



State of the Grid

Certified Minority
Business Enterprise
MBE

QUARTER 1-2 2023



**WELCOME TO OUR
Q1-2 2023 NEWSLETTER!**

Summer is in full swing here in the Pacific Northwest with manageable weather so far. But, according to NERC, as much as two-thirds of North America could face electricity shortages this summer in the event of severe and protracted heat.

Not to mention ongoing drought impacts, continued wildfire threats, and expanding heat wave events.

Here's hoping we can continue to keep our cool through this season!

Thank you for reading!
Dr. Mani Vadari, President

AT MODERN GRID SOLUTIONS, SMART GRIDS ARE BUSINESS AS USUAL
Differentiated services to utilities and their vendors focusing on Smart Grid and System Operations. Our team brings deep expertise in all aspects covering technology and management consulting.



IN THIS ISSUE

CHECK IT OUT!	1
INDUSTRY EVENTS	2
MERGERS AND ACQUISITIONS	3
KEY HIGHLIGHTS	4-5
FEATURED ARTICLES	6-7
WHAT'S ON MANI'S MIND	8
MEET THE EXPERTS	8
MORE ABOUT MODERN GRID SOLUTIONS	9



CHECK IT OUT!

Mani is on two new boards

Nationwide Energy Partners (NEP) has announced the appointment of Dr. Mani Vadari as a Board Advisor to the energy services firm and its sister company Armada Power. Nationwide Energy Partners is an energy services company exclusively serving multifamily communities through privatized utility ownership and clean energy technologies. Armada Power's patented water heater control technology provides grid resiliency, carbon reduction, and consumer comfort to grid operators, utilities, and consumers. Read more [here](#).

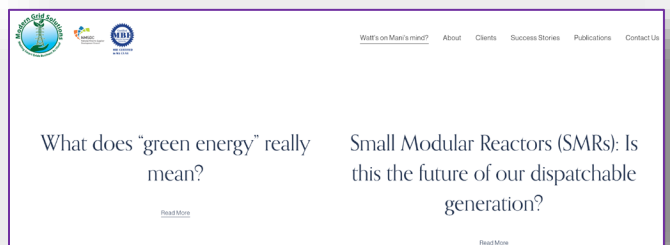
CIGRE Committee JWG C5/C6.29 has a new member

Dr. Vadari has joined CIGRE Joint Working Group "New Electricity Markets, Local Energy Communities," within (SC C5) Electricity Markets and Regulation. This working group will provide a worldwide overview of DER technology applied in Local Energy Communities (LEC), planning and operation of DER, and the development of LEC, by describing their level of development and the regulatory framework. The aim is also to understand how members of an LEC can be market actors and how the LEC can be itself a market actor. More info [here](#).

MGS Blog is Live!

Modern Grid Solutions has been creating content in various forums for many years. We excel in the technical and also strive to make what we write consumable. We've launched a new blog featuring short articles for everyone, not just power system engineers. The blog is called "*Watts on Mani's Mind*," with a nod toward our energy universe from the perspective of Dr. Mani Vadari, MGS Founder and President.

Our first two posts are available from the MGS website [here](#).





INDUSTRY EVENTS

Upcoming events

CONFERENCE: Sustainable Aviation Fuel Conference

August 17, 12:00 pm – 7:00 pm in Seattle at the Museum of Flight

Every year, the Washington State Academy of Sciences (WSAS) brings together people and ideas at its annual symposium to address a critical issue facing the state. This year, the academy is focusing on how Washington State and the aviation industry can reach their emission reduction goals through innovations in technology, public policy, infrastructure, and workforce development.

The 2023 symposium – Sustainable Aviation in Washington State: Connecting Policy, Technology, Infrastructure and Workforce Development Needs – will be held on August 17 from 12:30-7 pm at The Museum of Flight in Seattle. Registration is required.

Dr. Vadari is speaking on a panel, “Infrastructure Changes for Sustainable Propulsion.” The topic will address electrical/non-standard aviation and challenges to the power grid.

