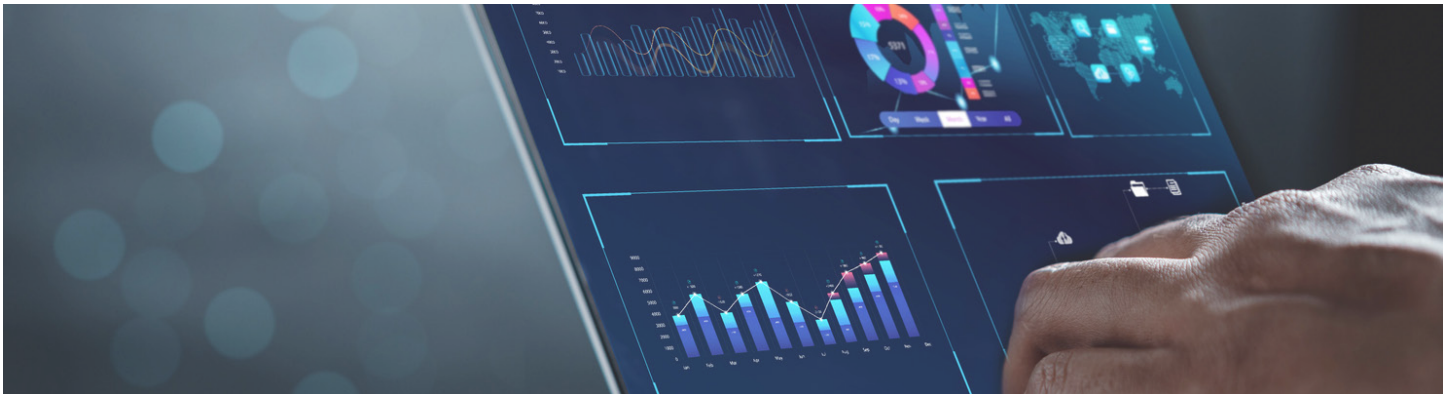
3) **Reliability and Quality of Service**: By effectively managing low-voltage assets, utilities can maintain a high level of reliability and quality of service. This is particularly important because power distribution networks are critical infrastructure, and any downtime can have significant impacts.

4) **Risk Management**: Effective asset management can help identify and manage risks associated with the LV network. This can include risks related to aging infrastructure, changing load patterns, regulatory compliance and environmental impacts.

5) **Sustainability**: Asset management can help in making decisions that consider the long-term sustainability of the distribution network. This includes considerations around energy efficiency, renewable energy integration and greenhouse gas emissions.

6) **Data-Driven Decisions**: Utilizing data gathered from the LV network, asset managers can make more informed decisions about operations, network planning and replacement strategies. This can greatly improve the overall efficiency and effectiveness of the distribution network.

7) **Regulatory Compliance**: Effective low-voltage asset management also ensures that utilities are compliant with regulatory standards and guidelines, thereby avoiding potential fines and penalties.



In summary, the value of Low-Voltage Network Awareness is multi-faceted, contributing to improved service reliability, cost savings, risk mitigation and sustainability. Beyond that, Itron's solutions establish a scalable, common and unified platform which enables:

» Leveraging different Itron and non-Itron data sources
» Ingesting data easily from third-party systems
» Unifying data to get enhanced analytics (LV feeder and transformer monitoring, AMI data aggregation)
» Preparing for the future (through native integration with the different components of the Itron Grid Edge Intelligence portfolio)

CAPABILITIES

Provides low-voltage network load visibility down to the LV feeder level and enables improved capacity planning.

» Acquire transformer/LV feeder loading reports
» Detect evolving transformer/LV Feeder overload
» Detect transformers/LV Feeders with unbalanced loading across phases
» Identify LV network with reverse power flow on one or more
» phases

Improves transformer reliability, helping to reduce outages and faults. Tracks key KPIs (CAIDI, SAIDI, SAIFI).

- Detect transformer winding short
- Detect transformer floating neutral
- Detect transformers that are overloaded or where the core is saturated using voltage data
- Detect transformers where load decreases to near zero for one or more phases
- Detect loss of one phase to transformer primary winding
- Monitor LV network voltages
  - Detect low voltages, determining if they are local to a transformer or LV feeder section
  - Detect high voltages
  - Detect transformers with unbalanced voltages

Enables improving resources and asset management (e.g., optimization of the asset lifespan).

