Meeting the Moment:

How Real-Time Monitoring Helps Utilities Improve Reliability, Reduce Risk, and Protect Communities

ubicquia | UTILITY DIVE

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Precipitous load growth, aging infrastructure, and distributed energy resources all underpinned by an increasingly unpredictable climate — the challenges facing utilities today are more complicated than possibly any other time in modern history. But the task of providing safe, reliable and affordable power is also more important than ever, precisely because of these conditions. Modern life and our economies need more electricity, and increased digitalization, advanced analytics, and real-time insights are critical to delivering the quality of power that customers demand at prices they can afford.

How can utilities respond? A crucial first step is to improve their visibility into grid conditions because, quite simply, you can't manage what you can't see. The proliferation of potential data points from today's grids means that a holistic, integrated view is not a nice-to-have, it's a necessity. That data must also be usable and provide quality insights, or else it's just data for data's sake.

For utilities to balance their many competing priorities and converging challenges, they need to begin with real-time monitoring to gain visibility into their customers, assets and grids. By monitoring distribution transformers and other key assets — not at 15-minute intervals but in real time — utilities can improve power quality and reliability. They can also mitigate risks by addressing issues before they escalate to the point of outages, and they can recover faster when outages occur or extreme weather events strike.

Let's explore how holistic monitoring solutions make the difference in today's conditions:

> With the right solutions, any utility, regardless of size, can take a data-driven approach to improving their operations. It starts with an ecosystem of rich, high-resolution data and then applying both AI-driven analysis and human expertise to use that data to meet genuine business needs."

Sam Holden

Director of Data Science with Ubicquia

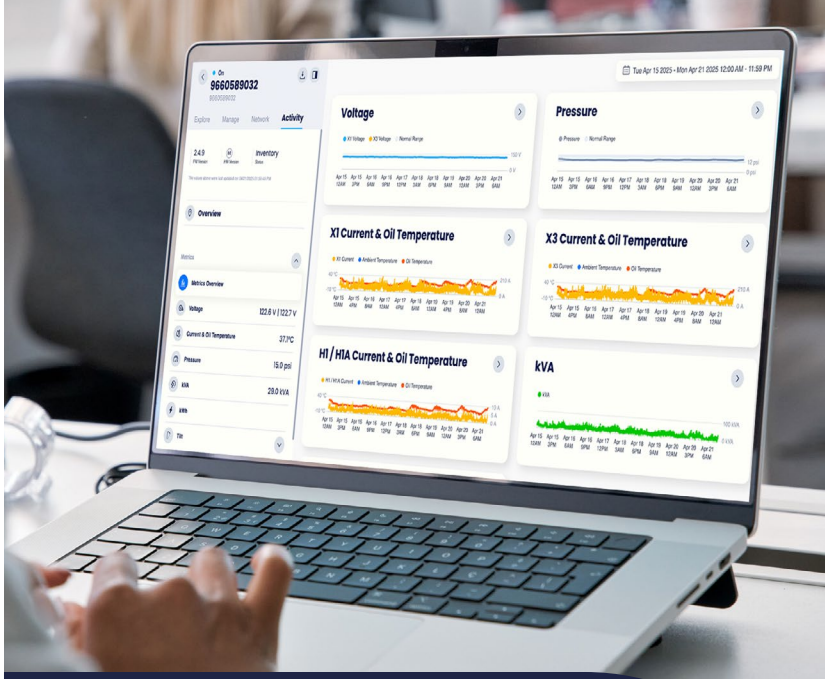
The core responsibility: **reliability**

The growth of electrification means there are ever-greater demands on grids. At the same time, those grids are increasingly bi-directional due to distributed energy resources (DERs), which increases the complexity of ensuring power quality and handling peaks and troughs.

The proliferation of smart meters is of course helpful in eliminating O&M from meter-to-cash operations. Smart meters, however, can't measure key aspects of transformers, the grid, or other assets, and they rely on overburdened mesh communication networks and suffer from high latency. As a result, it's important that utilities augment their smart meter data with high-resolution, granular data from additional sensors.

This is where a solution like Ubicquia's UbiGrid Distribution Transformer Monitor (DTM+) combined with the UbiVu AI-driven asset management platform provides the necessary visibility. DTM+ captures real-time voltage and current data sampled 7,800 times per second to monitor distribution power in real time. This sensor network also monitors the physical state of transformers, including oil temperature and pressure. This data is then processed to identify signs of potential failures, faults or power quality issues, and notifications are sent immediately via UbiVu's dashboard.