View the [full program](#) and [register](#).

WASHINGTON STATE Academy of Sciences

THE 16TH ANNUAL WSAS SYMPOSIUM

Sustainable Aviation in WA

Connecting Policy, Technology, Infrastructure and Workforce Development Needs

August 17, 2023, 12:00 pm to 7:00 pm, The Museum of Flight, Seattle

Reaching the emission reduction goals of Washington State and the aviation industry requires the adoption of new technologies as well as innovations in public policy, infrastructure and workforce development. Through its annual symposium, WSAS will bring together the people and ideas needed to map Washington State's path to leadership in this rapidly developing sector.

JOIN US if you are an elected official, staff of federal, state or local government, or are a member of the aviation community or academia.

SYMPOSIUM AGENDA
View the full agenda at washacad.org/2023-symposium

WELCOME
Roger Myers, Symposium Chair, WSAS Past President, and Aerospace Consultant
Washington State Government Official, TBD

OPENING KEYNOTE: A Vision for Sustainable Aviation: The Need, Technology Options, and Implications
Richard Wahls, Sustainable Flight National Partnership, NASA Aeronautics Research Mission Directorate

PANEL 1: Sustainable Aircraft Propulsion Technologies and Fuels
Moderated by Dr. Anna Oldani, Federal Aviation Administration

PANEL 2: Infrastructure Challenges for Sustainable Aviation
Moderated by Melinda Pagliarello, Airports Council International – North America

2ND KEYNOTE: Workforce Development for the Sustainable Aviation Ecosystem
Howard E. McKenzie, Chief Engineer, The Boeing Company

PANEL 3: Creating the Sustainable Aviation Ecosystem Workforce
Moderated by Dr. Kristi Morgansen, Dept. of Aeronautics and Astronautics, University of Washington

SYMPOSIUM SUMMARY AND CLOSING REMARKS

NETWORKING RECEPTION IN THE MUSEUM OF FLIGHT'S GREAT GALLERY

REGISTER: washacad.org/2023-symposium

CO-ORGANIZERS

WASHINGTON STATE Academy of Sciences | JCAWI | Washington State Department of Commerce | THE MUSEUM OF FLIGHT | AFA AEROSPACE FUTURES ALLIANCE

Recent past events

CONFERENCE: India Smart Utility Week

February 28-March 4 in New Delhi

Dr. Vadari attended the 2023 India Smart Utility Week and delivered a Master Class on “Energy Transition to Net Zero Power – Strategies and Pathways”, delivered a keynote speech on “Renewable Energy – the Need to Dispatch DERs”, and moderated a panel on “Evolving Architectures on Net Zero Power Systems”.

See photo to right.



CONFERENCE: Accenture International Utilities and Energy Conference (IUEC)

April 3-5 in Los Angeles, CA

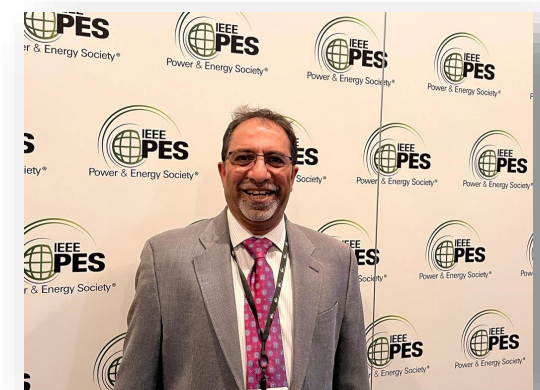
Dr. Vadari participated in a panel session on “Accelerating Grid – The Future of Distribution Strategy.” The discussion centered on how the energy transition impacts the various aspects of the value chain from generation to T&D to retail.

CONFERENCE: IEEE PES General Meeting

July 16-20 in Orlando, FL

Dr. Vadari attended the 2023 IEEE PES General Meeting and was recognized in the Awards ceremony for being elevated to the grade of IEEE fellow.

See photo to right.