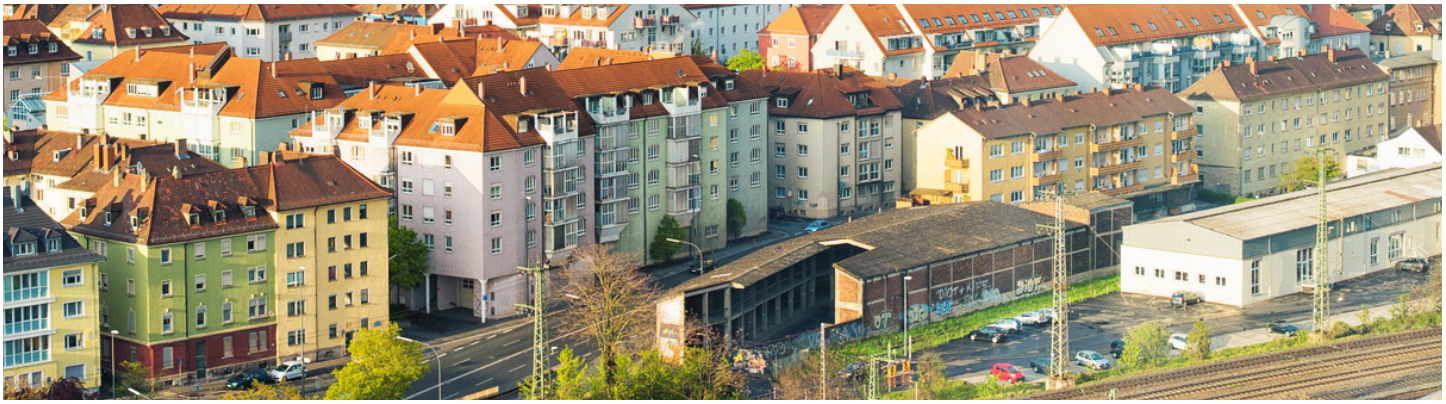
- Provide visibility on transformer aging
- Help pinpoint issues in field and reduce field operational drain
- Reduce faults and stress on assets extending their lifetime

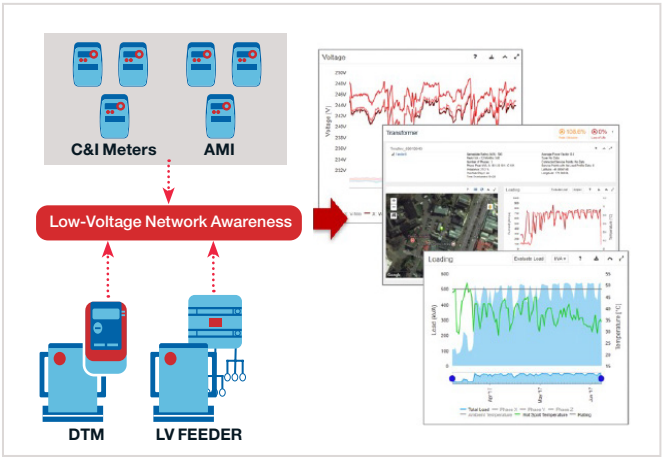
Helps minimize losses.

- Reduce technical losses derived from load imbalances and overloads
- Bring revenue assurance use cases and energy balance (optional) in combination with AMI data
- Pinpoint where high incidence of theft occurs with transformer/LV load balancing
- Pinpoint specific service point location to investigate with theft investigation and AMI data
- Show geo-spatially where theft is occurring
- Reduce and eliminate unbilled energy consumption

The Itron solution provides a strong foundation to combine distribution transformer and LV Feeder monitoring data with AMI data to deploy additional use cases like:

- Mapping grid connectivity:
  - Meter-to-transformer/LV Feeder ID visibility
  - Meter phase-to-transformer/LV Feeder mapping
- Providing visibility at the LV system level, identifying potential issues at the LV-line level
- Detecting EV/PV





LVNA Architecture with Aggregated AMI Data

SOLUTION ELEMENTS

Low-Voltage Network Awareness is a fully integrated, end-to-end solution that ingests AMI, LV Feeder and distribution transformer devices data from Itron and third-party systems. Itron's LVNA end-to-end solution provides a full stack with Itron's distribution transformer monitoring devices, third-party low-voltage feeder monitoring as well as connectivity and data collection services that enable the key use cases around LV asset management and LV system capacity planning.

This versatile solution provides a modular suite of market-leading data analytics applications that help maximize the benefits and full potential of low-voltage data sources. The platform supports a wide range of use cases, including revenue assurance, AMI operations, network operations, load research and distribution planning, among others. It also supports electricity, gas and water services, and all meter-reading technologies.

Our LV network monitoring solution provides capabilities and LV visibility based on the source of data.