DTM+ transmits data over LTE networks, which ensures reliable connectivity even in remote locations. This allows utilities to monitor transformers even when they're far from other parts of the network, leveraging the most robust and secure communications available across the world.



Combining signatures in current and voltage with physical characteristics provides a great view for asset management — a type of insight that hasn't been available on the distribution side until now."

Sam Holden

Director of Data Science with Ubicquia

Ubicquia's industry experts combine their knowledge with the platform's quick machine learning-based capabilities to identify potential problems weeks in advance before they result in an outage or equipment failure. Utilities can implement preventive maintenance and stop outages before they happen, and since these data insights pinpoint individual transformers, it can save on costly truck rolls to locate an issue.

"By packaging state-of-the-art machine learning capabilities with subject matter expertise, this system builds up utilities' internal capabilities and provides actionable, data-driven insights for any size utility," Holden adds.

This proactive approach improves reliability scores like SAIDI and SAIFI, as well as customer satisfaction metrics like Net Promoter Score (NPS) and Customer Satisfaction Score (CSAT). It also optimizes OpEx, whether through savings such as truck rolls and maintenance hours or by extending the life of assets and thereby shifting OpEx to CapEx.

Visibility at this level is particularly valuable with commercial & industrial (C&I) customers who may have power quality issues that propagate to other customers or parts of the grid.

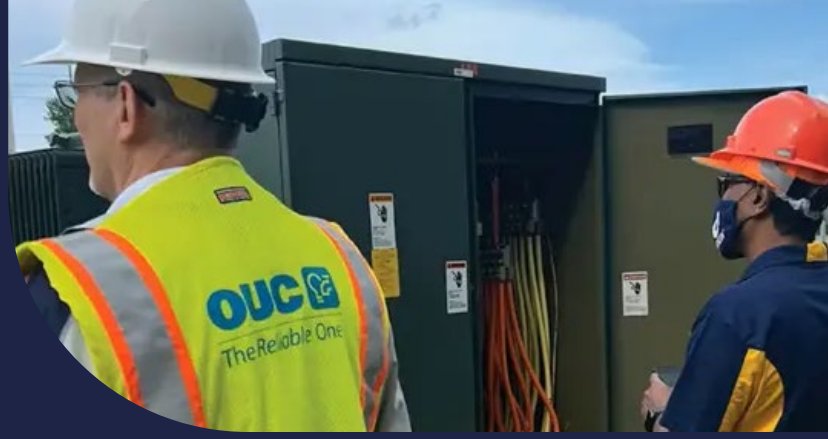
Power quality event identification, triangulation of location and establishment of cause — these elements give you visibility and insights to know exactly what's happening. With these insights, utilities improve complaint resolution and save money on diagnostics and maintenance."

Sam Holden

Director of Data Science with Ubicquia

Case Study

Better power quality and reliability: **Orlando Utilities Commission**



Power quality is vital for C&I customers, and the Orlando Utiilties Commission (OUC) is proud of its track record providing reliable power to over 400,000 metered customers, including 32,000 C&I customers. Located in the Orlando/Orange County and St. Cloud/Osceola County area in Florida, OUC serves large-scale manufacturers, healthcare facilities, an international airport and more.

One of these C&I customers, a large manufacturing plant, utilized a well-designed system of three dedicated underground feeders and 10 three-phase transformers. This system withstood multiple hurricanes and tropical storms that hit the region. But in 2022, the facility began experiencing outages and low voltage events with no apparent cause, which resulted in three blown transformers.

The meters connected to the transformers only provided data in 15-minute intervals, and OUC engineers knew they needed more granular information. They didn't have the visibility to pinpoint which transformers were being overloaded and why. A site visit by OUC staff revealed that the manufacturing customer had installed an 800-horsepower compressor and an entire process line wired to a fully loaded transformer. The compressor brought the transformer above its current rating and caused bayonet fuses to blow.

At this point, OUC installed UbiGrid DTM+ sensors along with the UbiVu AI-driven asset management platform on the three overloaded transformers. This allowed the utility to immediately see the customer's load profile and any current spikes. OUC could also detect sags and harmonics and address them before an outage occurred or a transformer was damaged.

Not only did this new visibility prevent outages, but it also allowed OUC to quickly remediate one that did occur. An outage over the holiday season in late 2023 was diagnosed remotely by OUC staff, who identified the exact transformer and circuit affected. A field technician was dispatched to the site and quickly fixed the bayonet fuse, saving time for the utility and restarting power faster for the customer.

