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# STATE OF THE GRID

## QUARTER 1, 2024

**Connecting the dots for a smarter energy future.**

Expert consulting services tailored to utilities and their vendors focusing on Smart Grid and System Operations.

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## Welcome to our new look!

At MGS, we've given our newsletter a fresh look. While the presentation has been updated, the content remains our top priority. In this edition, we share the latest news, insights, and trends related to the design and operation of a modern electric grid. We hope you find it valuable for your modernization journey!

# INDUSTRY EVENTS

## ENERGY THOUGHT SUMMIT

April 15-18 in Austin, TX

JD Hammerly joins MaryJo Nye from Cyient to discuss "Misplaced Energy: Imagining Network Efficiency in the Era of the Digital Dynamic Grid."

## IEEE/PES T&D CONFERENCE AND EXPOSITION

May 6-9, 2024 in Anaheim, CA

Held once every two years, IEEE PES T&D attracts attendees from around the world, including executives and decision-makers from electric utilities, engineering consulting firms, power producers, manufacturers, IT and software solution providers, and more. IEEE PES membership not required. More info [here](#).

## EI 2024

June 18-20, 2024 in Las Vegas, NV

The Edison Electric Institute (EII) is a trade association representing all US investor-owned electric companies. This is an annual gathering of leaders from industry and

government, as well as thought leaders from business and academia. More info [here](#).

## IEEE POWER & ENERGY SOCIETY GENERAL MEETING

July 21-25, 2024 in Seattle, WA

This power engineering conference brings together practicing power engineers and academics from all over the world in an international forum for experts to promote, share, and discuss various issues and developments in the field of electrical power engineering. 2024's theme is: *The new Electric System: Reinvention and Resilience*. More info [here](#).

Dr. Mani Vadari will be on the panel, "Role of Energy Storage to Support Reliability, Resilience, and Decarbonization of the Power Grid: Current State, Challenges, and Best Practices."



## Hot Off the Press!

### Why do many Outage Management System (OMS) implementations fail initially?

Dr. Mani Vadari will answer this question in a trilogy of articles exploring the intricacies of OMS implementations.

[The inaugural article is featured here on Page 7.](#) It introduces the concept of an OMS within electric utilities, traces its evolution, elucidates its current state, and underscores its significant benefits to utilities and their customers.

### IEEE PES Innovative Smart Grid Technologies (ISGT) Conference publication, February 2024

"SMARTER Rules-Based Distributed Deconfliction of ADMS Applications" by Alexander Anderson, Andrew Fisher, Shiva Poudel, Andrew Reiman, Todd Wall and Vadari Subramanian.

# M&A

## **Itron acquires Elpis Squared**

Elpis Squared, provider of software and services for utility grid operations, was acquired by Itron for an undisclosed amount. Per Itron, the acquisition will strengthen and complement the company's solutions, adding expertise in grid planning, operations and engineering to Itron's Grid Edge Intelligence portfolio.

[Read more.](#)

## **RETC finalizes SolarPTL acquisition**

Renewable Energy Test Center (RETC LLC), a subsidiary of VDE, has announced the successful acquisition of SolarPTL LLC. By combining capabilities, RETC and SolarPTL will provide clients with testing and certification of renewable energy products and systems. This also expands RETC's national footprint with locations in California, Nevada, and Arizona and their expanded reach in Europe as a member of the VDE Group. [Read more.](#)

## **Hitachi Energy partners with Grid United on HVDC capacity to link US Regions**

Hitachi Energy is partnering with independent developer Grid United LLC in a collaboration designed to boost high-voltage transmission capacity between the eastern and western US power grids; a problem that has recently vexed US developers who face long lead times for high-voltage direct-current (HVDC) transmission components amid a global supply crunch. [Read more.](#)

## **EIPGRID acquires FE**

EIPGRID, a global community energy solutions and services provider, announces the acquisition of Mirae & Hwangyung (FE), a load aggregation business headquartered in Jeju Island, as a step forward into the 'VPP (Virtual Power Plant) + EaaS (Energy-as-a-Service)' business ecosystem and commitment to new sustainable business models. Building upon its DR technology and business infrastructure, EIPGRID is set to integrate VPP and EaaS applications into its service portfolio starting from Jeju, before expanding globally. [Read more.](#)