MERGERS AND ACQUISITIONS

RWE completes acquisition of Con Edison Clean Energy Businesses

RWE AG, one of the world's leading renewable energy companies, successfully closed the acquisition of all shares in Con Edison Clean Energy Businesses, Inc. (Con Edison CEB), from Consolidated Edison, Inc. after only five months from the announcement of the transaction. All relevant authorities have approved the acquisition. The transaction makes RWE the number four renewable energy company in the U.S. and the country's second-largest solar owner and operator, with business activities now spanning across the majority of U.S. states. Read more [here](#).

AEP agrees to sell unregulated renewable assets

American Electric Power (AEP) has entered into an agreement to sell its 1,365-megawatt (MW) unregulated, contracted renewables portfolio to IRG Acquisition Holdings, a partnership owned by Invenergy, CDPQ and funds managed by Blackstone Infrastructure, at an enterprise value of \$1.5 billion including project debt. The sale is expected to close in the second quarter of 2023. At the closing, AEP expects to net approximately \$1.2 billion in cash after taxes, transaction fees and other customary adjustments. Read more [here](#).

WEC to buy 80% ownership of the largest solar project under construction in the U.S.

WEC Energy Group announced that the company has agreed to acquire an 80% ownership interest in the Samson I Solar Energy Center. Samson I is a 250-megawatt project located about 140 miles northeast of Dallas, Texas, and is part of the five-phase Samson solar portfolio. The portfolio is being built on 18,000 acres in northeast Texas, and when completed, it's expected to total 1,300 MW. Samson is the largest solar project under construction in the United States. Read more [here](#).

AES buys 2-GW solar-plus-storage project from Avantus

In similar news, Avantus (formerly 8minute) announced the sale of the Bellefield project, the nation's largest permitted solar project with integrated storage, to The AES Corporation. Located in Kern County, California, Bellefield will feature a total of one gigawatt of solar and up to one gigawatt of energy storage across two phases. With more than 90 projects currently in development, Avantus has one of the largest pipelines of solar and energy storage projects in the United States, exceeding 50 gigawatts of system capacity, including 42 GW of solar and 78 GWh of energy storage – enough to provide power for more than 30 million people throughout California, Texas and the Southwestern United States. Its portfolio features historic milestones, including the U.S.'s largest solar cluster, the first operating solar plant to beat fossil fuel prices and a project to deliver solar with storage at record-low prices. Read more [here](#).

Billionaire acquires Sun Cable renewable project

The collapsed US\$20 billion Sun Cable renewable energy project has been rescued by part owner and Australian technology entrepreneur Mike Cannon-Brookes. Sun Cable's mega project includes the proposed Australia-Asia PowerLink, which would send power from a 20 gigawatt (GW) solar farm with the world's biggest battery in northern Australia across a 4,200 kilometers long (2,610 miles) undersea cable to Singapore. Read more [here](#).

Vistra acquires Energy Harbor's nuclear and retail businesses

Vistra Corp. announced that it has executed a definitive agreement with Energy Harbor Corp., pursuant to which Energy Harbor will merge with and into a newly-formed subsidiary of Vistra. The transaction will combine Energy Harbor's nuclear and retail businesses with Vistra's nuclear and retail businesses and Vistra Zero renewables and storage projects under a newly-formed subsidiary holding company, referred to generally as "Vistra Vision." This combination creates a leading integrated retail electricity and zero-carbon generation company with the second-largest competitive nuclear fleet in the country, along with a growing renewables and energy storage portfolio. Read more [here](#).

Bitfarms to acquire 22 MW of hydropower capacity in Quebec

Bitfarms, a global Bitcoin vertically integrated company, has entered into agreements to acquire 22 MW of hydropower capacity and to lease a site in Baie-Comeau, Quebec. The Baie-Comeau area is home to five hydroelectricity generation facilities with over 5.4 gigawatts nameplate capacity. Bitfarms currently has 10 farms, which are located in four countries: Canada, the United States, Paraguay, and Argentina. Powered by predominantly environmentally friendly hydroelectric and long-term power contracts, Bitfarms is committed to using sustainable, locally based, and often underutilized energy infrastructure. Read more [here](#).

