



Securing the Last Mile: Distribution Visibility for Grid Stability

The last mile is rapidly changing, and accurate visibility is becoming essential for building a resilient, future ready distribution system.



The electric grid is experiencing unprecedented change. Electrification, distributed energy resources (DERs), inverter based technologies, and customer driven load growth are reshaping how power moves across distribution systems. Yet amid all the attention placed on substations, feeders, and high voltage assets, the distribution network, where customers connect and where many of these changes originate, has historically remained a blind spot. The growing need to secure the last mile is pushing utilities to rethink visibility at the distribution transformer level and beyond.

Understanding the Role of Distribution Visibility

Distribution visibility is a methodology that uses field deployed sensors and integrated analytics to monitor voltage, loading, harmonics, power quality, and disturbances in real time. Modern low voltage platforms install quickly on distribution transformers, communicate through cellular or LoRaWAN, and send data directly into cloud based analytics systems. The intent is straightforward: allow utilities to understand what is happening between the substation and the meter, where new loads, reverse flows, and equipment behavior can be difficult to predict.

This visibility is increasingly important because utilities start from vastly different technological baselines. Some have advanced metering infrastructure (AMI) capable of delivering granular interval data; others still rely on manual or AMR meter reading. Even with AMI, the operational data needed for planning, protection and asset health often resides deep within IT and customer information environments, making it difficult to access or contextualize. Low voltage sensors provide an operational shortcut, capturing the measurements that matter most for grid planning, operations and reliability without overhauling existing systems.

Outage Management

One of the strongest use cases for distribution monitoring is outage management. When transformers are equipped with sensors that continue reporting even during loss of grid power, utilities can instantly identify fault locations, isolate trouble spots, and reduce truck rolls spent searching for failed components. For utilities without AMI, this level of response represents a transformative improvement in customer restoration speed.

Asset Management

Once treated as low cost, long life commodities, distribution transformers are now exposed to stresses they were never designed for. Electric vehicles, rooftop solar, battery storage, and modern electronics introduce harmonic distortion, bidirectional flows, and unpredictable loading patterns. International field data now suggests that these conditions can significantly shorten transformer life, in some cases reducing expected lifespan by 30 years. With ongoing supply chain challenges, losing transformers prematurely creates both operational and financial risk. Low voltage visibility gives utilities the ability to detect abnormal heating, imbalances or harmonic activity before failures occur, enabling planned replacements rather than emergency outages.

Distributed Energy Resources (DERs)

DER integration may be the most compelling catalyst for distribution monitoring. High solar penetration has already demonstrated the challenges that arise when large numbers of systems push power back through aging distribution equipment. EV charging introduces large, fast changing loads that can overload transformers overnight, with customers often installing chargers without notifying utilities. Heat pumps are expected to amplify winter peaks in many regions, further complicating load forecasting. Without real time insight into the distribution transformer, utilities must rely on assumptions that can lead to over building or missed risks. Field level monitoring has already enabled significant cost avoidance in planning projects by revealing actual hosting capacity and allowing utilities to optimize or right size upgrades.

Grid Modernization

Beyond immediate operational benefits, distribution visibility supports long term grid modernization. The data improves phase balancing, informs feeder reconfiguration, enhances voltage optimization, and supports non wires alternatives, especially in areas where managed charging or distributed storage can be orchestrated to mitigate overloads. It also strengthens the evidence base for capital planning and investment filings, providing the quantifiable insights needed to justify upgrades in a regulatory landscape increasingly focused on cost effectiveness and customer value.

As electrification accelerates, the distribution system's last mile will only grow in complexity. Distribution visibility offers a practical, scalable way to navigate this complexity, illuminating what was once unseen and enabling smarter, faster and more resilient grid decisions.

Edge Zero is Helping Utilities Secure the Last Mile

Interested in learning how low-voltage visibility solutions can transform your operations? During our recent webinar, Securing the Last Mile: LV Visibility for a Resilient Grid, experts from Wesco and Edge Zero discussed how utilities can strengthen grid performance through distribution visibility. Through real world use cases, the presenters demonstrated how affordable, easily deployed sensors provide real time transformer loading, harmonics, outage detection, and asset health indicators. Watch now to learn how Edge Zero's platform delivers actionable insights that enhance outage response, asset health, and grid planning.

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