## **Repsol to acquire ConnectGen for \$768M**

Repsol, a multi-energy company, agreed to acquire the renewable energy platform ConnectGen, with a 20,000 MW pipeline and development capabilities. The deal



strengthens Repsol's expansion into the renewable energy industry, reinforcing its international portfolio to support its strategic target of 20,000 MW of installed capacity by 2030. [Read more.](#)

## **One Equity Partners acquires Acteon Group**

One Equity Partners ("OEP"), a middle-market private equity firm, announced it has acquired Acteon Group, an international marine energy and infrastructure solutions company. Established in 1989, Acteon is based in the U.K. and provides engineering and data-driven services to the offshore renewables, nearshore construction, and energy industries. Acteon has over 2,000 full-time employees, including over 400 engineers, across more than 20 countries globally. [Read more.](#)

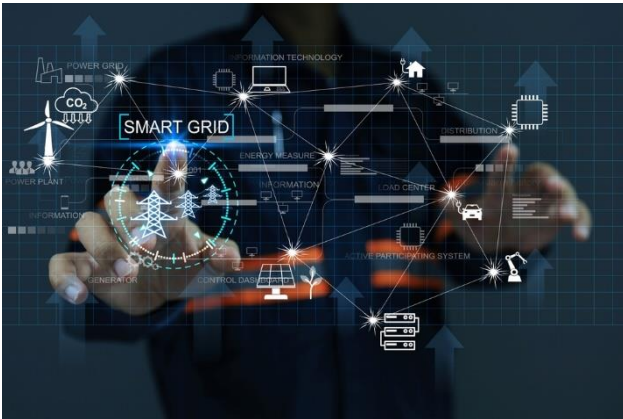
## **SPIE acquires MBG**

SPIE, the leading European provider of multi-technical services in energy and communications, has announced the signing of an agreement to acquire approximately 75% of MBG energy GmbH in Germany. Through this acquisition, SPIE aims to bolster its presence in the rapidly expanding photovoltaic roll-out market, particularly in light of the impending implementation of the EU Solar Standard within the European Performance of Buildings Directive. [Read more.](#)

## **ADVIK buys business assets of Aceleron Energy**

Advik, an automotive component manufacturer, has recently completed the acquisition of the business assets of the UK-based Aceleron Energy Ltd., a company known for its advanced Li-ion batteries. With this, Advik moves into the Electric Vehicle (EV) and Energy Storage System (ESS) sectors. [Read more.](#)

# KEY HIGHLIGHTS



## **Orsted and Eversource get approval for Sunrise Wind**

Sunrise Wind today received its Record of Decision (RoD) from the US Department of the Interior's Bureau of Ocean Energy Management (BOEM), crossing a critical milestone in the federal environmental review process for the offshore wind project serving New York. Ørsted and the utility Eversource plan to build a 924-megawatt project, Sunrise Wind, 30 miles (48 kilometers) east of Montauk, New York. They say the wind farm will power about 600,000 New York homes when it opens in 2026.

[Read More.](#)

## **Tidal energy kite commissioned**

The 25-ton Dragon 12 tidal energy kite was commissioned early on the morning of February 9, delivering the first electricity to the national grid in the Faroe Islands. According to Minesto, the Dragon 12 has been generating and flying in its 8-shaped trajectory with an outer dimension of 70 meters at an average flight depth of 50 meters all as stipulated by the control system. The company remotely monitors and controls the powerplant which is interfaced with the grid management system at SEV's main control room in Torshavn. [Read more.](#) Watch video [here.](#)

## **GridEx VII report highlights further action to enhance grid resilience**

The GridEx VII Lessons Learned Report is a detailed post-exercise review and analysis of NERC and the Electricity Information Sharing and Analysis Center's (E-ISAC) GridEx VII, that took place in November 2023. More than 15,000 participants participated in a two-day exercise, which tested operational and policy measures needed to restore the grid following a severe cyber and

physical attack. The report provides recommendations and actions for utilities, government partners, the E-ISAC, and other stakeholders to prepare for and respond to security incidents that affect the North American electric system. [Read the report](#) (PDF).