World's first fusion energy purchase agreement

Helion Energy (Helion) announced an agreement to provide Microsoft with electricity from its first fusion power plant. Constellation will serve as the power marketer and will manage transmission for the project. The plant is expected to be online by 2028 and will target power generation of 50 MW or greater after a 1-year ramp-up period. The planned operational date for this first-of-its-kind facility is significantly sooner than typical projections for the deployment of commercial fusion power. Read more [here](#).

Black & Veatch acquires Bird Electric

Black & Veatch announced that it has acquired Bird Electric Enterprises and Bird Electric Properties both part of BASElectric Holdings, LLC (collectively known as Bird Electric). The agreement, driven by growing demand for construction solutions to address megatrends impacting the world, accelerates the growth of both companies by combining key industry engineering, construction and procurement talent and business-enabling resources. Bird Electric is a U.S. self-perform electrical construction services provider to electric utility clients with a national reach in emergency power restoration – a key area Black & Veatch is focused on growing. Bird, with more than 600 employees, also has long-established relationships with fuels producers, and its capabilities are relevant and applicable to other adjacent linear and distributed construction markets and solutions that Black & Veatch serves. Read more [here](#).

NiSource to sell minority stake in NIPSCO to Blackstone

Blackstone Infrastructure Partners affiliate agrees to acquire 19.9% non-controlling equity interest in NIPSCO for \$2.150 Billion, with an additional equity commitment of \$250 million to fund ongoing capital requirements. Blackstone invests alongside NiSource in NIPSCO to fund the energy transition and accelerate the reindustrialization of the Midwest. NiSource reaffirms its commitment to Indiana and to its consolidated credit, earnings and growth commitments through 2027. Read more [here](#).

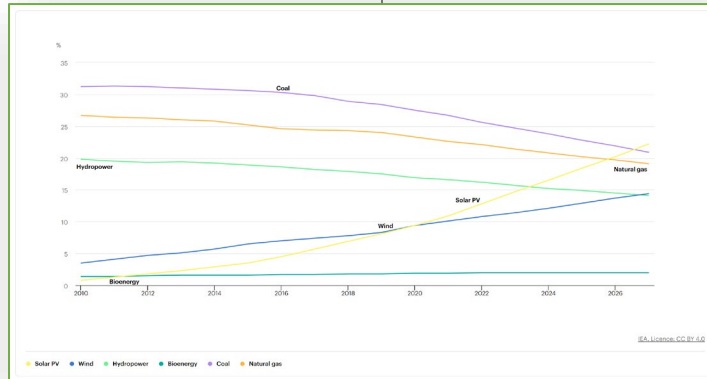




KEY HIGHLIGHTS

Report shows solar to surpass coal in the next five years

The global energy crisis has triggered unprecedented momentum behind renewables, with the world set to add as much renewable power in the next 5 years as it did in the past 20. Utility-scale solar PV and onshore wind are the cheapest options for new electricity generation in a significant majority of countries worldwide. Global solar PV capacity is set to almost triple over the 2022-2027 period, surpassing coal and becoming the largest source of power capacity in the world. The report also forecasts an acceleration of installations of solar panels on residential and commercial rooftops, which help consumers reduce energy bills. See chart to right. Read more [here](#).



IEA says global investment in clean energy to rise to USD 1.7 trillion in 2023

Investment in clean energy technologies is significantly outpacing spending on fossil fuels as affordability and security concerns triggered by the global energy crisis strengthen the momentum behind more sustainable options, according to the IEA World Energy Investment 2023 report. Annual clean energy investment is expected to rise 24% between 2021 and 2023, driven by renewables and electric vehicles, compared with a 15% rise in fossil fuel investment over the same period. But more than 90% of this increase comes from advanced economies and China, presenting a serious risk of new dividing lines in global energy if clean energy transitions don't pick up elsewhere. Read more [here](#).

