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SUBSTATION SOLUTIONS: DESIGN, AUTOMATION & MONITORING

Mark Paul: Designing Substations for Safety and Maintainability

Power Panel Discussion: Testing & Inspection Solutions for Electrical Equipment

Lee McClish: A Renewed Focus on Electrical System Maintenance



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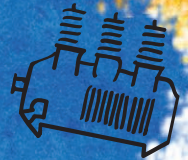
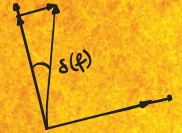


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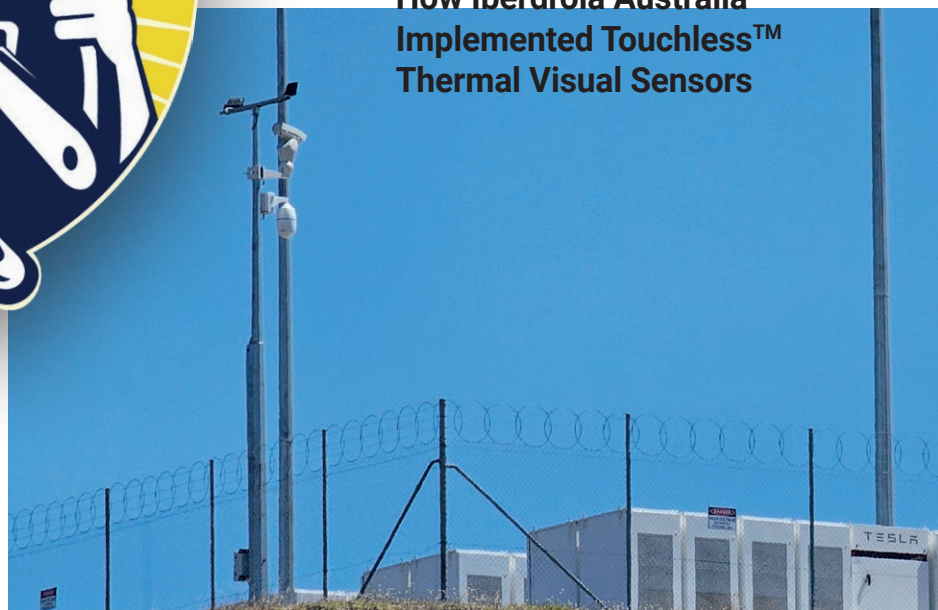
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POWER SYSTEMS TECHNOLOGY

TRANSFORMER TECHNOLOGY ^{MAG}

Publisher:

APC MEDIA LLC
2152 Caper Dr.
Marietta, GA 30064, USA
transformer-technology.com

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BE Koncept Communication Boutique

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ISSN 2642-2689 (Print)
ISSN 2642-2697 (Online)

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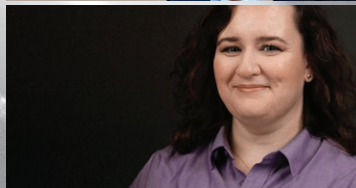
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Resilience of the Electrical Power System in the US and Europe



As a reliability SME for much of my career, I have seen reliability and resilience be used together more often. From my perspective reliability is making sure the lights stay on and resilience makes sure they recover from any disruption or challenges. While that is a little too simplistic, it gets the point across.

Resilience of electrical power systems is a critical concern for any power system provider but given the increasing frequency of extreme weather events, cyber threats, and the transition towards renewable energy sources, while similar in both the US and EU, there are some key differences. Resilience, in this context, refers to the ability of power systems to withstand, adapt to, and recover from disruptions.

Resilience Challenges in the US

One of the primary concerns in the US is the aging infrastructure. Many components of the US grid, including transformers and transmission lines, are decades old and susceptible to failure. Additionally, the US experiences a high frequency of natural disasters, such as hurricanes, wildfires, and floods, which can cause significant damage to power infrastructure. For instance, Hurricane Maria in 2017 devastated Puerto Rico's power grid, leaving millions without electricity for months.

Cybersecurity is another critical challenge. The US power grid is increasingly reliant on digital technologies, making it vulnerable to cyberattacks. The 2021 Colonial Pipeline cyberattack highlighted the potential for cyber threats to disrupt critical infrastructure, including power systems.

Resilience Strategies in the US

To address these challenges, the US has implemented several strategies to enhance power system resilience. The modernization of grid infrastructure is a key focus, with investments in smart grid technologies that improve monitoring and control capabilities.



The modernization of grid infrastructure is a key focus, with investments in smart grid technologies that improve monitoring and control capabilities.

The US Department of Energy (DOE) has also launched initiatives to enhance cybersecurity, such as the Cybersecurity for Energy Delivery Systems (CEDDS) program. Additionally, the integration of distributed energy resources (DERs), such as wind, solar and battery storage, is being promoted to increase grid flexibility and reduce reliance on centralized power plants.

Microgrids, which can operate independently from the main grid, are also being developed to provide localized resilience during outages.

Resilience Challenges in Europe

Europe faces similar resilience challenges, albeit with some regional variations. The continent's power system is highly interconnected, which can be both a strength and a vulnerability. While interconnectivity allows for efficient energy distribution, it also means that disruptions in one

area can have cascading effects across multiple countries.

Europe is also grappling with the transition to renewable energy sources, which, while essential for reducing carbon emissions, introduces variability and unpredictability into the power supply. The increasing frequency of extreme weather events, such as heatwaves and storms, further exacerbates these challenges.

Resilience Strategies in Europe

European countries have adopted a range of strategies to enhance power system resilience. The EU has established regulatory frameworks, such as the Clean Energy for All Europeans package, to promote grid modernization and the integration of renewable energy.

Investments in interconnectors, which link national grids, are being made to improve cross-border electricity flows and enhance system stability. Europe is also a leader in the development of offshore wind farms, which provide a reliable and renewable energy source. Additionally, the EU is investing in research and innovation to improve energy storage technologies, which are crucial for balancing supply and demand in a renewable-heavy grid.



Investments in interconnectors, which link national grids, are being made to improve cross-border electricity flows and enhance system stability.

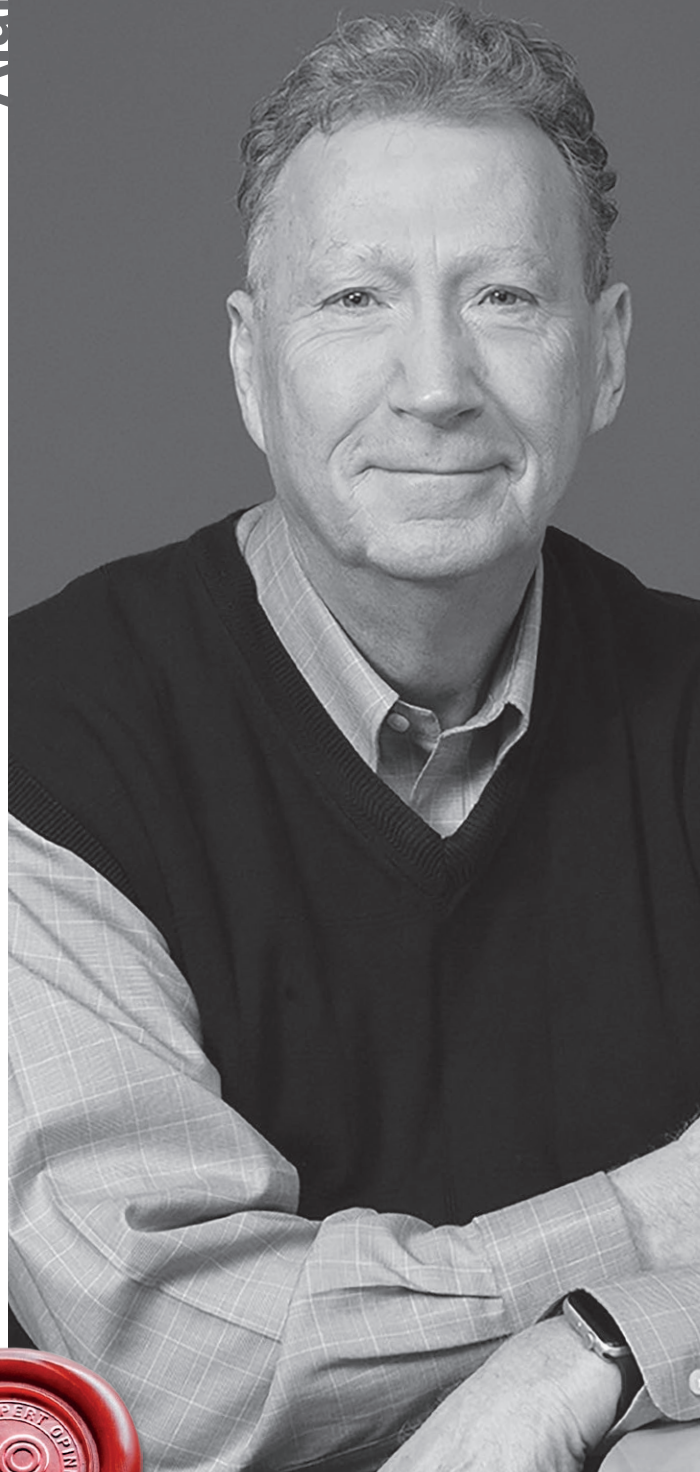
The resilience of electrical power systems in the US and Europe is of paramount importance in the face of evolving challenges. Both regions are making significant strides in modernizing their grids, enhancing cybersecurity, and integrating renewable energy sources.

However, continued investment and innovation are necessary to ensure that power systems can withstand and recover from future disruptions. By learning from each other's experiences and collaborating on technological advancements, the US and Europe can build more resilient power systems that support sustainable and secure energy futures.

Alan M Ross

CRL, CMRP
Managing Editor
APC Media
Technical Director

Alan has decades of experience in the power systems industry and is one of the greatest reliability experts out there.



Designing Substations for Safety and Maintainability

by **Mark Paul**

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INTEGRATING INSPECTION ACCESS FROM DAY ONE

Modern substations are evolving. Once seen purely as physical nodes for power transformation and distribution, they are now considered strategic assets, as centers of operational safety, compliance assurance, and long-term equipment health. As demands on reliability, uptime, and sustainability intensify, the expectations placed on substation infrastructure have changed dramatically. Gone are the days when systems were designed solely for capacity and protection. Today, a substation must support seamless maintenance, real-time inspection, and zero-compromise safety from the very beginning.

Yet, in the design process, one critical factor often remains overlooked: inspection access.

Across utilities and industrial sites alike, operators are under increasing pressure to maintain aging infrastructure while meeting ever-tightening regulatory standards. The shift toward condition-based maintenance, the rise in arc flash safety awareness, and workforce constraints due to skilled labor shortages all contribute to the urgency of a new approach. Within this landscape, integrating inspection access directly into the substation design—from the earliest stages of engineering—offers a powerful and practical way to future-proof performance, simplify compliance, and protect people and assets.





Mark Paul is a "recovering engineer" who loves to help educate people with new ideas and to look at technologies with a different mindset. With a background in controls engineering, corporate sales and leadership development, his career spans several industries including energy management, distribution, and coaching. He is a published author passionate about living a life of "no regrets" and helping others to do the same.

Designing for inspection doesn't require radical innovation or budget-busting upgrades. It simply means embedding practical tools into the infrastructure that make routine maintenance safer, faster, and more accurate. That includes built-in thermal imaging access via infrared (IR) windows, acoustic ports for ultrasound inspection, visual temperature indicators like thermochromic labels, and digital tools that verify and track each inspection event. These aren't complex add-ons—they're straightforward, scalable enhancements that transform how substations are serviced across their full lifecycle.

Designing for inspection...means embedding practical tools into the infrastructure that make routine maintenance safer, faster, and more accurate.

The benefits of this approach extend far beyond the inspection itself. When inspection tools are built into the design, maintenance teams no longer need to open energized equipment or shut down critical systems to collect data.







This dramatically reduces the risk of arc flash or electrical shock, keeps equipment in service, and ensures that inspections are conducted under true operating conditions. That, in turn, improves the accuracy of thermographic scans and acoustic readings, providing earlier warning of failures and more actionable insights.

Designing substations with access in mind removes the common excuse for missed inspections: it's too risky, too disruptive, or too expensive. If thermal and acoustic ports are already in place, inspections can be completed in minutes by qualified technicians without downtime. That shift—from deferred or emergency maintenance to routine, proactive service—can be the difference between a minor repair and a catastrophic failure. Reliability is no longer left to chance or delayed by bureaucracy.

This approach also delivers significant financial advantages. Retrofitting inspection points after installation is always more expensive than incorporating them during the design and construction phases. When IR windows and ultrasound ports are added as part of the initial layout, the labor, engineering, and coordination costs are minimal. Trying to do the same job five years later—often around live equipment and during tightly scheduled outages—requires far more time, money, and risk mitigation. Additionally, avoiding planned or unplanned shutdowns for inspections saves operators countless hours of lost productivity, especially in high-demand sectors such as manufacturing, healthcare, and data centers.

Regulatory compliance is another area where design-integrated inspection pays dividends. Standards like NFPA 70E and 70B, OSHA requirements, and IEC guidelines all point toward safer, more accountable inspection practices. By making it easy to conduct and document closed-panel inspections, built-in access helps facilities maintain detailed records and demonstrate compliance.

It also aligns with the Hierarchy of Controls, moving organizations away from risky administrative and PPE-based solutions and toward elimination and substitution. Essentially providing safer, more reliable strategies by design.

So what does this actually look like in practice? Consider switchgear, one of the most common substation components with high inspection demand. A well-designed lineup will include IR windows positioned to allow thermal imaging access to busbars, breaker contacts, and cable terminations. It might also incorporate ultrasound ports or sensors that allow a technician to detect partial discharge, such as arcing or tracking, without opening the gear. These ports or sensors can be positioned on doors or covers and offer consistent, repeatable acoustic pathways for condition-based monitoring.

Adding thermochromic indicators—color-changing labels and clips that react to elevated temperatures—provides a continuous passive warning system that any operator or inspector can see at a glance.

Similarly, large transformers can benefit from infrared windows strategically placed near high-loss areas like terminal connections or internal tap changers. These windows enable routine scans to detect insulation breakdown or load imbalances long before overheating leads to failure. Adding thermochromic indicators—color-changing labels and clips that react to elevated temperatures—provides a continuous passive warning system that any operator or inspector can see at a glance. By combining active and passive inspection tools, designers give maintenance teams both the detailed data and the everyday visual feedback needed to catch problems early.

In enclosed substations or control buildings, inspection access can be paired with smart layout choices. Designers can avoid placing obstacles between inspection points and panel doors, allow room for thermal camera operation, and position enclosures to allow safe, unobstructed access. Including NFC tags that link to digital inspection records adds another layer of integration—streamlining the connection between the physical infrastructure and the digital asset management system. The result is a site that is not only easier to inspect, but far more likely to stay in compliance over time.

The contrast between retrofitting and designing right from the start couldn't be clearer. A facility that installs gear without built-in access often faces hard choices down the line: risk worker safety by opening energized panels, schedule expensive shutdowns to inspect offline, or pay to retrofit dozens of IR windows and ports under high-stakes conditions. These delays and complications can be avoided entirely by specifying inspection access as part of the equipment procurement or build plan. What's more, original equipment manufacturers increasingly support this model, offering switchgear, transformer, and MCC configurations with access points pre-installed at the factory.

Facilities that embrace design-integrated inspection report fewer unplanned outages, more accurate asset data, and better alignment with maintenance schedules and staffing capabilities.

And this isn't just theory. Facilities that embrace design-integrated inspection report fewer unplanned outages, more accurate asset data, and better alignment with maintenance

schedules and staffing capabilities. In critical power environments—hospitals, water treatment plants, semiconductor factories—the ability to monitor equipment safely and efficiently is no longer a luxury. It's an expectation. Choosing not to design for maintainability is effectively choosing to increase long-term operational risk.

Substations must be designed not just for what they do today, but for how they'll be maintained tomorrow.

At its core, this shift represents more than just a technical upgrade. It reflects a deeper mindset change: a move from reactive maintenance to reliability engineering, and from short-term construction savings to long-term operational efficiency. Designing substations for inspection access is a simple, scalable, and profoundly practical way to future-proof your infrastructure while protecting your people and your power.