## **CEWD's 2023 energy workforce survey results**

The bi-annual report from the Center for Energy Workforce Development (CEWD) resulted in four key findings:

- Emerging technology jobs show significant growth
- New challenge of developing a younger workforce
- Non-retirement attrition is higher post-COVID
- Relatively high adoption DE&I practices

[Read the report](#) (PDF).

## **DOE offers \$34M for 12 grid modernization projects**

The U.S. Department of Energy (DOE) recently announced \$34 Million to improve the reliability, resiliency, and security of America's power grid. Projects across 11 States will support undergrounding electric power lines, helping modernize the electric grid and replace aging power infrastructure. [Read more.](#)

## **BPA staff recommends markets+ over EDAM**

The Bonneville Power Administration released a much-anticipated staff report that tentatively recommends the agency choose SPP's Markets+ over CAISO's Extended Day-Ahead Market (EDAM). Since the summer of 2023, the team making the recommendation has been working with customers and constituents and analyzing Western Interconnection day-ahead market options offered by the SPP and the California Independent System Operator. The team has also engaged in market development efforts with both SPP and the CAISO. BPA staff identified governance, resource adequacy requirements and greenhouse gas accounting and other favorable attributes in their recommendation for BPA to participate in a day-ahead energy market and that BPA should join the Southwest Power Pool's Markets+ initiative. [Read more.](#)

### **CAISO proposed \$6.1B transmission plan**

The California Independent System Operator (CAISO) aims to enhance its grid infrastructure with \$6.1 billion in transmission projects. The plan aligns with California's ambitious goal of adding over 85 GW of clean energy capacity by 2035. Pending approval, these projects are expected to be completed within the next eight to ten years. The draft plan outlines access to more than 38 GW of new solar energy, approximately 21 GW of geothermal capacity, and the import of 5.6 GW of wind energy from Idaho, Wyoming, and New Mexico. Additionally, it allows for 4.7 GW of offshore wind development along the state's northern coast. [Read the draft plan.](#)

### **National Grid announces \$4B plan to upgrade upstate New York power grid**

National Grid plans to invest more than \$4 billion to transform its energy delivery system and propel economic growth across Upstate New York. The plan is known as "Upstate Upgrade." The company is embarking on more than 70 projects through 2030 that will generate thousands of new jobs and more than a billion dollars in additional economic growth, while ensuring the energy grid is able to meet customers' growing demand for electricity. [Read more.](#)

### **Eversource completes \$190M reliability program**

The completion of the \$190 million Eastern Connecticut Reliability Program – a suite of upgrades to the electric grid – is a collection of projects, including infrastructure improvements to local substations and transmission lines, enhance system reliability and communication between substations to better serve customers. [Read more.](#)

### **Report claims fast solution to upgrade power lines**

The 2035 and Beyond Report by GridLab shows that large-scale reconductoring with advanced conductors can rapidly expand transmission capacity and contribute to cost-effective clean energy deployment. In many cases, advanced conductors can double existing transmission line capacity at less than half the cost and a fraction of the time as new lines, according to the new report. [Read the report. \(PDF\)](#)



### **Itron launches cloud computing platform**

Itron, Inc. debuted its Itron Enterprise Edition (IEE) Cloud, an enterprise-grade, cloud-exclusive Meter Data Management (MDM) platform developed to meet the dynamic needs of electric utilities. According to Itron, IEE Cloud, which is available on Microsoft Azure and other cloud platforms, not only lowers total cost of ownership but also eases the utility's IT burden and provides enhanced visibility into operations. The solution is part of Itron's Grid Edge Intelligence portfolio. [Read more.](#)

### **DOE announces \$45M to protect from cyber threats**

The U.S. Department of Energy (DOE) announced \$45 million to 16 projects across six states to protect the nation's energy sector from cyber attacks. Managed by DOE's Office of Cybersecurity, Energy Security, and Emergency Response (CESER), selected projects will help develop new cybersecurity tools and technologies designed to reduce cyber risks and strengthen the resilience of America's energy systems, which include the power grid, electric utilities, pipelines, and renewable energy generation sources like wind or solar. [Read more.](#)