Distribution Transformer Awareness with Transformer Load Management

This module monitors and analyzes distribution transformer loading levels and accurately reports on asset health using a distribution transformer monitoring device. This provides a complete view of the load details for a particular transformer to identify over-utilized, under-utilized and at-risk transformers, assess unanticipated load increases that may result in asset failure, use-loading history and peak seasonal loads to evaluate transformer sizing. It provides information about imbalances and voltage and power quality.

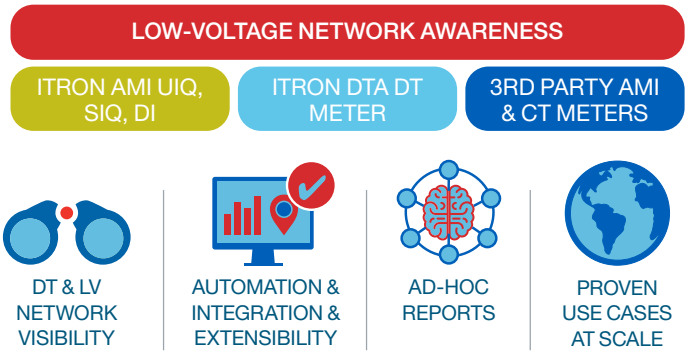
Low-Voltage Feeder Awareness

Our solution supports a wide range of use cases supporting asset management of the LV network beyond the transformer. Data can be imported from LV feeder monitoring solutions to help support use cases such as network planning, fault analysis, power quality monitoring and management of losses.

AMI Data Aggregation

Our solution also allows you to aggregate and analyze metering loads across the distribution system to identify asset risks and connectivity mismatches, support load planning and estimate technical losses. With AMI data aggregation, the system can deliver additional use cases beyond distribution transformer asset visibility. The platform helps determine correct meter-to- transformer relationships and directly improves outage identification and related restoration times. The system also calculates peak coincident loading to identify under- or over-loaded transformers, and it helps anticipate transformer loss of life and asset failures to proactively identify and prioritize the reallocation, servicing or replacement of these assets.

By using our solution, you will benefit by combining sensor data at the LV substation level with AMI data aggregation to provide full visibility at the low-voltage system level.



Single Pane for Back-office Analytics (Grid Operations, Distribution Transformer Awareness, Revenue Awareness)

Low-Voltage Sensors

Itron provides a Distribution Transformer Monitoring solution and collaborates with a range of partners to provide low-voltage feeder monitoring solutions. These allow visibility of not only your transformer loading, but disaggregated analysis of individual LV circuits by phase. This increased granularity, combined with Itron analytics creates a platform for informed decision making for your LV assets.

OUTAGE-FREE INSTALLATION

Installation of sensor solutions can be done in less than 30 minutes without disrupting services for the end customer.

Loss Reduction

Low-voltage sensor solutions can support loss reduction for both technical and non-technical loss aspects. Identification of high neutral currents and phase imbalances can easily be identified. Using substation-based monitoring combined with AMI data, Itron's advanced platform can deliver accurate loss assessment through balanced metering, along with a wide range of meter-based analytics to identify specific energy theft patterns

Network Planning

The Itron LVNA solution provides the most accurate, most up-to-date visibility of the LV network, allowing informed decisions to be taken when it comes to planning the LV network. Increasing loads due to new connections, installations of EV charging stations and PV Solar generation can all be planned with confidence.

Fault Management

Keeping electricity flowing to customers is often the number one priority for any utility, so being informed in real time of where faults are and who they are affecting is key to restoring supplies.

Power Quality

With customers installation of EVs, PVs and other Distributed Energy Resources, the stress on the LV network has never been greater. Itron's LV sensor solutions allow monitoring of key power quality aspects such as high/low voltages, sags, swells and total harmonic distortion.

Deployment and Support Services

Our experienced Global Delivery Services (GDS) teams provide the necessary services needed to help you meet your challenges when deploying grid edge intelligence solutions. They provide support with field surveys, design, roll-out planning, options for best technology selection, interoperability, back-end deployment, integration support, field deployment support, testing, training, security implementation and testing, ongoing operations, service level and technology longevity, firmware upgrades and warranty.

Our GDS team also utilizes a strategic, phased approach and provides support by identifying, understanding and prioritizing which use cases will deliver the most impact and value to your operations, as well as maximize your return on investment.

GAIN INSIGHTS & UNLOCK VALUE

Itron's Low-Voltage Network Awareness solutions improve operational efficiency and increase the reliability of service to your customers. The solution's extensive capabilities not only help you achieve your goals, but most importantly, reduce your costs—ultimately contributing to your bottom line.

Contact your Itron sales representative for more information.

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