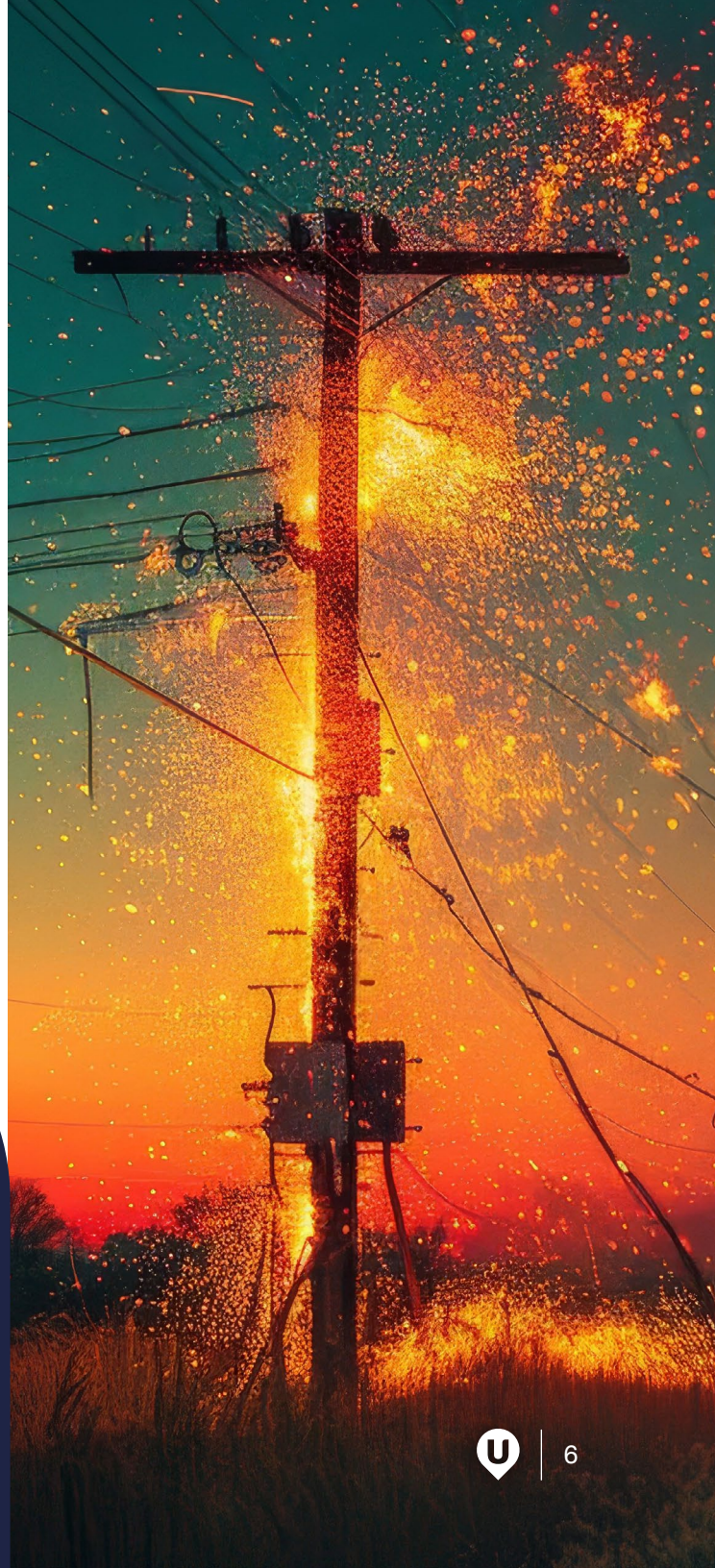
OUC avoided unnecessary truck rolls and man-hours to locate the problem, and the customer could restart their operations faster. Thanks to Ubicquia's DTM+ and AI-powered solutions, the utility provided outstanding service, and their customer maintained critical business operations.

Preparedness and public safety: **key improvements through visibility**

Visibility and proactive maintenance have benefits beyond individual customers — they support better service for all customers and the communities that utilities are a part of.

For example, fire risks are a significant issue as climatic conditions and development combine to increase those risks. Real-time monitoring, along with advanced analytics, can identify the types of faults that create a greater fire risk. This visibility guides utilities' maintenance and emergency management efforts, whether addressing a high-risk fault immediately or knowing exactly which spans to cut power from when fire conditions are at their worst.