### **Texas-New Mexico Power launched new outage notification system**

Texas-New Mexico Power (TNMP) has launched its outage notification system to improve customer experience and service reliability. The live and operational system uses technology to alert customers immediately about service interruptions, ensuring transparency and enabling users to receive real-time updates during unforeseen events. [Read more.](#)

## FEATURED ARTICLE

# UTILIZING PUBLIC NETWORK

# INFRASTRUCTURE: IS COST THE TIPPING POINT?

By [Jeff Mulvey](#), Solutions Specialist at Expeto

### The Cost of Modernization

Utilities are modernizing at a rapid rate. Growing demand for electricity, mandated decarbonization commitments, integrating alternative energy sources, and managing the impacts of increasingly extreme weather events require utilities across the globe to explore new approaches to address these challenges.

Yet with service areas that cover extensive geographies, delivering these programs requires significant capital investment, and the cost must be passed on to the customer. For essential services like electricity, these increased costs have impacts across the community and supply chains.



### Rethinking Connectivity

Connectivity for a modernized grid has the potential to be a significant cost for utilities. The grid must support bi-directional flow of energy from households back to the grid, the growing proliferation of Distributed Energy Resources (DERs) while at the same time providing hybrid mobility, for example connected workers moving from utility facilities to their service vehicles. Implementing these new technologies also requires SCADA elements deployed throughout the territory. This is only possible by ensuring Field Area Networks (FANs) cover 100% of the service area extending to homes and businesses, while controlled in real-time.

However, upgrading connectivity is prohibitively expensive, with estimates in the ranges of \$100's of millions to billions of dollars, in addition to the specialized skills to build and operate the infrastructure. Traditionally utilities transferred these costs to businesses and consumers, but increasing economic pressures will require alternate options around building out massive private networks. Why would a utility not consider utilizing the public cellular networks?

### Zero-Trust Public Network Infrastructure

Discussions around leveraging public network infrastructure generally have the cost benefits counterbalanced with the risks associated with such a strategy. Public networks are argued to be synonymous with loss of operational control along with increased risks of outages and reduced safety in operations. But advances in network technologies have eliminated the basis for these concerns.

A hybrid 4G/5G mobile network can serve the connectivity needs of the modern grid. The ability to overlay a networking connectivity platform, built with a zero-trust, cloud native architecture, over a public network to provide real-time private network control, visibility and management capabilities down to individual connected assets is a game-changer for utilities looking at alternate solutions. The 'private-over-public' network enables utilities to egress data directly to their networks and leverage their existing security policies to provide complete security and control of field assets and data. Where public coverage is not available or it is more cost-effective to deploy a private network, a private radio network can be deployed, and the connectivity platform will centralize the control of both the public and private mobile networks as a single hybrid mobile network.

Utilities must ensure that the connectivity foundation they choose to power their modernization initiatives can not only prep are for sustained success in the future, but also deliver the greatest value to customers. It's time to consider leveraging public networks as a future-proof, highly secure, fully controllable and rapidly scalable connectivity platform using a single multi-carrier SIM/eSIM with improved mobility coverage as an alternative to traditional private deployments.

## FEATURED ARTICLE

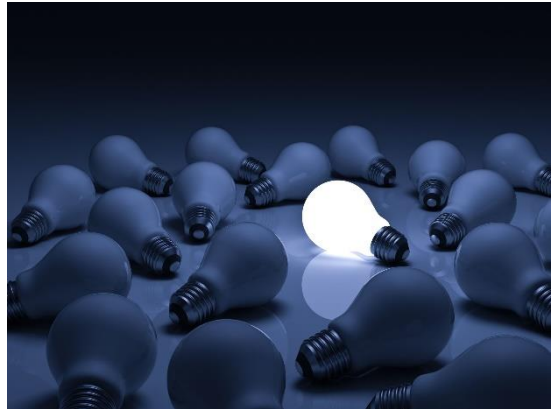
# ENHANCING OMS IMPLEMENTATION SUCCESS RATES: A TRILOGY OF INSIGHTFUL ARTICLES

By Dr. Mani Vadari

This trilogy of articles delves into the intricacies of Outage Management System (OMS) implementations, shedding light on the common hurdles that hinder initial success and offering guidance to bolster success rates. Here is an abridged version of the first article.