PacifiCorp found liable for 2020 destructive wildfire

A jury in Portland, Oregon decided that the state's second-largest electric utility PacifiCorp – which owns Pacific Power – must pay punitive damages for causing the Labor Day wildfires in 2020 – in addition to the earlier verdict in a class-action suit for negligence. It's expected to amount to billions of dollars. The jury awarded \$73 million to 17 homeowners named as plaintiffs in the case, with damages for a broader class involving the owners of nearly 2,500 properties burned in the fires. Read more [here](#).

National Grid launches 'Great Grid Upgrade' in the UK

National Grid has announced two significant moves to get its Great Grid Upgrade underway. The utility issued a call for supply chain partners to deliver the major grid upgrade, representing £4.5 billion (\$5.6 billion) worth of network construction by 2030. The program will initially center on nine onshore projects across England and Wales, part of the significant new electricity network infrastructure needed to move more clean energy from where it's generated to where it's needed. National Grid also announced proposals for a 90km transmission project, which they state is in early development. The new infrastructure will connect green energy generated from the Humber and in the North Sea to the main grid, the motivation behind the Great Grid Upgrade. National Grid is calling the Great Grid Upgrade the "largest overhaul of the grid in generations". Read more [here](#).

Duke to see its 3.4 GW commercial renewable business for \$2.8B

Duke Energy announced it has reached an agreement to sell its unregulated utility-scale Commercial Renewables business to Brookfield Renewable, one of the world's largest owners and operators of renewable power and climate transition assets, at an enterprise value of approximately \$2.8 billion, including non-

controlling tax equity interests and the assumption of debt. Duke Energy's expected net proceeds from this transaction are approximately \$1.1 billion, subject to certain customary adjustments. Duke Energy will utilize the proceeds to strengthen its balance sheet and avoid additional holding company debt issuances. This will allow the company to focus on the growth of its regulated businesses, including investments to enhance grid reliability and help incorporate over 30,000 megawatts of regulated renewable energy into its system by 2035. Read more [here](#).

Energy execs prioritizing reliability over Decarbonization

Denmark-based DNV's latest report, [Trilemma and Transition](#), showed that energy executives are now prioritizing the security (reliability) of energy over and above providing clean and affordable energy. In fact, most executives say the energy

system will not resolve the energy trilemma in the next decade. Around 39% of energy professionals said they are confident about meeting decarbonization and climate targets. Even so, progress in the energy transition is the greatest driver of confidence among energy professionals for the year ahead, and a majority believe the energy transition is accelerating. The DNV report analyzed the views of more than 1,300 senior energy professionals, based on a survey conducted between December 2022 and January 2023. Read more [here](#). The chart to the left is from DNV's [Trilemma and Transition](#) report.

\$11 billion 'historic' investment available to U.S. rural utilities

The U.S. Biden-Harris Administration announced the availability of nearly \$11 billion in grants and loan opportunities to help rural energy and utility providers bring clean energy to their communities. The funds are being touted as the single largest investment in rural electrification since President Franklin D. Roosevelt signed the Rural Electrification Act into law in 1936. Funding is available through two programs under the Inflation Reduction Act. Specifically, the U.S. Department of Agriculture (USDA) will be opening a Letter of Interest process for the Empowering Rural America ("New ERA") program, which makes \$9.7 billion available to eligible rural electric cooperatives to deploy renewable energy systems, zero-emission and carbon capture systems. In addition to New ERA, USDA will also be opening a Letter of Interest process for the Powering Affordable Clean Energy (PACE) program, which makes \$1 billion available in partially forgivable loans to renewable-energy developers and electric service providers, including municipals, cooperatives, and investor-owned and Tribal utilities to help finance large-scale solar, wind, geothermal, biomass, hydropower projects and energy storage in support of renewable energy systems. Read more [here](#).