As the utility industry continues to face mounting regulatory scrutiny, aging infrastructure, and changing workforce demographics, designing for safety and maintainability isn't just wise... it's necessary. Whether you're building a new facility or modernizing an existing site, integrating inspection access into your blueprint gives you a critical edge. It improves performance. It simplifies compliance. It protects your workers. And it pays for itself many times over across the life of the asset.

Substations must be designed not just for what they do today, but for how they'll be maintained tomorrow. Embedding inspection access from day one transforms substations from vulnerable points of failure into resilient, reliable assets. It's not just better thinking—it's better engineering.



11 Things You Should Know About Infrared Windows

Every open-panel inspection means risk, lost time, and rising costs. Arc flash hazards put technicians in danger, PPE slows the job, and missed checks can leave you out of compliance or facing downtime you can't afford.

Infrared windows change the equation. Keep panels closed, protect your team, and stay audit-ready while completing inspections faster, safer, and with less gear.

Read the Ebook *11 Things You Should Know About Infrared Windows* and see how.



THE TRUTH ABOUT ULTRASOUND AND PARTIAL DISCHARGE

In the world of electrical reliability, assumptions can be costly - and half-truths, even more so.

"Ultrasound can detect partial discharge." It's a claim you've probably heard before. But according to Josh Robinson, it's only part of the truth. In his RED Talk, *The Truth About Ultrasound and Partial Discharge*, Robinson breaks down what that statement really means - and why repeating it without context is a problem for everyone in the field.

"It's not a lie," Robinson says. *"But it's not the whole truth. And that makes us all look bad."*

The episode dives into a persistent misunderstanding in the maintenance and inspection industry: that a single tool can detect every form of partial discharge. But PD isn't a one-size-fits-all phenomenon. There's surface PD - like arcing, tracking, and corona - and there's subsurface PD, the kind of hidden insulation failure that leads to catastrophic equipment blowouts. Only one of those makes a noise that ultrasound can hear.



So what happens when a technician relies on the wrong method - or a sales pitch that oversells its capabilities? What crucial warning signs are being missed?

Robinson uses simple, relatable analogies to make a complex topic click: a garden hose with a hidden pinhole; electrons "dripping" from a wire like a leaky tap.

His delivery is candid, a little irreverent, and deeply informed by hands-on experience. He doesn't pull punches - especially when it comes to the gap between what tools can do and what they're sold to do.

If you work with high-voltage equipment, if you spec out testing programs, or if you've ever had to sit through a product demo and wonder what's real and what's fluff - this is a talk you need to hear.

Robinson also introduces tools many in the industry overlook: TEV sensors, HFCT clamps, UHF blocks for gas-insulated switchgear. He doesn't just point out the problem - he shows the right way to tackle it.

But more than anything, his message is a call for honesty. *"I'd like to see sales guys who lie less,"* he says. *"Because when one person overpromises, it makes the rest of us look like we don't know what we're doing."*





RED Talks features voices who challenge assumptions and move the conversation forward.

Josh Robinson's episode is one of our sharpest yet - raw, practical, and grounded in real-world experience. No marketing gloss. No fluff. Just the kind of clarity that helps keep systems safe and reliable.

Think you already know what ultrasound can do? Watch this first.



**JOSH ROBINSON
ULTRASOUND
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Watch [Josh Robinson's RED Talk](#) now.

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Telecommunications: The Cornerstone of Grid Modernization

by **Kathy Nelson**
+++++

The utility industry is undergoing a significant transformation, with telecommunications emerging as a critical enabler of grid modernization. As electric grids evolve to become smarter, more efficient, and more resilient, the importance of robust, reliable, and versatile telecommunications infrastructure cannot be overstated. This article explores the pivotal role telecommunications play in shaping the electric grids of the future and the paradigm shift occurring in utility telecommunications strategies.

Evolution of Telecommunications in Utilities

Utilities have used private telecommunications networks, both wired and wireless, since the 1960s for communications needs such as field crew communications using Land Mobile Radio (LMR) networks and Supervisory Control and Data Acquisition (SCADA) communications



Kathy Nelson, PE is the Founder and CEO of KN Utility Telecom Consulting, a firm specializing in strategic telecommunications for utilities. She brings over 32 years of experience in utility telecommunications, including a 25-year career at Great River Energy. Kathy served on the Utilities Technology Council Board of Directors for a decade, including as Chairwoman from 2017–2018. Her leadership roles have also included driving IEEE standards development at Ondas Networks and delivering strategic consulting services for utilities at West Monroe Partners prior to launching her own firm. Kathy lives in Minnesota and is the proud mother of three adult children and a spirited sheepadoodle.



for generation and transmission grid monitoring and control.

These narrow-channel, purpose-built networks were designed to meet specific utility needs and served as their communications systems for several decades. As additional utility capabilities increased over time, networks to support use cases such as Automated Meter Reading (AMR) and then Advanced Metering Infrastructure (AMI), Distribution Automation (DA) on distribution feeders, physical security of facilities and a myriad of other use cases emerged resulting in a patchwork of siloed systems. While these purpose-built networks served their purpose for decades, new technologies now offer greater capabilities.

As these purpose-built networks age and approach end of life, coupled with the demands of grid modernization, they are driving a fundamental change in this approach. Modern grids require real-time

data exchange, advanced control systems, and seamless integration of distributed energy resources - all of which depend on sophisticated telecommunications infrastructure.

Modernizing Utility Telecommunications

Utilities are shifting from legacy systems to advanced telecommunications infrastructure, which supports multiple use cases on a single network. Technologies such as private LTE (PLTE) and other wideband solutions are replacing the single-purpose networks of the past. This consolidation improves operational efficiency, provides flexibility, and allows utilities to scale their networks to meet future grid requirements.

The Critical Role of Spectrum Selection

One of the most crucial aspects of implementing modern utility telecommunications networks is the selection

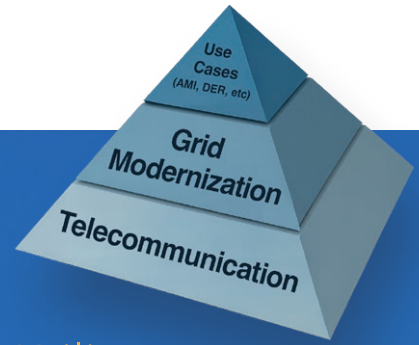
of appropriate radio frequency (RF) spectrum. The choice of spectrum directly impacts the capabilities, performance, coverage, and capacity of the network. Utilities must carefully weigh factors such as propagation characteristics, interference potential, and regulatory constraints when choosing their spectrum.

Low-band spectrum (below 1 GHz) offers excellent coverage and building penetration, making it ideal for wide-area networks in rural areas. Mid-band spectrum (1-6 GHz) provides a balance of coverage and capacity, suitable for suburban and urban deployments. High-band spectrum (above 6 GHz) offers increased capacity but limited range, making it appropriate for specific high-density applications.

The shift to broadband or wideband spectrum marks a significant change for many utilities that are used to operating within licensed narrowband spectrum.

Modern grids require real-time data exchange, advanced control systems, and seamless integration of distributed energy resources - all of which depend on sophisticated telecommunications infrastructure.





Although this transition often requires substantial investment, it offers greater capacity and enables utilities to support multiple use cases on a single telecommunications network.

Educating Stakeholders on Telecommunications Importance

Traditionally, telecommunications expertise within utilities was concentrated in the Information Technology (IT) department, with the Chief Information Officer (CIO) often being the sole executive aware of its importance. As telecommunications become central to utility operations, there is a growing need to educate other C-suite executives and regulators on its critical role.

Utility leaders must recognize that modern telecommunications networks are operational assets that directly impact grid reliability, efficiency, and resilience. Similarly, regulators need to be educated about the importance of these investments to ensure the implementation of appropriate cost recovery mechanisms.

Spectrum acquisition is a critical area for stakeholder education. Narrowband spectrum for purpose-built utility networks is generally low-cost, but modern wideband or broadband systems often require regulatory petitions and detailed technical justifications. In the United States, these licenses are frequently obtained through the secondary market at much higher cost, making clear communication of the investment imperative to both internal and external stakeholders.

Tailored Solutions for Unique Utility Needs

While the trend towards advanced telecommunications networks is clear, it's crucial to recognize that there's no one-size-fits-all solution. Each utility must conduct a thorough

analysis of its unique needs, considering factors such as:

- Geographic service area and terrain
- Device density and distribution
- Existing infrastructure
- Regulatory environment
- Long-term grid modernization goals
- Budget constraints

A solution that works for a large urban utility may not be suitable for a rural cooperative. Some utilities may adopt a hybrid approach, combining private LTE in urban areas with narrowband solutions for remote locations, while others may opt for a fully private solution or partner with commercial carriers.

Challenges and Opportunities

The transition to advanced telecommunications networks presents both challenges and opportunities. One of the primary challenges is keeping pace with rapid technological advancements. Utilities must make informed decisions about which technologies to invest in, balancing the risk of obsolescence with the potential benefits.

Another challenge is integrating new telecommunications systems with existing infrastructure. Many utilities have a mix of legacy systems and modern technology, and ensuring smooth interoperability can be complex and time-consuming.

Despite these challenges, advanced telecommunications networks offer considerable opportunities, including:

- Real-time monitoring and control of distributed energy resources
- Advanced outage management and self-healing grid capabilities
- Enhanced customer engagement platforms
- Improved cybersecurity measures for increasingly connected grids
- Multiple use cases served by one telecommunications network

Utility leaders must recognize that modern telecommunications networks are operational assets that directly impact grid reliability, efficiency, and resilience.



The Future Landscape of Utility Telecommunications

Looking ahead, telecommunications will become fully integrated into every aspect of utility operations. The traditional boundaries between Information Technology (IT) and Operational Technology (OT) will continue to blur, leading to more holistic and efficient grid management systems.

Utilities are likely to build private broadband or wideband networks, either independently or through partnerships. These networks will support not only basic utility operations but also emerging technologies like IoT sensors, edge computing, and augmented reality for field workers.

Collaboration between utilities on telecommunications infrastructure is also expected to increase, with shared networks helping to distribute costs and maximize benefits, especially for smaller utilities with limited resources.

Embracing the Telecommunications Revolution

As the utility industry continues to evolve, telecommunications is no longer just a support function - it's a strategic asset that will play a crucial role in shaping the future of the sector. Utility leadership must elevate telecommunications in their strategic planning, invest in building internal expertise, educate stakeholders about its importance, and make informed, forward-looking decisions about telecommunications infrastructure.

The utilities that successfully navigate this telecommunications revolution will be best positioned to thrive in the era of grid modernization. They will achieve greater efficiency, enhanced resiliency, and improved ability to integrate new technologies and energy sources that are transforming the industry.

In conclusion, embracing this telecommunications revolution is not merely about keeping pace with technology – it's about laying the foundation for reliable, efficient, and sustainable electric grids of the future. As the energy landscape continues to evolve, those utilities that prioritize robust, flexible, and forward-looking telecommunications strategies will be best equipped to meet the challenges and opportunities that lie ahead.



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IS THERE AN ENERGY CRISIS LOOMING?

Introduction

The demand for energy continues to grow at an exponential rate. You only have to look around, we are all connected, from communications to online banking and the surge in AI tools. Daily life is now entwined with digital tools, from new AI tools like Grok and ChatGPT, to communications, online banking, and e-commerce. Our digital dependency fuels the surge in demand for data centres, resulting in energy consumption growing at a rate we have never experienced before.



What is the energy crisis that we are facing?

A recent publication from the US Department of Energy has highlighted that there is a crisis on the horizon due to unprecedented growth in data centres and AI. However, this is not an issue only affecting the U.S.; it's a global issue with energy grids stretched beyond capacity.

What impact will this have on energy in the future?

Rising Risk of Blackouts:

The U.S. Department of Energy warns of up to 800 hours of outages per year by 2030, which equates to a full month of blackouts, if our energy infrastructure fails to adapt.

Transformer Supply Bottlenecks:

For some time now, transformers have been a major supply chain challenge with many utilities reporting lengthy timelines of up to three years. Rising demand is putting greater strain on transformers and driving the need to replace aging units, many of which are now over 40 years old and approaching the end of their lifecycle.

Unprecedented Demand from AI and Electrification:

The most important things to today's civilisation, from social communication, to commerce, banking, electric vehicles and adoption of AI communication, are all consuming significant levels of energy. Demand in the U.S. is predicted to increase by 15% in the next 4 years alone.

Subsequent consequences of failure:

A single large-scale transformer failure can have a huge consequential impact. We only have to remember back to the Heathrow airport incident to see the major financial but also social impact of transformer failure. More recently, in Spain, we have seen the extreme seriousness of failure with a whole nation effectively coming to a standstill. The consequences are not just financial they are also putting safety, public reputation as well as national and global energy security at risk.

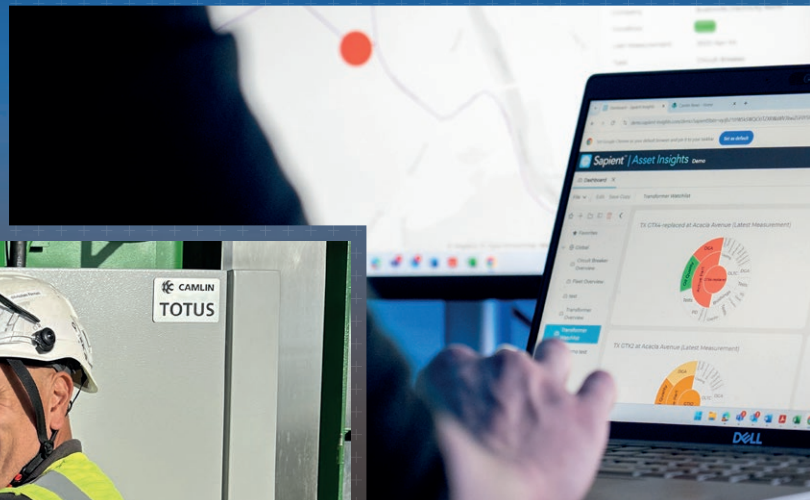


What can we do? Utilities need a Transformer Monitoring Strategy

For many utilities, the major challenge is not from a technical standpoint but rather addressing the widespread strategic risk. Transformer failures are no longer isolated incidents; they are now becoming a major threat that could destabilize the entire grid.

Here's where a robust transformer monitoring strategy, supported by Camlin Energy becomes essential:

- 1. Prevent Catastrophic Failures:** Aging transformers are prone to failure, which can trigger widespread outages. Many failures are easily preventable with advanced knowledge. Real-time monitoring can detect early signs of issues (e.g., insulation degradation, overheating), enabling proactive maintenance to prevent costly disruptions.
- 2. Mitigate Supply Chain Risks:** With replacement lead times stretching years, utilities cannot afford unexpected failures. Monitoring systems help extend transformer lifespan through timely interventions, reducing reliance on scarce replacements.
- 3. Manage Surging Demand:** The rapid growth in energy consumption, especially from AI and electrification, puts transformers under unprecedented stress. Monitoring ensures optimal performance under high loads, preventing over-load-related failures.
- 4. Enhance Grid Resilience:** Advanced monitoring provides data-driven insights into transformer health, enabling utilities to prioritize upgrades, optimize maintenance schedules, and strengthen grid reliability against extreme weather or demand spikes.
- 5. Economic and Security Benefits:** By preventing outages, utilities avoid billions in economic losses and safeguard critical infrastructure, aligning with national security priorities outlined in the DOE's report.
- 6. Regulatory and Stakeholder Pressure:** As regulators and customers demand greater reliability and sustainability, a proactive monitoring strategy demonstrates leadership in modernizing the grid and meeting Environmental, Social, Governance goals.