"Not all faults are created equal," Holden says. Phase-to-phase faults have an extremely high potential for sparks, and monitoring solutions can differentiate these high-risk faults from other issues.



Power quality data combined with weather and fire risk data produces a targeted, localized map of events at risk of starting a fire. This real-time information provides true fire protection."

Sam Holden
Director of Data Science with Ubicquia

Improving reliability and safety

Visibility into faults and infrastructure integrity means utilities aren't sending staff into uncertain conditions. Knowing where damaged poles are, or anticipating oil leaks from a transformer before they start, can prepare staff to bring the proper equipment and take the right safety precautions when they go out into the field. Power quality monitoring also manages risks from DERs, such as solar panels discharging power back to the grid, so utility staff have the information they need to be safe when conducting repairs. With real-time monitoring solutions, utilities keep their employees — and their entire communities — better protected.

Monitoring also prevents vegetation-based outages before they occur. With solutions like DTM+, utilities can identify the location of faults associated with different types of vegetation. This supports condition-based trimming schedules rather than static, time-based schedules, which aren't responsive to growth conditions or the locations of spans at the highest risk of an outage.

Ubicquia layers together the time series of power quality events with weather data so utilities can better understand where and when high winds and precipitation drive branches and vegetation into power lines. "That's a powerful signal to send maintenance crews to trim that vegetation before it causes a full-blown outage," Holden says.

Optimizing vegetation management saves time and OpEx costs and results in better reliability. This type of monitoring can even be extended to assets like electricity poles to further improve emergency management in storms and dark sky scenarios. Ubicquia's TVM pole tilt/impact monitoring solution, for example, alerts utilities to leaning or damaged poles to assist in post-storm restoration when there normally wouldn't be visibility into real-time conditions.

Visibility today means **better operations tomorrow**

The challenges facing utilities today are extensive, but the growth of monitoring technology and AI-driven solutions is providing them with better tools to handle this level of complexity. By building a solid foundation of data combined with cutting-edge analytical tools and industry expertise, utilities can leverage Ubicquia's Actionable Insights to stay ahead of power quality challenges and provide better reliability for their customers.

At the same time, they can optimize their OpEx budgets and make their resources go further. With solutions like Ubicquia's, utilities can stretch their budgets and build resiliency.

By holistically monitoring customers, assets and their grids, utilities can overcome climate and infrastructure challenges while providing the reliable power supplies that our world depends on. The industry may be facing difficult conditions, but technological solutions are available to meet this moment and provide better grid resiliency.

Contact Ubicquia to learn more about monitoring solutions for your grid.

> The DTM+ is an affordable solution that provides any utility with truly actionable insights that are greater than the sum of their parts."
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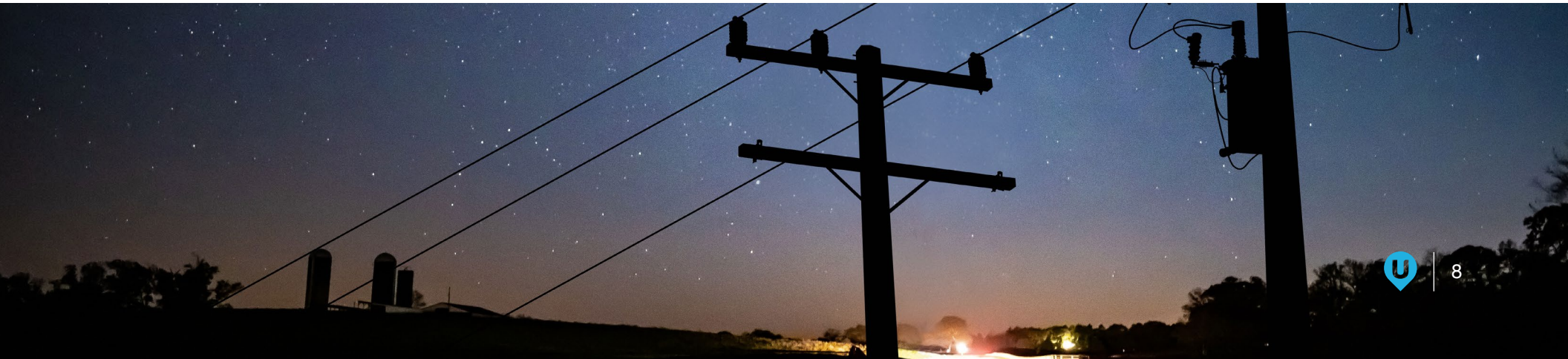
> ***Sam Holden***
> Director of Data Science with Ubicquia



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