Electric co-ops apply for smart grid funding

An Association representing 69 electric co-ops in the USA has applied for bipartisan funding to deploy smart grid technologies, including advanced analytics, distributed automation and Advanced Metering Infrastructure (AMI) among others. NRECA Research, the R&D arm of the National Rural Electric Cooperative Association (NRECA) applied for the smart grid development funding from President Biden's Inflation Reduction Act for the Association's 69 electric co-ops across 26 states. If approved, the co-ops will use the funds to complete high-priority grid modernization projects and increase the reliability and resilience of their electric power systems. Specific co-op projects in the consortium application cover a range of technologies, including advanced analytics, distribution automation, unmanned aerial systems and second-generation AMI. Read more [here](#).

Duke Energy to spend \$65 billion over five years on low-carbon transition

Duke Energy CFO Brian Savoy told Reuters that Duke expects to spend \$65 billion over the next five years with most of it going to pay for its transition to low-carbon energy sources. Savoy said about 55% will go toward the power grid with much of the rest funneled toward renewable electricity generation. Duke expects to reduce carbon emissions by more than 50% by 2030 and achieve net-zero carbon emissions by 2050. Duke's power and gas utilities serve about 10 million homes and businesses in the Carolinas, parts of Florida and the Midwest, and it owns about 50,000 megawatts (MW) of energy capacity. As part of Duke's plan, Savoy said the company plans to retire all of its coal plants by 2035 when it will have about 30,000 MW of renewables like wind and solar, and about 10,000 MW of energy storage, like batteries. The company currently has about 16,000 MW of coal-fired power plants. Read more [here](#).



Electricity consumers in the dark on energy conservation initiatives offered by their utility

Despite "record high" residential electricity prices, customers are not taking advantage of energy management and conservation programs offered by utilities, J.D. Power said in a recent report. Only 14% of residential electricity customers participated in one or more energy management programs in 2022, the firm said, citing internal data. Similarly, only 11% took advantage of product rebates and 22% enrolled in pricing programs. And those participation rates are largely unchanged from 2020 levels, despite electricity bills rising 13.1% on average last year, the report said. Read the report [here \(PDF\)](#).

Research and innovation priorities road mapped for Europe

The energy system research and innovation (R&I) roadmap for 2022-2031 has been released by the European Technology Innovation Platform Smart Networks for Energy Transition (ETIP SNET). The roadmap, an update of the 2020-2030 edition published in June 2020, is aimed to describe the current ten-year path towards the 2050 carbon-neutral energy system with massive use of renewables for large-scale electrification, widespread deployment of smart grid technologies and sector coupling of energy carriers via storage. The roadmap is based on the concept of 'high-level use cases' that were previously identified and should be realized by 2031. For each, several 'priority project concepts' are detailed covering key integration features for the future energy system and on which individual projects can be based, extending the list of those previously identified to be well underway before 2025. Read more [here](#).

French-Spanish subsea interconnection underway

Electricity Interconnection France-Spain ([Inelfe](#)), the joint venture of the Spanish (Red Eléctrica) and French (RTE) electricity transmission networks, awarded a major interconnection contract to a Hitachi Energy/Vinci consortium. Hitachi will supply four high-voltage direct current (HVDC) converter stations to interconnect France and Spain via a subsea cable across the Biscay Gulf. The HVDC link will improve reliability in the region and allow for more renewable energy integration as well. The Biscay Gulf interconnection, labeled as a project of common interest (PCI) at the European level, will consist of two HVDC links, with a converter station at each end of both systems. Combined, the links will efficiently supply a total of 2,000 MW at 400 kV over 248 miles (400 km). Read more [here](#).

UK's first transmission-connected solar farm goes live

The new 49.9 MW Larks Green solar farm is the first in the UK to be directly connected to National Grid's high voltage transmission network, with previous solar projects having been simply connected to their local Distribution Network Operator's system. Now solar energy can travel further distances, potentially plugging energy gaps in parts of the country that don't have any locally-connected solar farms.