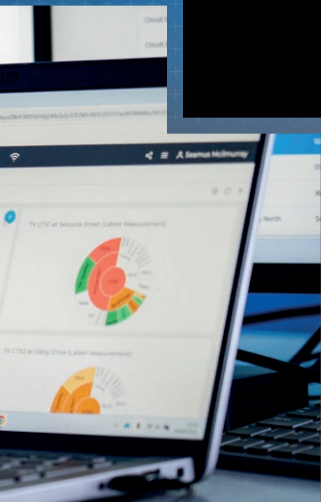
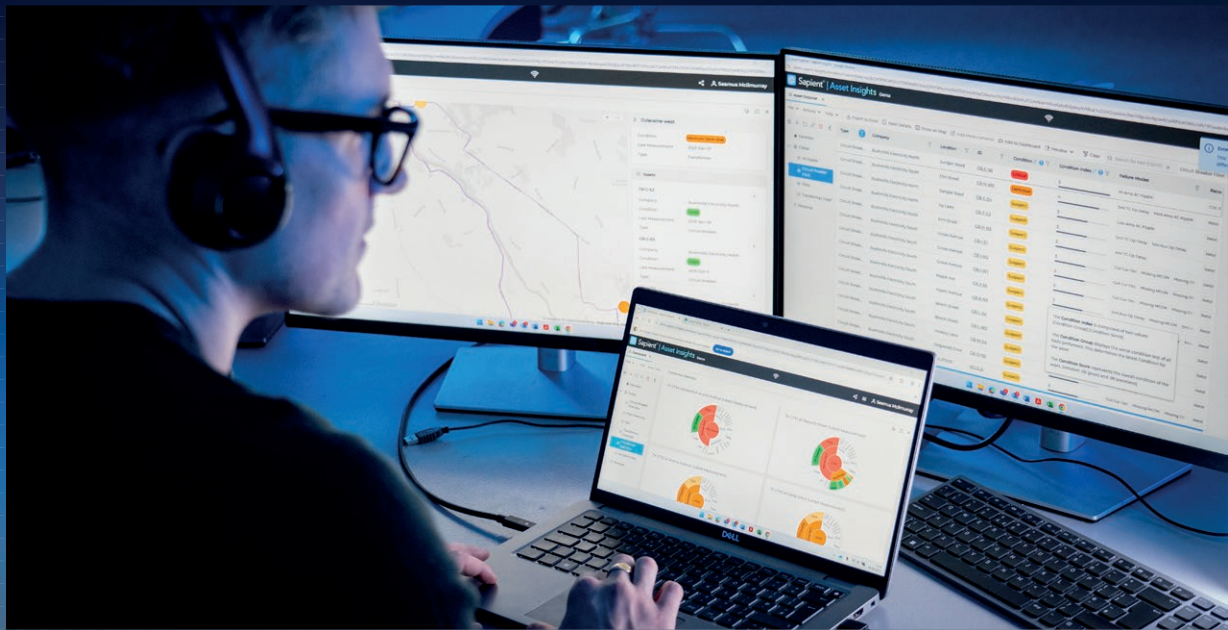
Conclusion

Utilities must adopt transformer monitoring strategies to address the threats posed by aging infrastructure, supply chain bottlenecks, and surging demand. Asset monitoring can offer a solution that enhances grid reliability, reduces risks, and enhances operational performance in an increasingly electrified world. Investing in these solutions now is not just a technical necessity but a strategic move to ensure and future-proof the future energy networks.

This is where Camlin Energy comes in!

We specialize in asset monitoring with experience spanning almost 40 years. Camlin Energy delivers solutions that empower utilities to act with insight, not hindsight. From real-time diagnostics to predictive analytics, our technologies are designed to help utilities detect issues early, prioritize resources, and extend transformer life, ensuring asset and network reliability and resiliency.

We understand energy reliability is non-negotiable; in fact, it is mission-critical! Camlin Energy continues to work in partnership with utilities, not just to keep pace, but to proactively take the lead and control of their infrastructure, making smarter data-driven decisions.



Click below to learn more:

[Asset Monitoring Sensors](#)

[Sapient Asset Insights](#)

[Asset Lifecycle Services](#)

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(+1) 773-598-4126

A Renewed Focus on Electrical System Maintenance

Of course, everyone knows NFPA 70B has been a standard now for two years running! Unless maybe you reside outside of the continental US. Why does it matter? When the lights go out and power is gone, then everyone cares! At the [Electrical Safety and Reliability Association](#) we are passionate about electrical system safety and uptime.

Data Centers cannot provide their primary mission without power and neither can any industry. Anyone who owns an automobile knows that if you don't maintain it, in a matter of time it will cease to function. Electrical equipment is usually located out-of-sight, somewhere behind the facility. Folks know it exists but take it for granted. I did this for 25 years in manufacturing, until there was a problem, i.e.: utility power outage, blown fuses in the substation, etc.

Plant Services is a great magazine that has the pulse of all things related to Maintenance and Reliability. In April they conducted a [2025 electrical safety survey revealing top risks for manufacturing facilities](#). Safety should always be the main reason for properly maintaining electrical, or any equipment. Great resources on this issue are the [Electrical Safety Foundation](#)



[International](#), and of course, the [Electrical Safety and Reliability Association](#).

Knowing the necessity of power in a Data Center, NFPA 70B, IEEE standards and ANSI/NETA MTS were consulted to develop a robust electrical maintenance plan. I would urge each plant manager to ensure there is a written Electrical Maintenance Plan (EMP) as required by NFPA 70B. Between the forementioned sources, there are a whole host of requirements and recommendations. Performing all of them is probably cost prohibitive. Performing none of them will tend towards a disaster someday. Meeting in the middle is best by evaluating potential failures, analyzing actual failures and balancing the risk and impact on the facility to complete the maintenance.



I would urge each plant manager to ensure there is a written Electrical Maintenance Plan (EMP) as required by NFPA 70B.

I am a strong advocate of consulting with the folks in the field performing the work, whether be it creating a preventative maintenance task plan, or setting standards for any maintenance work. They know what work is value-added and what is really just not necessary. The goal is to perform the tasks that will prevent failures, reveal the real condition of the equipment and properly maintain it.



The goal is to perform the tasks that will prevent failures, reveal the real condition of the equipment and properly maintain it.

Below is a list of electrical system failures I have experienced that maybe you can relate to:

1. Arc flash from medium voltage transformer due to poor installation.
2. DGA results from a high voltage transformer of >50,000 ppm of Hydrogen.
3. \$6000 penalty on the monthly utility bill for low power factor.
4. High fifth harmonic creating control issues in the plant due to many VFDs.
5. Loss of electronic equipment from lightning strikes or utility surges.
6. High voltage fuse clears and you actually have a spare (10 years old).

How about the hidden failures found by various methods of testing?

1. IR scanning revealing one phase significantly higher on the medium voltage supply.
2. Finding a cracked bushing, or low oil level in the high voltage substation.
3. DGA results of high acetylene revealing partial discharge.
4. High resistance readings of fuses, surge arrestors, insulators, etc.
5. Potential readings on grounding system reveals high or infinite resistance.

Performing an FMEA on your high-risk electrical gear where a loss could result in an outage is highly recommended. These include transformers, switchgear, cables, circuit breakers, switches - mostly high or medium voltage. Don't forget about other devices out-of-sight and out-of-mind like batteries, ex: substation batteries, fire alarm panels, security system, MV switchgear, emergency and exit lights.

Other aspects of a robust EMP are end-of-life strategies, obsolescence planning and cybersecurity for electronic devices. Developing a re-energization plan after a utility outage will help forge some of the necessary plans.

Electrical equipment should be considered highly critical and receive the appropriate level of attention, maybe more than production equipment. Let's keep those lights ON!



Author:

Lee McClish

Director, Maintenance and Reliability
NTT GDC



Lee McClish is currently the Director, Maintenance and Reliability for NTT GDC, a global telecommunications and data center company. His previous positions were held with BASF, Graphic Packaging and Packaging Corporation of America as a Reliability Engineer, Maintenance Engineer, Reliability Centered (RCM) Manager and Production Manager. He also served in the US Navy as a Submarine Officer. He holds a Bachelor of Science in Mechanical Engineering degree from Ohio Northern University and a Master of Business Administration from Ashland University. He holds the following certifications: 1. Certified Maintenance and Reliability Professional (CMRP). Sponsored by the Society of Maintenance and Reliability Professionals, 2. Certified Reliability Leader (CRL). Sponsored by Reliability Web and accredited by the Asset Management Professionals, 3. Certified Plant Maintenance Manager (CPMM). Sponsored by the Association for Facilities Engineering. He is also the author of a recent book "Maintenance Leadership 101" published through Reliability Web and available on Amazon.

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CONTROL &
PREVENT

MOISTURE
PRESENCE.

REGULARLY.



Power transformers rely on the proven combination of paper and oil insulation. Despite advances in materials science, no alternative has yet matched the reliability and performance of this traditional system. However, the longevity and efficiency of paper-oil insulation is highly dependent on maintaining optimal environmental conditions; particularly in terms of moisture prevention.

Moisture: The silent threat to the transformer's longevity

Moisture is a silent but serious threat to transformer health, contributing to aging and failures in transformers.

It compromises both the oil and the cellulose-based paper insulation.

Proactive moisture mitigation:

To limit moisture ingress, dehydrating breathers with hygroscopic salts are commonly used. These devices prevent ambient moisture from entering the conservator.

Choose our advance Self-dehydrating breather type eSDB.

Whether you are managing asset health remotely or on-site, our eSDB breathers provide continuous protection. Your transformer will be continuously protected from moisture intake, and you can collect the necessary data online for remote transformer health management.

Understanding the source:

While external contamination can introduce moisture, it is also essential to understand that moisture found in transformers can originate internally. As paper insulation ages, especially under hot temperatures, it decomposes and releases water. This means that even a perfectly sealed transformer can accumulate moisture over time. Therefore, **moisture management is not just about sealing the transformer—it is about monitoring and mitigating internal degradation.**

However, understanding moisture levels inside a transformer goes beyond external protection. Historically, moisture data could only be obtained through oil sampling and laboratory analysis, including Dissolved Gas Analysis (DGA). These methods, while helpful, offer only snapshots in time. Today, continuous monitoring technologies provide real-time insights, enabling predictive maintenance and early intervention.

Choose our Oil diagnostic device type eDOC.

Measure the presence of moisture and hydrogen inside the transformer oil continuously and make informed decisions about the asset maintenance needs.

Power of data driven maintenance strategy.

The true power of continuous monitoring lies in its ability to build historical data trends. These trends reveal patterns and anomalies that single data points cannot. With consistent data references and real-time data, operators can make informed decisions that extend the life of transformers and reduce operational risk.

MeDICA, our Monitoring ecosystem for transformer Diagnostics with Integrated Customer services and Analytics.

By integrating and interpreting data from online monitoring and offline testing, we can develop a sustainable maintenance strategy together and ensure a longer lifespan for your transformer.

Moisture care:

Moisture is inevitable—but its impact does not have to be. With the right tools, product solutions, and services to monitor and prevent moisture, you can protect your transformers, optimize performance, and secure your investment for the long term.

Moisture in transformers? No problem with our solution.

Our Moisture Care includes:

- Self-dehydrating breather type eSDB that prevents moisture from entering your transformer.
- Oil diagnostic device type eDOC that detects moisture levels in the oil.
- Consulting services and regular reports to support you with moisture management.

Contact us: marketing@comem.com

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systems with
intelligence

HOW IBERDROLA AUSTRALIA IMPLEMENTED TOUCHLESS™ THERMAL & VISUAL SENSORS

CASE STUDY

Iberdrola Australia is a leading renewable energy provider that generates and contracts electricity from wind turbines, solar photovoltaic, and other low-emission energy sources. With over 1,100 MW of installed capacity and more than 2,500 MW of planned capacity, the company provides clean and sustainable electricity to individuals, households, and businesses throughout Australia.

Previously, Iberdrola Australia conducted physical inspections of wind farms and substations using thermal sensors and other handheld monitoring tools. This process was time-consuming and expensive, and it increased the risk that an undetected issue could grow into a more severe failure.

To reduce maintenance costs while enhancing reliability and safety, Iberdrola Australia needed 24/7 monitoring and alerting for high-value substation and wind farm assets.

THE REQUIREMENTS

Iberdrola Australia planned to implement asset monitoring and a condition-based maintenance program using data from thermal & visual sensors.

The Project Delivery team identified several requirements:

- Utility-grade sensors rated for use in high-voltage environments
- High-quality and rated to withstand harsh outdoor conditions
- Ability to integrate with existing SCADA and alarming systems
- Able to meet cybersecurity regulations
- Experienced team with knowledgeable and responsive support



THE ENGAGEMENT

After an extensive search, Iberdrola selected Touchless® Monitoring Solutions from Systems With Intelligence. Five sites were chosen for the initial phase of the project based on the age of the assets, the condition of the surrounding region, and the strategic priorities and investments of the business.

Systems With Intelligence designed, manufactured, and delivered the sensors to the Project Delivery team in Australia. Systems With Intelligence also provided remote commissioning and support services throughout the project. Iberdrola Australia partnered with locally certified contractors for the physical installation of the sensors at each site.

The quality of the product, the capabilities of the sensors, and the proven experience of the team were all factors that led Iberdrola Australia to choose Systems With Intelligence.

THE BENEFITS

The system immediately proved its value when it detected a previously unseen hotspot on the first day of operation. Thermal data allowed the Operations & Maintenance team to determine that a high-voltage cable was too short, resulting in high temperatures at the connection point. The team was able to schedule a repair before the issue caused a serious failure.

With continuous, 24/7 asset monitoring, technicians automatically receive alerts and alarms on their phone, even when away from the office or outside of regular business hours. Once an alert is received, they can log on to SCADA, point the camera to the issue, and diagnose the cause remotely without getting in their truck and driving hours to the remote site.

The visual camera also improves physical security at each site by allowing teams to detect possible threats, vandalism, or other safety concerns and take action from a central location.

Finally, an unexpected benefit emerged early in the project. Cameras mounted on top of the wind turbines offered a wide-angle view of the surrounding landscape. Video from these sensors could be used by first responders in case of emergency, providing an early warning and detection system to local communities.



THE RESULTS

Following the initial implementation of the sensors, Iberdrola Australia has been able to reduce maintenance costs and transition toward a Condition-Based Maintenance program that enhances reliability, improves safety, and better utilizes scarce technical resources.

About Systems With Intelligence Inc.

Systems With Intelligence™ Inc. is a global provider of Touchless™ Monitoring Solutions for electric utility applications. SWI systems collect and analyze the data that allows utilities to increase safety and reliability while reducing operating costs. Coupling thermal monitoring and visual imaging technology with advanced analytic algorithms, Systems With Intelligence™ solutions automate remote site monitoring.

Systems With Intelligence™ products are engineered to operate in the harshest environments, withstand high levels of electromagnetic interference, static discharge and voltage surges found in industrial applications to ensure uninterrupted operation. Providing a monitoring system that operates reliably and connects seamlessly allows customers to remain focussed on their operations.

The Systems With Intelligence™ management and technical teams are comprised of professionals with extensive experience in advanced technology for mission critical applications in harsh environments. With domain expertise in substation and industrial automation, communications and utility operations our team is uniquely positioned to deliver effective and intelligent monitoring solutions.

For more information, visit the company's official website at
www.SystemsWithIntelligence.com

systems with
intelligence



ENERGY 4.0
COMPLIANT

USE SMART, CONTACTLESS SENSORS TO OPTIMIZE ASSET MAINTENANCE

IMPLEMENTING OUR SENSORS PRODUCES INSTANT RESULTS:

Reduce Costs: Condition-Based Maintenance lowers O&M expenses. **Enhanced Reliability:** Prevent equipment failures and outages. **Improved Safety:** Reduce employee exposure to hazardous environments. **Better Utilization of Technical Resources:** Optimizes use of scarce technical resources.



Read our blog: [Optimizing Operations & Maintenance With Energy 4.0 Technologies](#)



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Mike Adams

CEO
of Osmose

“

I firmly believe that sensor technology will eventually evolve to become so sophisticated and affordable that such comprehensive, granular monitoring will indeed be feasible. This is the future of truly efficient and targeted service.

Interview with **Mike Adams**

Osmose®



Alan Ross: Welcome to DistribuTech 2025! We are thrilled to host a Q&A session with Mike Adams, CEO of Osmose, who will share his insights on the evolving landscape of the utility industry, particularly concerning transmission and distribution.

Mike, thank you for joining us today. You've had a distinguished career in the power industry. Could you tell us about your journey into this specific sector and why you chose to be here?