## PART ONE

### The Role and Impact of Outage Management Systems



#### Overview

An Outage Management System (OMS) is a utility's toolkit for handling outages. It begins with a detailed network topology model, representing the system's initial state. As outages occur, this model is updated to reflect the actual switched state. The OMS tracks these outages until field crews or automation systems resolve them.

The OMS receives information from customer calls, AMI pings, and field observations. As outages are resolved, the system updates automatically or manually, with time-stamped actions for accurate reporting. From a customer standpoint, the OMS provides real-time visibility into power status and restoration estimates.

#### Evolution of the OMS

Outages have existed since the dawn of the electric utility. OMSs trace back to recording trouble-calls. Initially known as "trouble-call management systems," these captured customer reports of system issues. Incoming calls were manually logged on trouble tickets, sorted by circuit, and analyzed by experienced staff to estimate outage locations.

Early trouble-call management systems began with manual data entry of affected customers' names and locations. As complexity grew, two key additions emerged:

1. **Connectivity Model:** Describing the distribution system's structure, including feeder details and protective devices.
2. **Algorithms:** Leveraging the model to pinpoint root cause fault locations faster.

Over time, these systems evolved, introducing graphical interfaces displaying outages on network diagrams. Automation enabled prioritization based on business rules and streamlined crew dispatch.

Before OMSs, local service centers managed outages without distribution control centers. Spare parts, tools, and equipment were centralized, facilitating efficient field crew dispatch.

## **OMS Functions and Features**

The core functions of an OMS include:

- **Capturing Outage Information:** Gathering data from various sources such as customer reports, automated meter readings, and other systems.
- **Locating Faults:** Based on the collected data, circuit analysis is utilized to pinpoint the most likely fault location on the distribution network. Sometimes this may require a trouble-person to walk the line to actually locate the faulted location and the cause of the outage.
- **Prioritizing Repairs:** Ordering faulted locations for repair based on criteria set by the utility to ensure efficient restoration.
- **Coordinating with Field Crews:** Guiding field personnel to the probable fault locations and ensuring their safety by managing necessary de-energization.
- **Supporting Repair Efforts:** Providing logistical support to field crews to facilitate the repair process and subsequent re-energization of the circuit.
- **Communicating Outage Updates:** Keeping all stakeholders, including customers and local authorities, informed throughout the outage and restoration process.
- **Closing Outages:** Officially conclude the outage event in the system once it is resolved. This is sometimes done in two steps – to get power flowing quickly the field crew may elect to use “cuts” and/or “jumpers” to fix the problem quickly and come back later to make the fix permanent. The OMS will track these temporary fixes until the full system is back to its as-normal connectivity system.
- **Reporting and Metrics:** Supplying data for post-outage analysis and performance metrics, often integrating with advanced corporate reporting systems.

It's important to note that this list is not exhaustive; OMS functionalities can vary, with some systems offering additional features or fewer capabilities depending on the utility's needs.

## **Benefits of an OMS implementation**

Implementing an OMS offers several benefits that enhance the efficiency and reliability of utility services:

- Reduced outage duration/restoration times due to advanced outage location predictions.
- Improved customer satisfaction due to increased awareness of outage restoration progress and providing estimated restoration times.
- Reduce outage costs due to prioritization of resources and better scheduling planning.
- Improved media relations by providing accurate outage and restoration information.
- Improved operational visibility across the network due to the maintenance of the as-switched network and the associated visualization tools.
- Increased ability to handle nested outages and close out outages due to the ability to ping AMI meters in real time.

These benefits contribute to a more reliable and responsive utility service, ultimately leading to a better customer experience and more efficient operations for the utility.