Mike Adams: It's a pleasure to be here. My background is actually rooted deeply in power generation. I began my career back in 1989 with GE as a gas turbine field service engineer, and for 31 years, I was immersed in that sector. My career path also included a period with Alstom Power, and then I returned to GE when they acquired Alstom in 2015, eventually retiring from GE in 2020. I've now been with Osmose for three years. While I consider myself primarily a power generation professional, I'm still actively

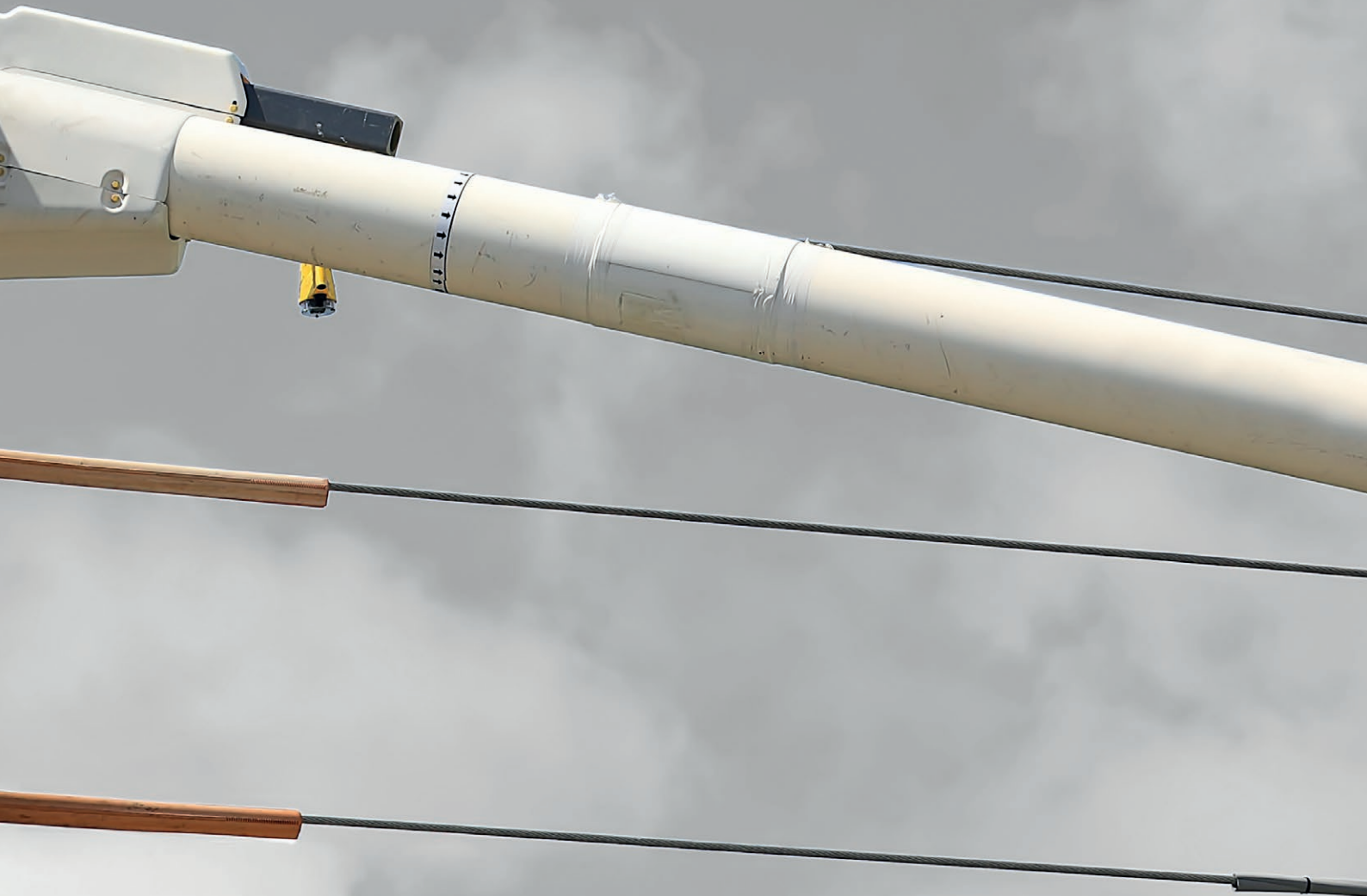


learning the intricacies of the Transmission and Distribution (T&D) space, even after three years.

What truly excites me about being in this industry now, particularly on the T&D side, is the observable shift in investment. Historically, a significant portion of capital was directed towards power generation, which, in hindsight, meant the grid was likely underserved and underinvested, potentially leading to its current state of health being somewhat behind where

it ideally needs to be. It's a privilege to be playing a role in addressing this critical area now, contributing to the necessary improvements and modernization of the grid.

Alan That's a fascinating perspective, especially given the evolution of power generation itself, is increasingly "at the grid edge," focusing on wind and solar. You then brought up nuclear power. Can you elaborate on your views regarding nuclear energy?



Mike Absolutely. It's important to acknowledge that while wind and solar are crucial, we shouldn't overlook nuclear power, which is also carbon-free. I am a strong proponent of nuclear energy, despite the fact that building traditional nuclear power plants can be a lengthy process. However, with the emergence of new modular designs, there's significant potential.

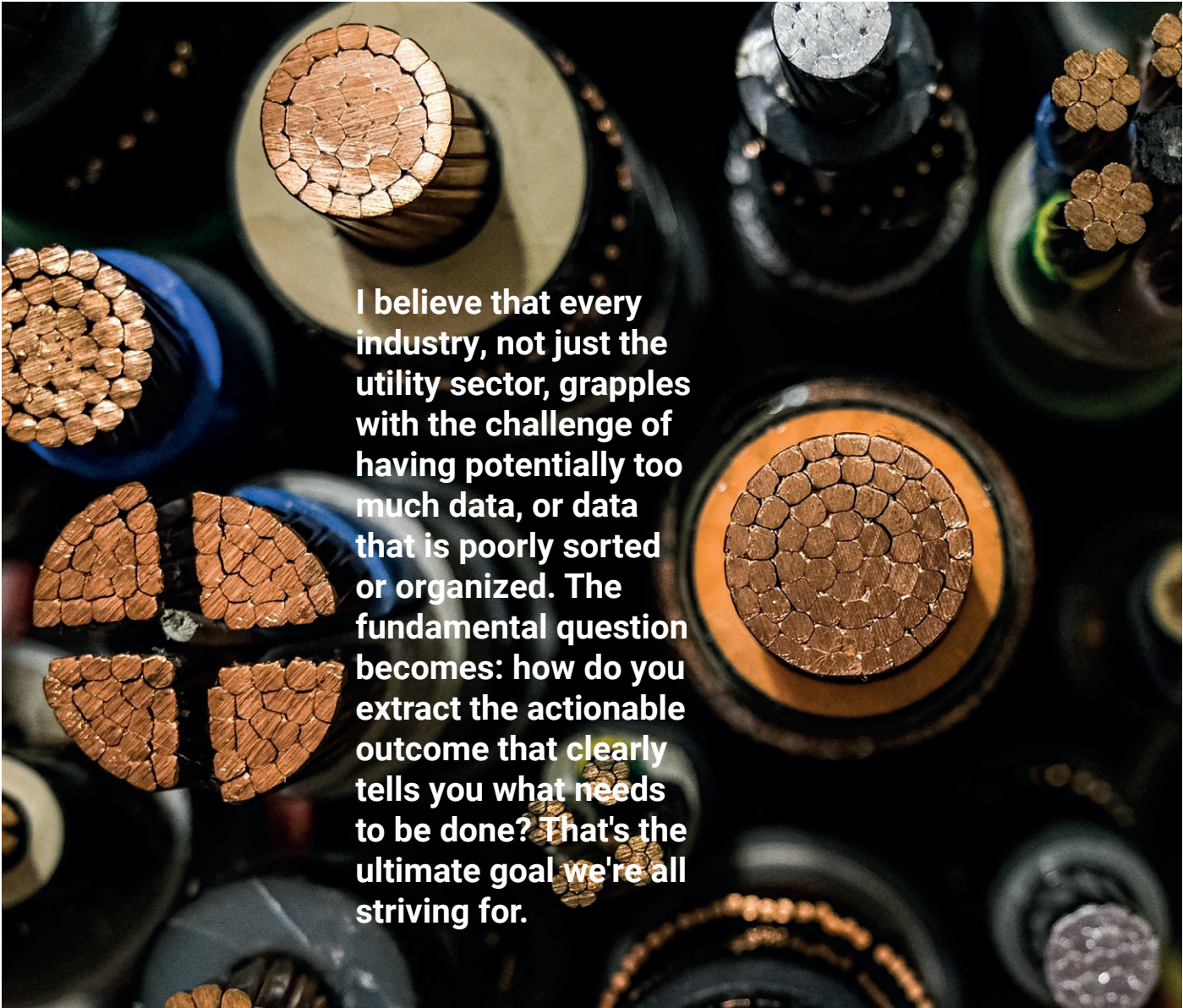
Alan While it faced initial complaints regarding cost overruns, it has proven to be an invaluable asset. The immense data center growth in North Atlanta—an area second only to Northern Virginia in scale—would simply not be feasible without the power supplied by that new plant.

We believe Plant Vogtle will stand as a significant and positive legacy for the state of Georgia, and I commend Southern Company and individuals like Tim Eccles of the Georgia Public Service Commission who championed it, even when it was unpopular. This really highlights the critical, long-term strategic importance of diverse, carbon-free baseload generation like nuclear.

Focusing on change, you've witnessed significant shifts from the Power Generation side to the current heavy emphasis on the T&D, particularly the distribution side. Could you discuss some of the most impactful changes you've observed in distribution over the past five to ten years?

Mike I'd be happy to, and if you don't mind, I'll actually go back even further, to the beginning of my career, because I believe it offers a very interesting perspective on the evolution of services in general. When I started with GE in 1989, the concept of a "service business" as we know it today barely existed; we primarily performed warranty work. From there, we evolved into a transactional services business, then moved to contractual services, and subsequently focused on driving productivity. By the time I retired from GE, the focus had shifted entirely to outcome-based services.

What I've learned from this evolution is fundamental: customers don't simply want the service; they want the outcome. They would genuinely prefer that no work is performed at all,



I believe that every industry, not just the utility sector, grapples with the challenge of having potentially too much data, or data that is poorly sorted or organized. The fundamental question becomes: how do you extract the actionable outcome that clearly tells you what needs to be done? That's the ultimate goal we're all striving for.

and that you simply confirm their equipment is sound, avoiding any outages. The pathway to achieving this ideal outcome is unequivocally data. I recall from my gas turbine days that after disassembling a machine for service, we'd often find that about 30% of it was perfectly fine, a fact we couldn't ascertain before disassembly. If we had possessed the capability to derive that insight from data, our service could have been far more efficient and precisely targeted.

This brings me to what I see as the most significant evolution: the integration of data, artificial intelligence (AI), and advanced analytics. These technologies have the power to supplement, and in many cases optimize, the traditional "wrench turning" work, whether it's in power generation or on the T&D side. This transformative potential is precisely why I remain actively engaged and passionate about my work today.

Alan That transition to data is powerful. It really resonates with the maintenance and reliability world, where we've moved from time-based maintenance, which often led to breaking things unnecessarily, especially with electrical breakers. Now, the focus is on condition-based maintenance, relying on sensors and data. However, utilities often tell us they don't just need more data; they need the decisions that come from it, and they struggle with interoperability between proprietary products. From a leader's perspective, how do you address this challenge of data volume versus actionable insights and interoperability?

Mike You've effectively answered your own question by highlighting the desire for outcomes. When I speak of outcome-based service, I am referring precisely to this: what people truly want are the insights derived from the data, not merely the raw data itself. I believe that every industry, not just the utility sector, grapples with the challenge of having potentially too much data, or data that is poorly sorted or organized. The fundamental question becomes: how do you extract the actionable outcome that clearly tells you what needs to be done? That's the ultimate goal we're all striving for. To address this, we've taken proactive steps. For example, we recently announced a partnership with Nira, an Australian company. Nira has developed a digital twin asset management health system that can take the vast amounts of data we collect and make it significantly more intelligible and actionable for utilities. This partnership represents an important area of exploration for us. While we certainly don't claim to possess all the answers, we are confident that the solution lies in effectively sorting data and transforming it into actionable insights. That is our guiding objective.

Consider our core business of inspecting wood poles. If we could develop the capability to precisely identify which pole is most likely to require work—perhaps based on factors like prevailing wind conditions, specific soil conditions, or rainfall, or even detect something as granular as damage from a woodpecker through pole-mounted sensors—the implications would be profound. Imagine if we could confidently skip over 10 poles and focus our efforts on just one that truly needs attention. This targeted approach would enable us to provide a much more affordable service to consumers in terms of electricity costs down the road and simultaneously allow utilities to buy down their risk in a far more efficient manner.

I don't want to overstate our current capabilities in this precise scenario, but this is undeniably the direction we are moving towards. Instead of routinely dispatching trucks 100,000 times a year, only to discover that, like my gas turbine analogy, 30% of those "truck rolls" were unnecessary because the equipment was in good condition, we aim for precision. A wood pole is a relatively simple, benign piece of equipment, so placing sensors on it might seem ambitious. However, I firmly believe that sensor technology will eventually evolve to become so sophisticated and affordable that such comprehensive, granular monitoring will indeed be feasible. This is the future of truly efficient and targeted service.

Alan You've really touched on the future, highlighting that it's going to be outcome-based, where customers simply want the job done, not necessarily the details of how. This brings up another point: the utility industry has a "me too" mentality. They often follow solutions proven by others and tend to stick with large, trusted companies. This can stifle innovation from smaller, nimble companies that might have great ideas but struggle to gain market trust. How do you see this dynamic—the need for proven outcomes versus embracing new technology—shaping the future of the industry?

Mike I largely agree with your assessment. There's a prevailing desire to be among the first adopters of new technology, but only if it's already a proven success. This "first above second" mentality, while understandable from a risk perspective, doesn't always foster true innovation. Genuine innovation often requires experimentation and a willingness to encounter failures while trying new approaches. This is where smaller companies frequently face challenges, as they typically lack the extensive investment power of their larger counterparts.

However, smaller companies possess a distinct advantage: nimbleness. Having spent the majority of my career with large corporations, I can attest to the greater agility that smaller organizations often exhibit. Regardless of company size, I fundamentally believe that data can act as an incredibly effective guide to more efficient service delivery across almost any domain.

At Osmose, we have an enormous volume of data. Consider that there are approximately 160 million wood poles in the United States. We estimate that throughout our history, we have inspected more than 19 million of these poles. Currently, we visit about 8 million poles annually, and during each visit, we collect a substantial amount of information—typically 18 to 20 distinct data points. This constitutes an immense dataset. While we are still in the early stages of fully leveraging this data to our maximum advantage, we are continuously improving our capabilities.

We perform some of this data analysis internally, but we also actively collaborate with third-party companies to enhance our efficiency. We recognize that a company of our scale may not possess all the answers internally, so it's often more beneficial to partner with smaller, more agile technology companies that are at the cutting edge of relevant technological advancements. We maintain a very open and collaborative approach to such partnerships.

Alan Osmose is widely recognized and trusted in the industry for its work. How does Osmose leverage this credibility, perhaps by integrating solutions from others? And as the leader, where do you see Osmose heading, and what's your vision for its future?

Mike You're right, Osmose is primarily known as a wood pole inspection company. However, we view ourselves more broadly as a services company focused on asset life extension. Our core value proposition to our customers is helping them extract the maximum possible life from their critical assets.

Let me illustrate this with a wood pole. If a wood pole is properly maintained, it can realistically last up to 100 years. In contrast, if no maintenance is performed, wood decay will likely cause it to reach its end of life around 40 years. The optimal approach is preventative: for instance, when a wood pole is about 10 years old, it may still appear new, but by then, the preservative at the ground line has likely deteriorated, and some decay might be beginning. At this point, the correct

action is to arrest that decay and reapply the preservative.

Performing this maintenance effectively can extend the pole's life for another 40 to 50 years, ensuring its continued integrity. Even around the 50-year mark, when further decay or reduced strength might occur, we can install a metal truss adjacent to the pole, which can add an additional 40 years of life or more, pushing the asset's total lifespan close to or beyond the 100-year mark when proper care is taken. This constitutes the majority of our business.

However, we have three other significant lines of business:

1. **Steel Transmission Towers and Steel Poles:** We apply the same life extension philosophy to these assets. As a mechanical engineer, it often surprises me how many people assume steel lasts indefinitely, but like wood, steel corrodes. This presents the same challenges as wood decay. We often find issues when inspecting steel transmission towers, especially around the 50-year mark, such as significant corrosion or structural vulnerabilities caused by environmental factors like a river eroding a bank or even a farmer accidentally impacting a tower.

We have encountered towers standing on only three legs. At such a stage, a full tower replacement is not always necessary. We offer solutions that can restore and life-extend these critical assets. This includes using ground LiDAR to create digital twins of towers, redesigning their structural integrity, and applying new protective coatings. This allows us to life-extend entire lines of towers at a fraction of the cost—typically around 20% of the cost of replacing a full line of towers. Our value proposition for transmission assets, primarily steel but sometimes wood, is identical to that for wood poles.

2. **Underground Segment:** We believe a significant portion of the grid will increasingly move underground. Our acquisition of Imcorp last year was specifically aimed at enhancing our capabilities in this area, also with a focus on life extension. We perform a very high-quality, what we call "factory-aid test," on underground cables utilizing a proprietary PDA (Partial Discharge Analysis) technique. This advanced analysis allows us to accurately predict the remaining life of an underground cable installation. Our focus remains on the structural integrity of the grid - whether it's the poles supporting the overhead lines, the towers supporting transmission, or ensuring the underground

installations remain robust. When issues are identified, we also offer quick repair solutions.

3. **Technical Services:** This line of business encompasses an engineering backroom team coupled with a field team. They specialize in areas such as pole loading analysis, distribution engineering, and infrared inspection. We provide services to both the telecom and electric utility industries, advising customers on system loads and potential issues.

A recent acquisition of a distribution engineering company last year was strategic because we recognize that the current broadband buildout is a major driver for our technical services business. Looking ahead, we foresee a critical need for the grid to be fundamentally redesigned as society moves towards greater electrification. With the anticipated surge in electric vehicles and the shift towards electric home heating away from gas, the grid infrastructure will need to be capable of carrying two to three times more electricity. We are committed to being a trusted partner for our customers as they navigate this transformative period.

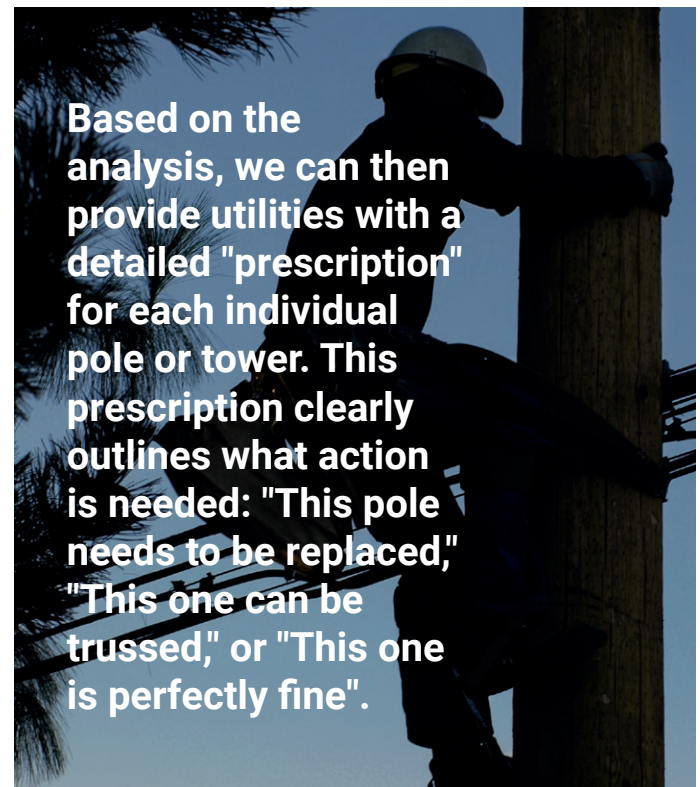
Ultimately, our goal is to remain highly relevant to the industry. While we are fortunate to have a trusted name, maintaining that trust requires continuous relevance, impeccable execution, and consistently delivering high-quality work. My primary responsibility is to define the right strategic direction and ensure the company operates effectively to achieve these goals.

Alan That's a comprehensive overview. Let's talk about resilience. We're seeing unprecedented weather events - hurricanes, wildfires, ice storms. Does Osmose get involved in the assessment post-event, or perhaps even in proactive remediation planning for these types of disasters?

Mike That is an incredibly important question, given the escalating frequency and intensity of weather events. Osmose does indeed participate significantly in the assessment piece after such events. However, it's crucial to clarify our role: we are a services company, not a construction company. Therefore, we do not engage in the physical restoration work, which we categorize as construction.

Our unique contribution lies heavily in the predictive aspect. Leveraging the extensive data we've gathered from prior wood pole and steel tower inspections, we have developed proprietary software. This software allows us

to simulate the precise impact that a specific wind speed, for instance, 120 miles per hour, would have at the ground line of an entire line of assets. Based on this analysis, we can then provide utilities with a detailed "prescription" for each individual pole or tower. This prescription clearly outlines what action is needed: "This pole needs to be replaced," "This one can be trussed," or "This one is perfectly fine".



We have conducted numerous resiliency studies with a variety of investor-owned utilities. These studies aren't limited to coastal regions vulnerable to hurricanes; they also encompass inland areas susceptible to straight-line winds, or regions where significant ice loading on lines, combined with straight-line winds, can cause substantial damage. Our approach involves building digital models primarily focused on the proactive side. A truly effective services company continuously strives to deliver value to customers by enabling them to prevent these catalyzing, catastrophic events. That is overwhelmingly where our focus lies.

When unfortunate events do strike, we redirect our workforce to assist with the assessment of the damage that has occurred. However, our involvement does not extend to the physical restoration activities.

Alan Mike, thanks so much, we greatly appreciate your insight and well done at moving Osmose into the new future.



AIMEE INTAC-LEUNG

P.ENG., PMP

Director of Transmission Project
Management, Invenergy

Championing Women in Leadership

With rapid advancements in clean energy and power systems, more women are stepping into high impact leadership roles. Among them is Aimee Intac-Leung, who exemplifies the intersection of technical excellence, global perspective, and purpose-driven leadership. With a career spanning borders and disciplines, her career blends corporate leadership and industry advocacy, cultivating lasting partnerships and inspiring the people who power our energy future.

She began her career at Intel and Parker Hannifin, gaining early insight to innovation and integration of complex systems. She then spent more than 15 years at Manitoba Hydro, where she held pivotal roles on design, testing, construction, operations and delivery of hydro generation and transmission gigawatt projects for the reliability of the province's High-Voltage Direct Current (HVDC) systems.

Now, as Director of Transmission Project Management at Invenergy, a global clean energy leader, Aimee leads large scale energy infrastructure projects with a focus on long-term sustainability, resilience and innovation. Her work consistently bridges boundaries, expanding expertise, connecting people, and fostering collaboration across sectors and cultures.

Beyond project delivery, Aimee has been a steadfast advocate for women and underrepresented communities in energy. She serves as Chair of Women in Energy CIGRE Canada, Vice Chair for International Partnerships of the U.S. National Committee of CIGRE and is an active member of IEEE. Through mentorship, scholarships, and inclusive initiatives, she helps bring people together and thrive not only in their education and careers but also their confidence and sense of belonging.

In 2025, Aimee was awarded the King Charles III Coronation Medal by the Lieutenant Governor and Premier of Manitoba, recognizing her leadership in the energy sector and her efforts in creating meaningful pathways for women in STEM.

Her visibility on conference stages and in boardrooms sends a clear and powerful message: women also belong at the center of power system transformation. Through her leadership, mentorship, and unwavering belief in the potential of others, Aimee continues to inspire the next generation of leaders and help shape a world where rising talents, regardless of background feel seen, supported, and empowered to lead.

Her story is a reminder that true progress in power systems isn't driven by technology alone but by the people who make that technology matter.

WPS Women in Power Systems

WOMEN IN ENERGY: IT'S TIME TO SEIZE REAL POWER AND IMPACT!

The power systems industry has long been a male-dominated field, with women making up just 22% of the global workforce and holding only 12% of leadership positions, according to recent reports. Yet, approximately 50% of energy consumers are women – from charging phones to heating homes, energy powers our daily lives.

Today, we're seeing a commendable trend: women are increasingly stepping into leadership roles in the power systems sector. However, a critical issue remains. Too often, women in leadership hold titles that lack real executive power, limiting their ability to drive meaningful change.

How do we address this imbalance?

We've posed this question to engineers, CEOs, and team leaders from top companies in the industry, sparking vital conversations. The journey towards equal representation is ongoing, but we aim to be part of the solution. By fostering discussion, building a strong community of women professionals, and amplifying their voices, we can drive progress and ensure that women are not just present but leading with real impact.

Support and elevate the voices through Women in Power Systems.

Contact: Managing Editor: [Tamara Marček](mailto:tamara.marcek@apc.media) tamara.marcek@apc.media

WOMEN IN POWER SYSTEMS BE THE VOICE OF CHANGE

Smarter Than Replacement: Proactive Cable Assessment as a Capital Strategy

Across North America, thousands of miles of systems are crossing the 30–40-year threshold—and many are already showing signs of deterioration. Meanwhile, utilities continue expanding their underground networks for grid resilience, wildfire mitigation, and urban growth, only to find that nearly 40% of newly installed systems contain manufacturing or installation defects that compromise long-term reliability.

Traditionally, utilities have had a binary choice: run cables to failure and replace them reactively or undertake costly replacements based solely on asset age and history. But both paths are expensive, operationally disruptive, and inefficient.

A third option—one that's both fiscally and technically superior—is now gaining wider adoption: high-sensitivity diagnostic cable assessments that match factory testing standards and enable targeted life extension. As the catalysts for cable life extension, these assessments also qualify as capital expenditures under FERC guidelines, shifting budget pressure from O&M to CAPEX while improving grid reliability.

Factory Level Insight, In the Field

Modern cable scanning technologies used in the assessments apply a 50/60Hz overvoltage to energized spans and detect partial discharge (PD)



activity with sensitivity as low as 5 picoCoulombs (pC)—the same threshold used in shielded factory labs. With advanced signal processing that filters out atmospheric electrical noise, these tools can pinpoint substandard components or damaged accessories with precision, even in noisy urban environments.

Unlike traditional very low frequency (VLF) or damped alternating current (AC) tests that may miss defects or produce ambiguous results, factory-grade field assessments provide usable insights that meet IEEE and ICEA standards. The accurate, actionable data from these assessments allow utilities to restore cable systems to like-new performance without the cost or complexity of full replacement or fluid injection that can't repair existing defects.

Capitalizable, Cost-Effective, and Reliable

The economic implications are big. In one large-scale deployment, CenterPoint Energy used proactive cable assessments to reduce loop restoration costs by 65% compared to full replacement and improved underground reliability by 98% after assessments and on-site mitigations. Even better, 75% of the utility's cable spans assessed required no immediate action, proving that many replacements would have been premature.

Because these assessments demonstrably extend useful life, they qualify as capital investments per FERC Docket AC09-27-000. This creates an opportunity for utilities to recast maintenance interventions as long-lived asset improvements—preserving O&M budgets while enhancing performance.

From Diagnostics to Forecasting

Beyond remediation, the data gathered from high-sensitivity cable assessments provides the groundwork for predictive maintenance. Using deep learning models trained on millions of defect signal waveforms, some utilities are now estimating remaining useful life with greater precision.



Using deep learning models trained on millions of defect signal waveforms, some utilities are now estimating remaining useful life with greater precision.

These cable assessment models can categorize defects by severity, location, and progression risk, enabling planners to triage repairs, defer low-risk work, and prioritize the highest-impact interventions. This data-driven approach reduces reactive dispatches, lowers emergency restoration costs, and enables just-in-time asset management that aligns with workforce constraints.

A Scalable Solution for a Smarter Grid

Proactive cable assessment isn't just a technical solution—it's a strategic one. It supports utility goals around resilience, reliability, and cost optimization. It accelerates capital planning. And it equips engineers and operators with the information they need to extend the life of critical infrastructure.

For utilities navigating an era of rising demand, aging assets, and limited capital, field-based diagnostic cable testing offers a compelling path forward: extend life, enhance reliability, control costs, and capitalize smarter.



This data-driven approach reduces reactive dispatches, lowers emergency restoration costs, and enables just-in-time asset management that aligns with workforce constraints.

Author:

Laura Cardoso

Senior Product Manager

Osmose Utilities Services



Laura Cardoso is a Senior Product Manager at Osmose Utilities Services, leading innovation in underground infrastructure solutions. With a background in Electrical Engineering from Vanderbilt University and an MBA from Rice University, she brings a unique blend of technical expertise and business strategy to the utility and energy sectors. Laura's career spans roles from Lead Electronic Hardware Engineer at Baker Hughes to Product Manager at MacroFab, and Applications Engineer at Greene Tweed. She's passionate about building products that solve real-world problems, drive operational efficiency, and create long-term value for customers.

The Iberian Peninsula Blackout of 2025

As power systems grow more complex, real-time software and automated controls must evolve to manage scenarios with high renewable penetration, fast frequency drops, and constrained interconnection capacity.

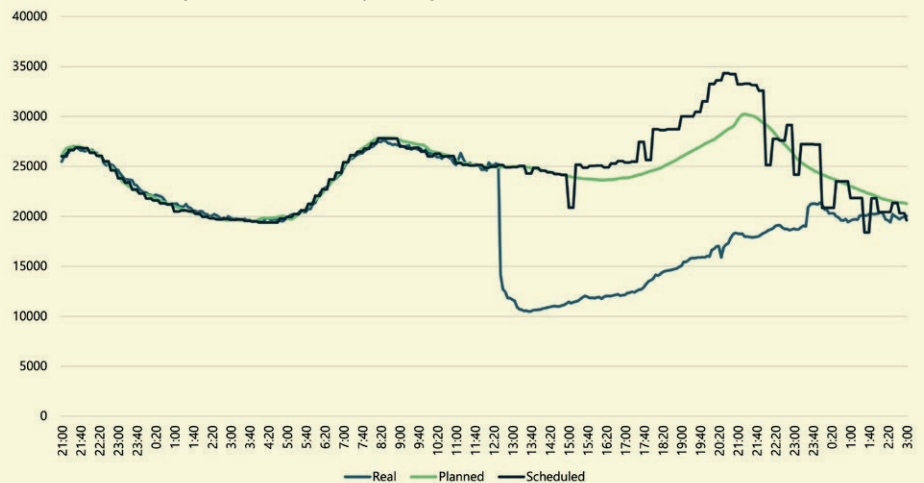
by **Michael Sheppard**
and **Komal Ishaq**



Introduction

On April 28, 2025, the Iberian Peninsula, encompassing Spain and Portugal, suffered a near-total blackout that lasted up to ten hours in many areas, impacting millions of lives and essential services. This massive power outage, triggered within seconds and cascading across two nations, exposed critical vulnerabilities in modern grid infrastructure and raised serious questions about the resilience of increasingly renewable-heavy energy systems.

Figure 1: Demand drop during the incident. Source: Red Eléctrica





Michael Sheppard has 20 years of market research experience designing numerous research practices from scratch while leading over 100 bespoke projects with Fortune-500 companies. In 2016 he co-founded Power Technology Research (PTR) and has since launched new research practices in solar, storage, battery, and e-mobility. In 2020, he co-founded Matos, an intelligence automation company focused on providing powerful AI-driven tools for the market research sector. In 2023, this business was acquired by PTR. Prior to founding PTR, he spent 8 years with iSuppli/IHS Markit in various analyst and consulting roles where he covered a broad range of sectors including mobile, renewable power and electricity transmission and distribution (T&D). In his last role, he led the power technology consulting group. He is an expert on the PV industry and has performed numerous competitive dynamics and opportunity assessment projects, covering upstream, downstream, and supply chain topics. In 2008, he obtained two Bachelor's of Science in both Financial Services and Corporate Finance from San Francisco State University.