*Stay tuned for our second article in this series, exploring how utility business processes impact OMS implementations and their outcomes.*





## Meet the Experts

Pallavi Gupta

Pallavi Gupta is a project management support analyst at MGS. She graduated from Barnard College in 2020. Her background in anthropology, particularly bioarcheology, led her to work in environmental justice. Passionate about the intersection of climate change and social and physical health, she also takes classes in business analytics and AI. Beyond work and studies, Pallavi enjoys pottery, Pilates, and exploring farmers' markets for dinner party ingredients.

## WHAT'S ON MANI'S MIND?

### Distributech 2024: A record-breaking success!

The 2024 Distributech (DTech) conference in Orlando, Florida saw remarkable growth, with over 17k industry participants and 650 exhibitors. Attendees raised concerns about event location, emphasizing convenience. And, unfortunately, DTech 2024 became a super-spreader event for COVID and flu, but most vaccinated contacts recovered swiftly. Even so, Modern Grid Solutions had a strong presence, connecting with professionals and forging new relationships.

#### DERs and DERMS: Advancements and trends

Continuing from last year, Distributed Energy Resources (DERs) remained a central theme at the DTech conference. Here are the key takeaways:

1. **DER Forecasting:** Vendors are now diving deeper, forecasting DER behavior down to the residence level.
2. **DER Program Management:** The role of the DER Program manager is gaining prominence. It serves as a crucial starting point in the end-to-end DER life cycle.
3. **Location Matters:** DER management varies based on utility location:
  - a. Within an RTO/ISO
  - b. Whether DERs are transmission- or distribution-connected
  - c. The focus on storage
  - d. Impact of FERC Order 2222 on operations
4. **Cloud Architecture:** Many products are being re-architected for cloud readiness. They handle real-time visibility and control across remote assets, from hundreds to hundreds of thousands.

In this dynamic landscape, vendors are continuously enhancing their offerings, introducing new features, and sharing experiences from utilities worldwide. The race is on, with front-runners leading the charge.

#### Key companies

**GE Vernova** showcased its GridOS at the conference. This new approach emphasizes rearchitecting for cloud readiness. While their EMS and ADMS will eventually transition to GridOS, the current focus is on DER and related features like program management, DER forecasting, and distribution-level optimization.

**Hitachi Energy** has integrated ABB offerings into its IT products. While the level of integration remains to be seen, their story and roadmap are clear. Hitachi now provides additional services:

1. **White Glove Delivery:** A 3rd party supplier delivers Hitachi ADMS systems to smaller utilities. Services include data gathering, model updates, validation, and interfacing with related systems.
2. **Method:** A subsidiary focused on system integration.

**Xtensible** stood out at the conference. Their focus was on the CIM database manager, enabling visualization of the CIM model through one-lines and displays. They seamlessly integrate with various data structures and formats, targeting an underserved market space.

Other companies included **Accurant**, **Expeto**, a wireless provider that delivers a hybrid 4G/5G mobile network that can serve the connectivity needs of the modern grid, and all use zero-trust public network infrastructure (see our feature article on page 6), and **Grokit Data** featured its solution for what may be the future of machine-to-machine communications with its Paranet network operating system, protocol, and actors.