Komal Ishaq is a Consultant at Power Technology Research (PTR), where she contributes to advanced research and analysis in the global power sector. With a Master's degree in Energy Systems from Northeastern University, Komal brings a strong interdisciplinary background spanning AI applications in energy, renewable integration, and power system planning. Her professional experience includes consulting for organizations like The World Bank and ICF, where she worked on resilient infrastructure planning, system adequacy modeling, and emerging energy technologies. She is passionate about leveraging data-driven insights to enable sustainable, resilient, and future-ready energy systems.

Timeline and System Collapse

The blackout began at 12:33 CEST. Within moments, about 15 GW of generation, roughly 60% of the electricity in use, was lost across mainland Portugal and peninsular Spain. Some areas in France also experienced brief outages. Power was not fully restored in Portugal until after midnight and in Spain by 04:00 the next morning.

The sequence of failure was rapid. Spain and Portugal experienced two earlier periods of frequency oscillations in 30 minutes leading up to the incident that were mitigated by system operators. Just before the blackout, Spain was exporting power to France, Portugal, and Morocco. At 12:32:57 CEST, a series of generation trips occurred in southern Spain, reducing generation capacity by 2,200 MW in under 20 seconds. This triggered a frequency decline below 48.0 Hz, prompting automatic load shedding mechanisms.

By 12:33:21 CEST, the alternating current (AC) lines between France and Spain tripped, disconnecting the Iberian Peninsula from the

continental grid. Three seconds later, the high-voltage direct current (HVDC) link also failed. The Iberian grid collapsed.

Restoration began promptly. By 12:44, one 400 kV AC line between Spain and France was re-energized. Moroccan-Spanish interconnection followed at 13:04. Spain's black-start-capable hydropower stations began restarting by 13:30, with AC lines progressively restored. Portugal lagged slightly behind, beginning black start at 16:11 and reconnecting tie-lines with Spain by late evening.^[1]

Probable Causes

Though official investigations are ongoing, preliminary analysis identifies several contributing factors to the blackout. The incident likely began in southwestern Spain (Extremadura), where diverse generation types, including solar, are concentrated. Notably, Red Eléctrica data indicated a plunge in solar output from 18 GW to 8 GW^[2] around the time of the blackout. The head of Red Eléctrica's operations noted that solar generation may have been involved in the initial generation trip.

Figure 2: Generation mix before the event. Source: Red Eléctrica

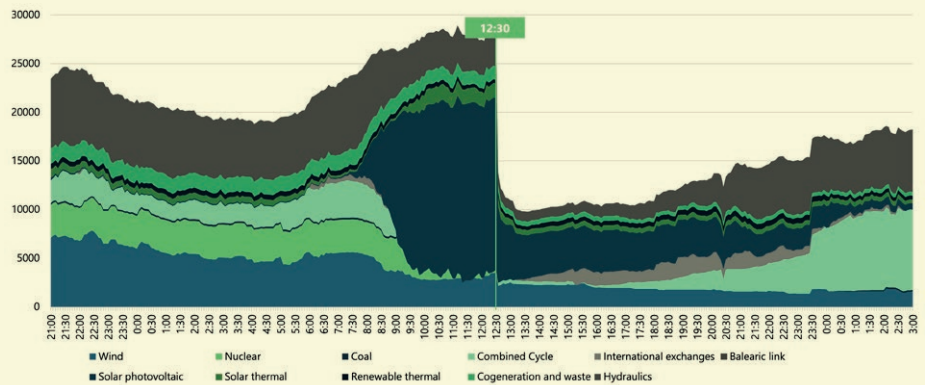
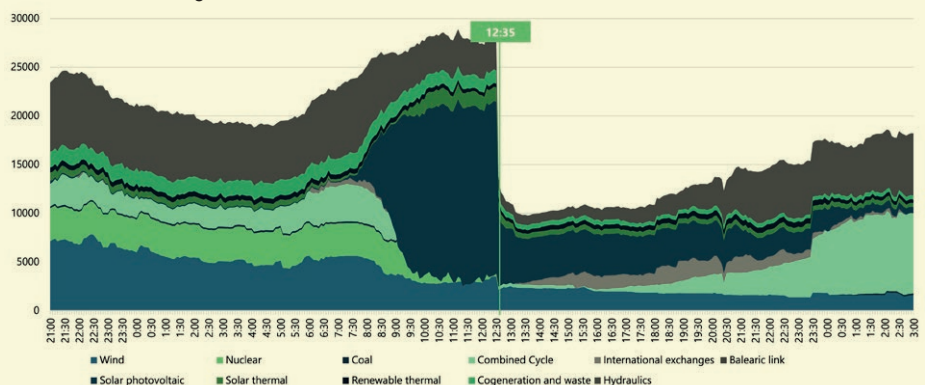


Figure 3: Generation mix after the event. Source: Red Eléctrica



Energy policy must embrace a holistic approach that integrates the goals of decarbonization with the fundamental need to maintain grid stability and resilience. Simply increasing renewable energy capacity is not sufficient without concurrently addressing the systemic impacts on the grid infrastructure.

Generation Structure (MW) – 28 th April 2025		
Hour	12:30	12:35
Wind	3499	2142
Nuclear	3387	0
Coal	229	0
Combined Cycle	982	326
International exchanges	-4196	0
Balearic link	-102	0
Solar photovoltaic	17657	7844
Solar thermal	1498	1058
Renewable Thermal	377	376
Cogeneration and Waste	1356	835
Hydraulics	3172	1232

Table 1: Generation Structure (MW) before and after event. Source: Red Eléctrica

Two prior episodes of frequency oscillation suggest the system was already stressed. The Iberian grid may have been operating close to its stability margins, leaving it vulnerable to cascading failure after the initial shock.

A key factor was the high share of renewable energy, solar and wind contributed around 78%^[3] of electricity just before the event. While vital for decarbonization, renewable sources like solar and wind do not inherently provide rotational inertia, a stabilizing force offered by traditional synchronous generators (e.g., gas, coal, or nuclear). Lower system inertia means frequency can drop more quickly during disruptions, reducing the time available for mitigation and heightening risk of collapse. Importantly, the issue is not with renewables per se, but with how they are integrated. Inverter-based technologies, when equipped with advanced grid-forming controls, can help stabilize voltage and frequency. However, most systems today still depend heavily on traditional inertia.

Another factor was the limited interconnection capacity between the Iberian Peninsula and the rest of Europe which was only about 6%^[4]. Once the AC lines to France tripped, the Iberian system was effectively islanded and unable to draw power

from the wider grid, limiting its ability to compensate for the generation loss.

Additionally, the economic underutilization of conventional power plants might have left the system more fragile. Low or negative electricity prices, driven by high renewable output, reportedly forced some base-load plants, including nuclear units, to idle at reduced capacity. With fewer conventional plants online, the grid may have lacked crucial stability services like inertia and frequency regulation at a critical moment.

Furthermore, grid control systems may also have been insufficiently equipped to handle this sequence of events. As power systems grow more complex, real-time software and automated controls must evolve to manage scenarios with high renewable penetration, fast frequency drops, and constrained interconnection capacity.

Solutions and Recommendations

The blackout highlights the urgent need for systemic improvements across several dimensions to ensure a resilient, low-carbon power future. The following strategic actions are critical next steps that Spain and Portugal must prioritize and fast-track.

1. Scale up smart grid investment

This is essential to improving situational awareness and operational response during disturbances. Smart grids allow for real-time fault detection, automatic isolation, and faster recovery which are all crucial during cascading failures. Both countries are moving in the right direction but must maintain momentum. Spain's CNMC and Portugal's ERSE should identify and prioritize critical nodes for advanced monitoring and control upgrades, especially in high-renewables zones with documented curtailments.

2. Expand and strategically deploy energy storage

Large-scale energy storage can help stabilize renewable-heavy systems by providing fast-response capacity and absorbing shocks. Such systems, when properly located, offer grid balancing and can act as synthetic inertia. It is critical to accelerate permitting for storage assets at both transmission and distribution levels and integrate storage planning into local congestion mitigation strategies.

3. Deploy and fast track black start capable and grid-forming inverter technologies

Grid restoration and stability

increasingly depend on modern technologies beyond conventional generation. Spain and Portugal should prioritize inverter-based resources with both black-start and grid-forming capabilities. While these technologies have been successfully deployed in smaller, isolated systems, their widespread application in large, interconnected grids is still undergoing testing and development. Grid-forming inverters can emulate the stabilizing behavior of synchronous machines, actively regulating voltage and frequency—a function critical in high-renewables environments. These systems can also support grid restoration after major outages. Germany's Netzbooster project^[5] and Australia's Hornsdale Power Reserve^[6] demonstrate how inverter-based assets can contribute synthetic inertia and support grid restart. Iberian TSOs should integrate such technologies at strategic nodes to reduce restart times, stabilize frequency, and prevent cascading failures during disturbances.

4. Strengthen cross-border interconnection capacity

Spain's planned Bay of Biscay interconnector is a step in this direction. The EU's 15% interconnection target by 2030^[7] should be fast-tracked for vulnerable regions like the Iberian Peninsula.

5. Market reforms and policy alignment

Market designs should focus on valuing grid services like inertia, frequency control, and black-start capability. Policymakers must reform markets to better incentivize reliability-oriented services and ensure dispatchable resources remain financially viable. Capacity mechanisms and reserve markets should include criteria for stability contributions, not just energy output. This includes not only dispatchable thermal assets but also inverter-based resources that provide synthetic inertia or fast frequency response.

The UK has launched targeted markets like Dynamic Containment (DC) and Enhanced Frequency Response (EFR) to pay for fast-acting stability services from technologies such as batteries. The UK Capacity Market now includes criteria for black-start readiness and system support, not just energy supply.^[8] Similarly, Australia's Fast Frequency Response market rewards providers that react within 2 seconds to frequency drops. AEMO is also piloting procurement of system strength services from inverter-based assets to address low-inertia challenges.^[9]

Lessons Learned

The Iberian Peninsula blackout of 2025 has provided several lessons for managing power grids undergoing a transition towards higher levels of renewable energy. Maintaining adequate grid inertia in systems with a significant share of wind and solar power is essential for ensuring frequency stability during disturbances. Robust frequency regulation mechanisms and sufficient fast-response generation capacity, including energy storage, are important for quickly addressing imbalances between supply and demand. Furthermore, the reliability of protection systems to prevent localized faults from escalating into widespread system collapses is critical, as demonstrated by the rapid cascade of events following the initial generation trips. Moreover, diversified energy portfolios that include dispatchable generation sources and sufficient "black start" capable power plants are necessary for ensuring a secure and resilient energy system.

The blackout also yielded important policy implications. Energy policy must embrace a holistic approach that integrates the goals of decarbonization with the fundamental need to maintain grid stability and resilience. Simply increasing renewable energy capacity is not sufficient without concurrently addressing the systemic impacts on the grid infrastructure.

The energy transition is not just about increasing clean generation—it's about rethinking how we operate and safeguard the grid.

Significant and sustained investment in modernizing grid infrastructure, including the deployment of smart grid technologies and energy storage solutions, is essential to support the energy transition and prevent future widespread blackouts. Moreover, strengthening cross-border energy cooperation and increasing interconnection capacity are crucial for enhancing regional grid resilience and providing mutual support during energy emergencies.

In conclusion, the 2025 Iberian Peninsula blackout was a wake-up call: the energy transition is not just about increasing clean generation—it's about rethinking how we operate and safeguard the grid. The event revealed that high renewable penetration, while necessary, can become a liability without proper planning, technology integration, and policy alignment. To build a resilient and decarbonized power system, Europe, and the world should invest in smarter grids, better interconnections, more advanced control systems, and supportive market frameworks.

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- [8] National Grid ESO
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CHALLENGES AND OPPORTUNITIES AROUND POWER DEMANDS AND DATA CENTERS | AN ELECTRICAL SAFETY AND RELIABILITY ASSOCIATION (ESARA) REPORT



Editor's Note:

We welcome ESARA, the Electrical Safety and Reliability Association, as a new Alliance Partner with APC Media. ESARA is also a sponsor of RED Talks, which we also feature in our Perspectives section. To access ESARA go to www.joinesara.org for free practitioner membership and to learn more about Corporate and Approved Provider sponsorship.

The electrical power industry is undergoing a historic transformation, with more change in the last five years than in any previous period. This transformation significantly impacts power demands, especially concerning the exponential growth of data centers, leading to both significant challenges and new opportunities for the industry.



CHALLENGES

Aging Infrastructure and Increased Demand: Power system assets, including transmission lines, substations, transformers, and motors, are aging and often operating beyond their designed lifespan. The average power transformer, for instance, is between 38 and 42 years old, designed for a 20-year life. At the same time, demand for power is not only increasing but concentrating, particularly due to the exponential growth of AI and data centers. This puts immense pressure on an already aging distribution system.

Massive Cooling Loads: Data centers require a significant secondary load for cooling, often representing a larger portion of the load than the computing itself. Failures in these cooling systems lead to data problems, not just HVAC issues, making their health critical.

"Dirty Power" and Inverter-Based Loads: The rise of renewables like wind and solar introduces more transients and harmonics into the grid, leading to "dirty power". This is exacerbated by inverter-based resources, which rely on power electronics and can cause transformers to go into premature failure if not properly sized.

Quality and Cost Pressures: While older electrical assets were often "overbuilt" for durability, competitive pricing pressures today mean that new transformers and devices are not built to last as long, creating a challenge for ensuring long-term quality.

Workforce Shortages and Knowledge Gaps: There is a dwindling supply of skilled trades to maintain aging assets, and older generations are retiring, leading to significant expertise and labor shortages. The required expertise today differs greatly from 30 to 50 years ago.

Increased Risk with Reactive Maintenance: When maintenance is reactive—fixing problems only after they occur—the risk of incidents like arc flashes and electric shocks dramatically increases compared to planned, proactive maintenance.

System Complexity: The power system is becoming increasingly complex due to distributed energy resources (DERs) and inverter-based power generation, requiring more data and sophisticated information management. DER substations can cause existing transformers, cables, and system components to age twice as fast.



Supply Chain Issues: Before the COVID-19 pandemic, companies could wait for failures and receive replacement equipment within weeks; now, it can take years, forcing companies to maintain larger budgets for spare parts.

Local Opposition (NIMBYism): Utilities face challenges meeting increased demand, for instance, by running new transmission lines, due to local opposition. Not in my backyard!

OPPORTUNITIES

Shift to Proactive, Condition-Based Maintenance: There is a critical shift from reactive maintenance to a condition-based strategy rooted in real-time data.

NFPA 70B's 2023 revision now mandates inspections, making them requirements rather than just recommendations.

Advanced Monitoring Technologies:

- **Continuous Monitoring:** The industry is moving towards continuous 24/7 monitoring of assets, which is becoming more cost-effective due to falling sensor prices. This allows for the detection of issues that develop between annual inspections.

- **IoT Sensors:** The deployment of sensors for the Internet of Things (IoT) provides vast amounts of data. IoT-installed sensors can gather data daily, which is particularly beneficial for remote data centers where travel is costly.

- **Multifunctional Sensors:** Modern sensors can detect multiple parameters simultaneously, such as temperature, humidity, ultrasound, and vibration.

- **Simple Indicators:** Technologies like color-changing clips and dots can indicate temperature problems or other issues without specialized training, providing ongoing feedback on asset health.

- **Predictive Technologies:** Infrared, ultrasound, and fluid or oil analysis have become far more critical for detecting early-stage faults before they become costly failures.

AI and Machine Learning for Data Interpretation: The upcoming wave of "IoT 2.0" involves AI systems capable of interpreting vast amounts of data, eliminating the need for manual data management. AI can be trained through long-term trending and continuous system training to provide tangible and actionable information, leading to predictive failure analysis and alarm conditions.

Software Solutions and Data Consolidation: Companies are focusing on software solutions to manage distributed energy resource management systems (DERMS) and understand asset changes in dynamic power generation environments. Platforms that consolidate data from various measurement devices and sensors into a centralized system are emerging.



Focus on Humanized Safety: Companies like IRISS emphasize "humanizing safety," focusing on people to ensure individuals in the electrical space can return home safely at the end of the day. Proactive inspections and continuous monitoring contribute to this by preventing critical failures that could put lives at risk.

Bridging Knowledge Gaps: Simple technologies, like IoT sensors, can help bridge the void left by retiring subject matter experts, as they require less specialized expertise for interpretation.

Increased Redundancy: Manufacturers are increasingly accounting for redundancy in their power systems, with some facilities installing their own independent generating stations due to mistrust in grid reliability. Data centers often require their own power generation and energy storage.

By embracing these technological advancements and shifting towards proactive, data-driven strategies, the electrical power industry can better address the challenges posed by aging infrastructure and escalating power demands from critical applications like data centers.



POWER TRANSMISSION & DISTRIBUTION TECHNOLOGY | EXPO

Power Transmission and Distribution Technology Expo is well and truly set to become the definitive exhibition in Europe for the Power Transmission and Distribution industry. It is a totally 100% focused event on electricity infrastructure and power transmission and distribution technologies and that means that for every visitor, every exhibitor is potentially relevant. That is something that creates an entirely different dynamic for visitors and exhibitors alike and it is desperately needed for this highly focused community of electricity industry specialists.

To explain the difference, I can only reference one of the exhibitions we observed earlier this year, a gigantic illustration of what we do not believe in at all. An event in southern Germany with more than 3,000 exhibitors and just 5% or 6% of the exhibition area representing power transmission and distribution technology companies and even that was interspersed with companies with no specific relevance. That's a nightmare for industry experts looking for specific equipment and suppliers. When they come to Power Transmission & Distribution Technology Expo every stand and every booth will potentially be relevant to what they do. As one of our exhibitors recently stated, it's a highly focused high impact event.

For 2025 we are presenting around 120 companies including specialist industry support from Headline Speakers that include Siemens Energy plus GE Vernova, Schneider Electric, Cisco and JST Power Equipment who are of course all leaders in systems integration, systems development and systems engineering. Along with them, TSOs and DSOs will be giving talks in the hall designed to illustrate their latest thinking for improving transmission and distribution system efficiency and resilience and also aimed at informing technology suppliers about their next generation requirements and targets that equipment manufacturers and software companies will need to expect to meet to win the next rounds of major contracts.

And when we say this show is set to become the de facto event for this part of the energy transformation picture, well we are already receiving enquiries and booking requests from companies for 2026 from companies who were not able to be ready in time for this year's show but who realise that this is the event to be at going forward.

Talking with Rebecca Would,
Head of Show Development at
Next Events & Conferences



I come back to a real fundamental here. The landscape of exhibitions in what can be defined as 'energy' is expansive and actually really messed up. Messed up because exhibitors get pulled left and right to exhibit at countless 'energy' shows that are not focused on power transmission and distribution but shows that cover every possible element from electric car chargers to solar panels. That isn't the world of power transmission and distribution. It isn't the world of power transmission lines, sub-stations technologies, transformers and smart grids.

We are that world. We've done it before in other industry sectors and we are here now to do it again in this one. It's all about taking a very large industry like energy and creating a very specific industry exhibition for power transmission and distribution technology. We already have a database that's been custom built in-house of potential visitors that is in excess of 25,000 people focused on Europe, Middle East and North Africa and we have really focused people pre-registering daily who are planning to attend. Amongst them, procurement people feature strongly.

Airpelago

Ackermann Anwendungstechnik & Vorrichtungsbau GmbH

Ampacimon

APAR Industries Limited

Bekaert Hlohovec, a.s

Beta Enerjje

Bitstream

Broderson

BRUSH Group

Butler Technologies

Bynoc

Cunext Copper Ind srl

CurrENT Europe

Cyberhawk

De Angeli Prodotti S.r.l.

Digital Smart Group

DNV

Elsewedy Electric

EMCO Industries Limited

Energya Industries – Elsewedy Helal

Enging

Enline Energy

Entegra AG

Epsilon Composite

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European Springs & Pressings Ltd

FDUEG

Franklin Electric Grid Products

Ganz Transformers

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Greenwood Power

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JST Transformers

Kema Labs -Cesi SpA

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LAPP Insulators

Lemi Trafo

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MasterGrid Ircamex

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TSAT

Uvirco Technologies

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Vielhauer GmbH

Virtual Global Trading AG

Welotec

Westermo Network Technologies

Zaphiro Technologies

One other feature we are working on is Investors in Industry. There are very interesting opportunities for private investment firms and institutional investors to target electricity infrastructure projects as a key part of their business portfolios like never before. Quite how to make that work isn't always totally apparent and we have specialist presentations aimed at just that sort of question. It's sort of 'realisation of public/private partnerships' but goes deeper and broader in scope. Additionally, we have the expectation of seeing talent spotters from the same sector though most likely in this case from private equity funds who see power transmission and distribution companies to be in a mega-growth environment with the potential for rapidly escalation of revenues. Expect to see such people around the show.











Other key points. This is a compact high intensity expo. We have free parking right outside the exhibition hall. We have space set aside inside the expo hall for meetings between visitors and exhibitors on larger scales than their stands and booths would permit, plus high speed internet and desk areas where visitors can keep in touch with their workplace and mix and match their show time with keeping on top of their daily workload. Gone are the days when a day at an exhibition hall can luxuriously ignore the need to keep on top of your daily workload. We have food stations inside the hall serving a range of fresh cooked meals including Chinese and Italian dishes. It's compact, it's efficient it's focused. It's essential as an opportunity to meet major suppliers... and on that note I can tell you that this is a blue-chip international technology showcase event.

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HEADLINE SPEAKERS INCLUDE

 Henrik Näsström Marketing Manager & Project Lead COPPER Project Vårberg Energi	 Jan Vorrink Head of System Operations (SOP) & Control Centres NL TenneT	 Rolands Irklis Chairman of the Board AST Latvia	 Mohammed Moradzadeh Senior Consultant EliA	 Ana Maric Executive Director NOSBIH	 Renata Rubeša Assistant Director, Business Integration Croatian Transmission System Operator (HOPS)
 Karolina Pluta Polskie Sieci Elektroenergetyczne (PSE)	 Olmo Mezger Innovation Manager 50Hertz Transmission GmbH	 William Van den Broeck Innovation Consultant EliA Group	 Marcin Chomik Polskie Sieci Elektroenergetyczne (PSE)	 Baerte De Brey Vice President ElaadNL, E-Mobility Europe, and Stedin	 Christos Fotiadis Lead Project Management, Offshore 2 GW programme TenneT Germany
 Erik Thunberg Lead Engineer stations, Svenska kraftnat	 Nuran Cihangir Martin Grid Strategist and Control Engineer, Stedin	 Oliver Franz Chair, Distribution & Market Facilitation Committee VP European Regulation, E.ON SE, Euroelectric / E.ON SE	 Thomas Fureder Managing Director, Barclays Investment Bank		

SPECIALIST PRESENTATIONS

 Paolo Fuccella Account Executive/Utility Vertical Lead, CISCO	 Daniel Einweg Sales Head Digital Grid DACH, Schneider Electric	 Rene Bouyer Director Europe, JST Power Equipment	 Gaurav Visvanathan Head of Market Applications Battery Energy Storage Systems Europe, Siemens Energy Grid Technology	 Alexander Schmidt M&D Lead Technical Application Engineer ERCIS, GE Vernova
				



Along with my team and after 18 months of planning, I look forward to welcoming our exhibitors and visitors and our VIP guests to what will be a game-changing exhibition for the power transmission and distribution industry. See you there on September 16/17/18.



Find Us Here

Fly to Cologne/Bonn (20 minutes by taxi from the airport or fly to Dusseldorf (40 minutes by taxi or 20 minutes by rail) or Frankfurt with excellent rail connections. The Köln Messe/Deutz station for high-speed trains is located directly next to the exhibition grounds.

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CWIEME BERLIN 2025

VOICES FROM THE FOREFRONT OF A GROWING INDUSTRY

With nearly 500 exhibitors, 5,800+ footfall, and representatives from 87 countries, CWIEME Berlin 2025 once again brought together the global transformer and electrical manufacturing community under one roof. Across three days, the halls buzzed with conversations on supply chain resilience, innovation, sustainability, and the ever-accelerating demand for electrification.

The 2025 edition also marked a further step in the event's evolution – broadening its focus to include transformer users such as grid operators, utilities, and data centers, and debuting new networking spaces like the T&D Club. CWIEME Berlin 2025 also saw the launch of the first CWIEME C-Suite Club initiative in partnership with PTR and Genesis Consulting. This event was attended by an exclusive number of executives. The inaugural event consisted of round table discussions based on select topics drawn from an insightful presentation on current industry market growth and growth dynamics by Hassan Zaheer of PTR.





THE 2025 EDITION ALSO MARKED A FURTHER STEP IN THE EVENT'S EVOLUTION – BROADENING ITS FOCUS TO INCLUDE TRANSFORMER USERS SUCH AS GRID OPERATORS, UTILITIES, AND DATA CENTERS, AND DEBUTING NEW NETWORKING SPACES LIKE THE T&D CLUB.

Chris Gerber, renowned industry professional, Senior Partner of Genesis Consulting and CWIEME Advisory Board member, reflected on current market conditions and the unprecedented opportunities currently experienced in the transformer industry. "We no longer have to focus our entire existence and wellbeing on the competing with one another, but we can, for the first time in many years, given the current market conditions, afford to sit down and talk to one another, about the common denominators impacting our existence - good and bad - enabling us to ensure collective insight and understanding, and from this collective insight, draw and formulate the individual and collective strategies required that will strengthen, not only our own companies but also our global industry."

CWIEME Berlin's Vision – Nicola Acampora, Head of Growth at CWIEME

The show's driving vision came straight from the top. Nicola Acampora told us the mission is not just to host an exhibition, but to "create the most valuable meeting point for the transformer and power systems community."

"Our ambition this year was to infuse the event with positivity, drive change, and create spaces that spark genuine conversations. From the Bavarian Village to the T&D Club, we wanted people to connect on a human level – and we saw it happening everywhere on the show floor."

He also emphasized a strategic shift in the show's reach:

"We're expanding beyond traditional manufacturing to involve grid operators, utilities, data centers – the entire ecosystem. That's how we 'close the loop' and ensure Berlin is the key global hub for this industry by 2026."

FROM BOOMING DEMAND AND RAPID INNOVATION TO ENVIRONMENTAL RESPONSIBILITY AND GLOBAL COLLABORATION, THE CONVERSATIONS AT CWIEME BERLIN 2025 REVEALED AN INDUSTRY THAT IS AMBITIOUS, CONNECTED, AND READY TO GROW.



Nicola Acampora



Chris Gerber and Armando Pastore

GE Vernova – Armando Pastore, Product & Technology Bushings Leader

For GE Vernova, the discussion centered on balancing booming demand with uncompromising quality. Pastore described the current market climate as “challenged, but full of opportunity”:

“The market and energy demand are booming... We are working close with our customers to squeeze delivery times as much as possible. Quality is the first – bushings are designed to withstand low and high temperatures, fast and slow front over-voltages, harsh environments. Price is important, but quality is the main key parameter.”

He also spoke about the company’s role as a technology leader:

“Our Milan facility is the global R&D center for high-voltage bushings. We’re introducing Resin Impregnated Synthetic (RIS) bushings as part of our innovation roadmap, alongside OIP, RIP, and gas bushings – all designed for performance in demanding conditions.”

Yash High Voltage Limited – Nirav Patel, Executive Director

Nirav Patel highlighted Yash’s transformation from a small-scale operation into a global leader in precision-engineered transformer bushings, underlining Yash’s commitment to innovation, reliability, and building trust with customers worldwide.

“What started as a humble journey has today positioned Yash as a trusted global brand, delivering more than 40,000 products across 60-plus countries.”

He also mentioned the pride in making a mark globally while staying rooted in Yash’s values.

“Today, Yash is not just a manufacturer, but a unique solution provider trusted by customers around the world.”



Nirav Patel

ASTA – Dr. Karl Schäcke, Group CEO

Sustainability was a core theme for ASTA’s presence in Berlin. Schäcke explained how copper recycling can transform the industry’s carbon footprint:

“We can reduce 70% of the CO₂ quota in copper by recycling and upcasting... We’re working with major OEMs and grid operators on circular economy projects to deliver green transformers.”

Looking ahead, ASTA’s strategy rests on three pillars: recycling, its legacy copper business, and high-end manufacturing for e-mobility:

“We have visibility beyond 2030, and it looks like the pace is going up. Let’s make it happen for the next 10 years and make it a clean industry for future generations.”



Karl Schäcke

CWIEME BERLIN

● A Hyve Event

Ares Trafo – Cemil Berker, Deputy General Manager

Ares Trafo has evolved from a specialist component producer into a fully integrated supplier. Berker was proud to share how this transformation benefits customers:

“We can supply bushings in 4–5 weeks, and transformer tanks in 8-10 weeks, compared to the three or four months long delivery time, it is big advantage for our customers. If our customers want one package, everything, they can find it in our company – tanks, active parts, all components from one source. That’s one of our biggest advantages: we give them everything in one shipment without having to coordinate multiple suppliers.”

He added that this flexibility extends to responding quickly to urgent needs:

“Because we are privately owned, we can adjust our production programs in days, not weeks. That’s how we keep our promise on delivery times.”



Cemil Berker

Mobitron AB – Martina Willman, Managing Director

Mobitron’s third-generation Cargolog system addresses a critical risk in the sector – transport damage to high-value equipment. Willman told us:

“Our third-generation Cargolog captures everything happening to your cargo during transport and sends the data directly to your office. Data is knowledge – it can prevent costly delays, protect your reputation, and avoid environmental impact from unnecessary returns. The system even gives you precise time stamps and location data for any incident, so you know exactly when and where something happened.”

She also highlighted the long-term cost benefits:

“Our customers typically use the system for many years, and the return on investment is significant – fewer claims, less downtime, and more reliable delivery performance.”



Martina Willman

Crosslink Technology – Mike Groves, Global Sales Manager

For Groves, reliability in even the smallest components is non-negotiable:

“Even a small component is critical to our customers. If they don’t get it at the quality and timing expected, it creates problems for everyone. Our focus is on matching their growth with our capacity, investing in people, equipment, and floor space. We’re also introducing stocking programs for regular customers so they never have to wait for standard parts – they can get what they need immediately.”

He added that adapting to different market needs is part of Crosslink’s DNA:

“We’ve been in the business nearly 45 years, and we’re still evolving – expanding our range into medium-voltage, dead-front bushings, CTs, and PTs to meet growing customer requirements.”



Mike Groves

CWIEME BERLIN

Women in Power Systems Conversations – Interviewed by Javiera McGuigann, Global Business Director at Cargill

As part of the Women in Power Systems initiative, Javiera spoke with several female leaders at CWIEME Berlin about their perspectives:

- **Carmen Low, Comemde:** “This is really the key gathering point for our industry to meet, collaborate, and keep abreast of trends... Everyone’s facing the same challenges — lead times and supply outstripping demand — and everyone’s keen to find solutions together.”
- **Elena Guererro Nogueira, Repsol:** “We have to turn challenges into new opportunities. Commitment to sustainability and regulation is key — but so is continuing to innovate and adapt to our clients’ needs. At the same time, we can’t lose focus on safety and performance — those will always be at the heart of what we do.”
- **Najd Nassereddin, PTR:** “Events like this let you see trends, discuss strategies with decision-makers, and strengthen customer relationships. You also get a broader view of how the whole industry is moving. It’s a place where ideas turn into concrete collaborations.”



Carmen Low



Elena Guererro Nogueira



Najd Nassereddin and Javiera McGuigann

An Industry on the Move

From booming demand and rapid innovation to environmental responsibility and global collaboration, the conversations at CWIEME Berlin 2025 revealed an industry that is ambitious, connected, and ready to grow. The shared priorities voiced here — speed, quality, sustainability, and cooperation — will continue to define the sector’s trajectory in the years ahead.