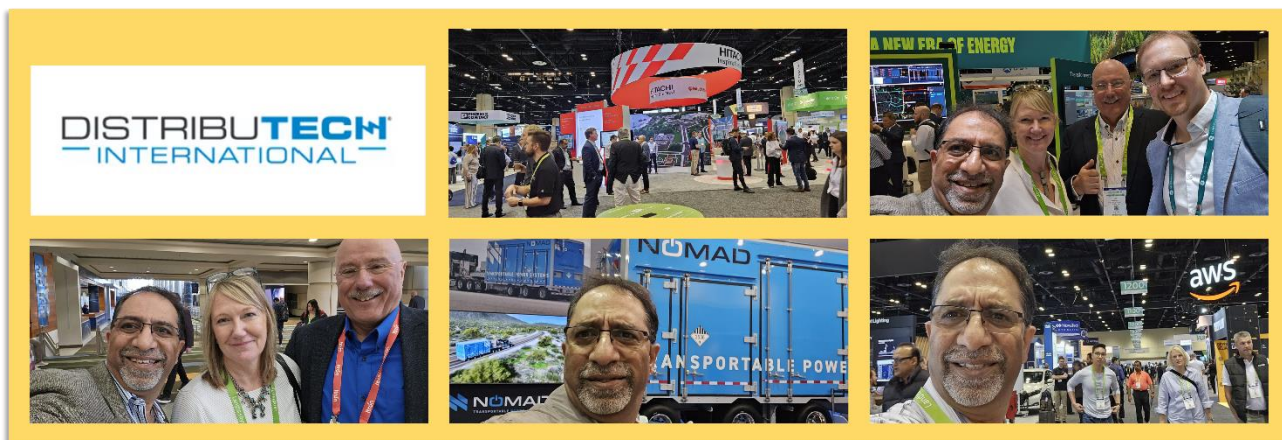
Of course, there were Cloud/IT providers like Amazon, Microsoft, Google, etc., and plenty of wireless providers, too, like Access Wireless, AT&T, and Verizon. Large and small energy consultants had booths, including Accenture, EY, Deloitte, MWRResources, PSC Consulting, and EPE.

All of these companies were there to win the favor of utilities of which many came in large numbers: Alabama Power, AEP, Execlong, BC Hydro, Constellation Energy, DTE, Duke, Entergy, Eversource, HydroOne, PG&E, PPL, Snohomish County PUD, and many others.

### **DTech 2024: A Transformative Experience**

Modern Grid Solutions returned from DTech 2024 with renewed vigor and insights. Here's our takeaway:

1. **Knowledge Amplified:** We left DTech significantly smarter, having delved into cutting-edge technologies and services. The learning curve was steep, but we emerged better equipped to serve our clients.
2. **Industry in Flux:** Our industry is undergoing a seismic shift, with dimensions expanding, scales recalibrating, and speeds accelerating. The future remains enigmatic yet promising.
3. **Collective Optimism:** Amidst it all, there's an electric buzz. Excitement at DTech 2024 surpassed our expectations. We're optimistic about a greener, nimbler, and more exhilarating future than the past century.



# ABOUT MODERN GRID SOLUTIONS

Modern Grid Solutions (MGS) is a global supplier of deep expertise in the electric industry. Our team, each with over 25 years of industry experience, delivers innovative solutions to utilities, corporate clients, and policymakers. Our experts cover a wide range of areas, including engineering, technology, economics, and operations. We're passionate about helping clients navigate the complexities of the modern grid, allowing them to focus on their core business. Our boutique consultancy stands out for its unique value proposition, where seasoned experts treat clients' businesses as their own.

[Read more about MGS.](#)

We focus on delivering value and actionable guidance to our clients, allowing them to flourish in the evolving energy landscape. Our on-going projects include:

- |  |                                      |
|--|--------------------------------------|
| • Canadian Municipal Utility Redesign    | • Northwest Utility Transformation   |
| • Multi-OpCo Distribution Transformation | • Energy Service Provider Assistance |
| • Business Architect Role                | • Decarbonization Strategy           |
| • Vendor Collaboration                   | • Startup Support                    |



## The guy (literally) wrote the books!

Dr. Vadari's books serve as widely-used textbooks in universities across the US and beyond. Major utilities also favor them.

- [Smart Grid Redefined: Transformation of the Electric Utility](#)
- [Electric System Operations – Evolving to the Modern Grid, 2nd edition](#)
- [Resiliency of Power Distribution Systems - Chapter 14, Technology and Policy Requirements to Deliver Resiliency to Power System Networks, by Gerry Stokes, Dr. Mani Vadari and John \(JD\) Hammerly.](#)

Additionally, MGS is the trusted authority for conducting in-depth training sessions on critical industry subjects, including power system fundamentals and grid modernization.

### Don't miss out on our incredible resources!

Head over to our [website](#) and discover our eBook, "[Utility Executive Quick Reference Guide](#)" and Dr. Vadari's Blog, "[Watts on Mani's Mind?](#)" And that's just the beginning! Explore much more on our website. Visit us and unlock a world of knowledge from our industry leaders.

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