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POWER PANEL DISCUSSIONS

Seth Johnson
President & GM at Powerside



Mark Paul
Vice President of Global Sales and Marketing at IRISS



Testing & Inspection Solutions for Electrical Equipment



Ultrasound Solutions

Allan Rienstra
CEO of SDT North America



POWER PANELS

Alan Ross
Managing Editor at APC Media

The electrical power industry is currently undergoing a historic transformation, driven by a convergence of aging infrastructure, shifting demand patterns, and the rise of new technologies. We talk with SMEs all the time who agree that this profound change impacts everything from generation and transmission to distribution and the "grid edge"—industrial and commercial facilities, and hospitals. To delve into these critical shifts, we invited three leaders in power systems technology: **Mark Paul**, Vice President of Global Sales and Marketing at IRISS; **Allan Rienstra**, CEO of SDT North America and **Seth Johnson**, President and General Manager of Powerside. Their collective insights reveal the

monumental challenges and innovative solutions shaping the future of electrical reliability and safety. To watch the Power Panel, click [here](#).

The Unprecedented Evolution of the Power Industry

The scale of change in the electrical power industry over the last five years is truly unprecedented. This transformation is not merely an incremental shift but a fundamental redefinition of how power is generated, distributed, and consumed.

Aging Infrastructure and Operational Strain

Our panelists agree that a significant factor



Transmission lines, substations, transformers, and motors, many designed and installed for a bygone era of consumption, are now being pushed to operate longer and under conditions for which they were never designed.

Allan Rienstra



Photo: Shutterstock

driving this transformation is the reality of aging power system assets. As **Allan Rienstra** explains, “transmission lines, substations, transformers, and motors, many designed and installed for a bygone era of consumption, are now being pushed to operate longer and under conditions for which they were never designed. For instance, the average power transformer, from utility grade to those supplying major plants or AI data centers, is between 38 and 42 years old, despite a design life of only 20 years. In the past, transformers were often “overbuilt” to ensure reliability, a practice no longer economically feasible, meaning new transformers will not last as long as their predecessors. The healthcare

industry, for example, is already grappling with electrical assets between 20 and 40 years old, which are likely beyond their lifecycle expectancy. The increasing age of these systems significantly raises the potential for critical failures, especially in industries where lives could be immediately at risk, like healthcare.”

Seth Johnson adds that “this situation has shifted the mindset of many consumers and utilities from proactive to reactive.” He recounts a large manufacturing facility that, “facing the inability to quickly obtain replacement equipment—what used to take weeks, now takes years—has allocated a significant budget for spare parts and



“

Facing the inability to quickly obtain replacement equipment—what used to take weeks, now takes years—has allocated a significant budget for spare parts and critical assets like transformers, fundamentally changing their approach to maintenance.

Seth Johnson

critical assets like transformers, fundamentally changing their approach to maintenance.”

This reactive stance, driven by supply chain constraints, underscores the vulnerability of current systems. Allan Rienstra further illustrates this point with a compelling anecdote: *“a cannabis facility, despite being able to see a nearby hydroelectric station, installed three independent natural gas-powered generating stations, demonstrating manufacturers' increasing need for redundancy due to distrust in traditional grid reliability.”*

Shifting Demand Patterns and the Data Center Explosion

Compounding the challenge of aging infrastructure is the drastic shift in power demand. **Mark Paul** says, *“this growth is explosive, not gradual or manageable, describing it as an exponential demand for AI and data centers.”*

Allan Rienstra added that, *“while the computing load in data centers receives attention, a massive secondary load is required just to cool these facilities. SDT, for example, receives numerous calls related to cooling systems, observing fleets of motors driving cooling fans and pumps running around the clock in challenging high humidity and heat environments. The failure of these cooling systems is not merely an HVAC problem; it directly impacts data operations. The health of these cooling system components is paramount, as technologies like ultrasound condition monitoring can detect early-stage faults before they escalate into costly failures.”*

Beyond data centers, general demand for electricity is growing everywhere as people seek to improve their quality of life and add new functionalities. This includes the increasing prevalence of devices requiring charging—



Power quality issues are worsening as more transients and harmonics enter the grid from distributed, inverter-based resources like wind and solar. Terms like ‘dirty power’ being delivered to AI data centers or manufacturing facilities are now common.

Seth Johnson



computers, phones, electric lawn mowers, and trimmers—which have replaced gas-powered tools. Even neighborhood lighting demands more electricity at night. This pervasive growth in demand places immense pressure on an already aging distribution system.

The need for power is exemplified by an AI search consuming 1,000 times the power of a typical Google search, which directly correlates with the growing power requirements for data centers.

The Dwindling Skilled Workforce and Knowledge Gaps

Another critical challenge is the shortage of skilled trades to maintain these aging assets, a supply that is continually dwindling as older generations retire. Seth Johnson notes that *“the expertise required today differs greatly from 30 to 50 years ago, highlighting a significant knowledge gap. This generational shift in both*

workflow and knowledge necessitates new approaches to asset management. The industry needs technologies that can simplify tasks, allowing less experienced personnel to interpret system conditions.”

Mark Paul elaborated, *“the workforce expertise is changing, and this is acceptable because what they need to know is different from what was required before. Simple, intuitive technologies, such as color-changing clips indicating temperature problems, can empower individuals without extensive backgrounds to identify issues.”*

The Silent Crisis: Power Quality and its Impacts

One of the most insidious problems exacerbated by these industry changes is power quality. Seth Johnson shared, *“power quality issues are worsening as more transients and harmonics*



“

Power electronics now constitute a significant portion of our load base; for example, every LED light is essentially a switch-mode power supply, introducing its own set of challenges to power quality.

Mark Paul



While continuous monitoring doesn't necessarily mean sampling data every second, the ability of IoT-installed sensors to gather data daily is incredibly significant, especially for remote data centers where travel is costly.

Allan Rienstra

enter the grid from distributed, inverter-based resources like wind and solar. Terms like 'dirty power' being delivered to AI data centers or manufacturing facilities are now common."

The industry has transitioned to inverter-based resources (IBRs) as significant sources of power generation. Unlike traditional, predictable power generation from high-inertia, large rotating machinery, IBRs rely on power electronics. This includes sources like solar and wind, whose output is dependent on variable factors like solar irradiance and wind speed, making management complex.

Mark Paul points out that *"power electronics now constitute a significant portion of our load base; for example, every LED light is essentially a switch-mode power supply, introducing its own set of challenges to power quality."*

Utilities face the immense challenge of maintaining voltage, harmonic distortion,

and other critical parameters while balancing diverse power contributors from residential, commercial, and large-scale wind and solar sources. This complexity extends to protection schemes, such as relay protection, which must adapt to a system increasingly reliant on distributed generation.

Real-world Consequences and Economic Pressures

The impact of poor power quality is tangible and costly. Seth Johnson highlights *"how utilities have seen transformers go into premature failure because they are not properly sized for inverter-based loads, requiring careful consideration of the K-rating and K-factor of the transformer. While engineers are adept at system modeling, the real challenge arises once the system is installed. There is a constant tension between delivering quality products and being priced competitively, leading to situations where equipment quality may not be as robust as it was decades ago."*



Tools exist to ensure activities are proactive rather than reactive, allowing for more inspections and continuous monitoring. This proactive approach provides valuable information, enabling reactions before a major issue occurs, which is where success and traction are gained.

Mark Paul

A concerning trend is the compromise on safety features due to cost pressures. Seth Johnson recalls “a project with a renewable group that declined feeder protection in a large 35 kV system because it would increase costs, despite it being a safety concern. The project leaders stated they only needed 95% uptime, seemingly unaware that such a failure could take down the entire substation.” This illustrates a critical reality in the industry today, although Seth expects this approach to shift as renewables become a larger part of the power infrastructure.

Furthermore, the integration of these new resources accelerates the degradation of existing infrastructure. Southern California Edison, for example, determined that every one of their Distributed Energy Resource (DER) substations—converted from step-down to both step-down and step-up functionality—causes the aging of transformers, cables, and all system components twice as fast. This exacerbates the existing

problem of aging infrastructure, making proactive management even more critical.

Revolutionizing Maintenance: From Reactive to Proactive with Data and AI

Given the profound changes in the power industry, the approach to maintenance, monitoring, and inspection is undergoing its own significant revolution. The overarching message from the panel is a decisive shift from reactive to proactive strategies, heavily reliant on advanced data and artificial intelligence.

Mark Paul emphasizes a pivotal change in NFPA 70B, the standard for electrical equipment maintenance. “The 2023 revision clarified that inspections are no longer merely recommendations but requirements—they “shall” happen, a strong legal term ensuring compliance. However, most assets still require only annual inspections, which poses a significant risk as issues can develop and escalate over the other 364 days of the year. This limitation

highlights the increasing pressure for continuous monitoring of assets, ideally 24/7." The good news, according to Mark Paul, is that "this is becoming increasingly cost-effective, with sensor prices falling and modern sensors capable of detecting multiple parameters simultaneously, such as temperature, humidity, ultrasound, and vibration."

Allan Rienstra reinforces this, noting the shift from periodic to continuous inspections. "While continuous monitoring doesn't necessarily mean sampling data every second, the ability of IoT-installed sensors to gather data daily is incredibly significant, especially for remote data centers where travel is costly." This shift, he says, "is not just about how we inspect assets, but a redefinition of why we inspect them, which NFPA 70B now reflects. Maintenance has moved from a reactive approach—responding to alarms—to a condition-based strategy rooted in real-time data."

Leveraging Data and the Power of AI

The panelists unanimously agree on the importance of data, but with a crucial caveat. Seth Johnson highlights the concept of data ingestion, "While sensors are everywhere providing raw data, the challenge lies in making sense of it. Data is only useful if it leads to tangible, actionable information. This is where the emerging wave of IoT 2.0, driven by AI systems capable of interpreting data, becomes transformative."

Mark Paul added that "with AI, the need for manual data management diminishes; AI can handle it."

Seth Johnson elaborates that "to effectively utilize this data, continuous monitoring 365 days a year is essential, not just annual checks. Long-term trending and continuous training of AI systems are the only ways to develop algorithms that provide predictive failure analysis or alarm conditions."

Allan Rienstra adds that his company, SDT, now "integrates AI models into our products following an acquisition by iCare Group, a dominant player in the IoT space." He draws a compelling analogy: "if we trust AI for interpreting MRIs and CT scans that impact human lives, we can certainly trust it to assess the health of motors, transformers, or cooling systems."

Crucially, communication is critical for all these assets. As Seth Johnson points out, "a utility cannot realistically operate using 500 different platforms. Therefore, developing APIs and other means to deliver actionable information to a centralized location is essential."

Simple Technologies Bridging the Gap

Beyond complex AI systems, simpler technologies are playing a vital role in enhancing continuous monitoring and bridging the knowledge gap in the workforce. Mark Paul highlights "color-changing clips that can indicate temperature problems between inspections, providing ongoing feedback on asset health without waiting for failures." He shared a personal anecdote where his wife, without any extensive training, easily noticed two red indicators on their breaker panel after a power drop, allowing them to diagnose an issue with an air conditioning unit.

Allan Rienstra praises such simple technologies, noting that they don't require an expert to interpret them, making them perfect for filling the void left by retiring subject matter experts.

Safety

The goal of leveraging these tools and data is to become smarter and more proactive. Mark Paul emphasizes that "tools exist to ensure activities are proactive rather than reactive, allowing for more inspections and continuous monitoring. This proactive approach provides valuable information, enabling reactions before a major issue occurs, which is where success and traction are gained". Allan Rienstra also underscores this shift to taking predictive technologies seriously, such as infrared, ultrasound, and fluid or oil analysis, as they have become far more critical than in the past.

The critical importance of this proactive shift is evident in safety statistics: the number of reportable incidents related to electrical systems dramatically increases—by roughly a hundredfold—when repairs are done reactively rather than proactively. While working with live power always carries a certain level of risk, especially from arc flash, the risk increases drastically when personnel are forced to rush in and fix a problem on an energized system. The aim is to ensure that proactive, planned maintenance replaces dangerous reactive interventions.

Advanced Technologies and Their Impact

The industry is actively seeking to understand and implement new technologies to adapt to these changes. Each panelist highlighted the advancements in their respective fields, demonstrating how innovation is addressing the complex challenges.

Ultrasound Technology

Allan Rienstra's company, SDT Ultrasound Solutions, is "hyper-focused on this singular

technology, which has many versatile applications. Ultrasound condition monitoring is becoming a go-to tool and will be even more important moving forward. It is one of the few tools that provides the time to act before an interruption occurs, whether at the grid level, substations, or within the crucial cooling systems of hyperscale data centers." SDT produces ultrasound products globally, and their recent acquisition by iCare Group integrates their ultrasound expertise with IoT capabilities and AI models for early detection of issues like surface or subsurface partial discharge. As Allan Rienstra explains, ultrasound is an extension of our ears, allowing us to detect sounds beyond human hearing.

Infrared Windows and Thermography

IRISS is a global leader in electrical maintenance safety solutions, best known for its infrared windows. These windows are designed to allow visual, infrared, and ultrasound inspections without opening panel doors, adding a critical layer of safety. The company improved these windows with clear polymer materials, enabling larger, custom-sized windows that offer maximum viewing angles without multiple small holes, facilitating safer and more efficient readings. Mark Paul describes thermography as "an extension of our eyes, allowing detection of what we cannot see with the naked eye."

IRISS's mission, "humanized safety," focuses on people, ensuring individuals involved in the electrical space make it home safely at the end of the day.

Power Quality Monitoring and Correction

Seth Johnson's company, Powerside, specializes in power quality—both monitoring, analysis, and correction. Originally performing power system studies, Powerside evolved into a correction solutions provider, offering power factor correction and harmonic mitigation equipment for various voltage levels. A key advancement came with their merger with Power Standards Labs, a manufacturer of high-fidelity Class A power quality monitoring and measurement devices. More recently, Powerside acquired Electrotek Concepts, an agnostic software platform that consolidates data from various power measurement devices and sensors into a centralized platform. Powerside is heavily invested in its software platform, both on-premise and cloud-based, and invests significantly in AI and machine learning to analyze trending data and incident details, training software to accurately diagnose system conditions. This allows them to consult on specific power quality engineering needs for utilities, commercial and industrial entities, and other engineering firms.

Addressing the "Fear of the Unknown" and Prioritizing Safety

New technology often produces fear when people do not understand it. Simplifying these technologies, demonstrating that they are not "black magic" but rather tools designed to monitor and maintain assets more accurately before issues become irreparable.

Ultimately, the goal of these technological advancements is to enhance safety. While big events like arc flashes cause significant damage and potential loss of life, more people die from issues occurring before an arc flash event, such as electric shocks. Detecting smaller problems early, like partial discharge—which typically occurs before an arc flash—is crucial for improving safety. The continued growth of technology aims to simplify and empower, leading to a truly humanized approach to safety.

The power industry stands at a pivotal juncture, grappling with monumental shifts in infrastructure, demand, and workforce dynamics. The insights from Mark Paul, Allan Rienstra, and Seth Johnson underscore the urgent need for comprehensive transformation. The era of reactive maintenance is giving way to a proactive, data-driven paradigm, where continuous monitoring, advanced sensors, and artificial intelligence are no longer luxuries but necessities. Technologies like ultrasound, infrared windows, and sophisticated power quality solutions are becoming indispensable tools for detecting early-stage faults, managing complex distributed energy resources, and ensuring the long-term reliability and safety of critical electrical assets.

The panel collectively conveys a powerful message: by embracing innovation, by diligently listening to what assets are "telling us," and by prioritizing humanized safety, the industry can navigate this historic transformation successfully.

The ongoing efforts of companies like IRISS, SDT Ultrasound Solutions, and Powerside are making a tangible difference, ensuring that both critical infrastructure and the individuals who maintain it are protected in an increasingly electrified and complex world. The future of power demands not just technological advancement, but a fundamental shift in mindset towards foresight, vigilance, and unwavering commitment to operational excellence and human well-being.



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ISSUE

RESILIENCE OF THE POWER SYSTEM

From **DERMS to energy storage, from distribution management to modern switchgear**, every layer of the network is under review. We go deep into **cable technology**—not just what's buried underground, but what's coming next. Plus, we take a closer look at how utility infrastructure is evolving, with the transformer still playing a central and lasting role in it all.

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