The solar plant comprises 152,400 solar modules installed across a 200-acre plot. According to the developers, it will generate an estimated 73,000 MWh annually – enough to power the equivalent of over 17,300 homes – and has the potential to displace 20,500 tons of CO₂ each year compared to traditional energy production. Read more [here](#).

AI helps inspect power poles in Austria

Austria's TSO Austrian Power Grid (APG) is introducing artificial

intelligence for virtual drone-based inspection of its 12,000 power masts. All of APG's high-voltage pylons are inspected at least twice a year, with drones having been used for years. If, as a result of the condition assessment of the masts, a new protective coating is required, it is applied in several passes. In order to control the quality of the coating, an ascent is still necessary and for which the line must be switched off.

APG envisages that through the use of AI in conjunction with drones, this step could soon be taken from the air, both more cost-effectively and resource-saving and improving the safety and efficiency of overhead line technicians. Read more [here](#).

Open-source global energy system model, PyPSA-Earth

PyPSA-Earth, an expansion of the PyPSA-Eur model for Europe, aims to facilitate large-scale collaboration by offering a tool that can model the global energy system or any component of it using data at high geographical and temporal resolution. The PyPSA- (Python for Power System Analysis)Earth initiative has launched as an open data-based open-source global energy system model. As a demonstration of the model data, validation has been performed for the entire African continent with the optimization features tested with a 2060 net zero planning study for Nigeria. (See image to left.) The PyPSA meets Earth initiative works on open modeling, open data, open source solver support and open communities for energy system planning. Many of the data, model, and solver activities are neutral to the model framework, opening the door for collaboration outside of the PyPSA space. The tools are developed and maintained by members of the multi-organizational PyPSA developer team. Read more [here](#).

Eversource to build New England's largest transmission project for offshore wind

Eversource is building what it calls "the Cape Cod Solution": electrical upgrades to carry offshore wind power and reduce outages on the Cape, the company says. The project consists of three phases. The first, begun in April, is the construction of a new 115-kilovolt overhead transmission line from the Bourne Switching Station to the substation in West Barnstable. The line will be built to 345-kilovolt standards to accommodate offshore wind, but will initially operate at 115 kilovolts. Avangrid, owner of Park City Wind, is paying for the extra capacity, according to Eversource. That line is expected to be complete by the middle of next year. Read about Phases 2 and 3 [here](#).



FEATURED ARTICLE



Addressing energy equity

By Anil Jampala, Senior Director at [PSC Consulting](#)

The U.S. electricity grid is foundational to the nation's economic vitality, stability, and societal well-being. Recent data indicates significant inequities in energy sourcing and distribution. Without strategic planning and thoughtful policy design, the benefits of clean energy investment will not be spread equitably.

Grid evolution

The "grid" is a wide-area synchronous network of more than 7,300 power plants, 160,000 miles of high-voltage power lines, and millions of miles of low-voltage distribution transformers.[1]

This complex lifeline is aging and struggling to meet current demands, major blackouts are increasing, and cyber warfare and terrorist attacks are looming. The grid faces a future of more people and electricity demands to maintain residences, commerce, agriculture, transportation, and more. Renewables are increasing, and consumers are becoming prosumers, further straining the grid.

Energy burden

The Universal Declaration of Human Rights of 1948 recognizes access to energy as a human right, declaring it essential for life, food, shelter, health, and education. However, some U.S. communities still cannot afford or access electricity.

The 2020 Residential Energy Consumption Survey found that 34 million U.S. households struggled to pay energy bills or maintain adequate temperatures in their home. About one in five Americans reported forgoing other necessities (e.g., food) to pay their energy bills. Of this population, 10% struggled with utility disconnections and live in unhealthy temperatures. Certain demographic groups reported more instances of energy insecurity, including lower-income households, households with children, and renters.[2]

Energy equity

Energy equity recognizes disadvantaged communities that have had underinvestment in clean energy infrastructure and provides a level playing field for marginalized groups to participate in and benefit from the energy market. Energy equity aims to safeguard access to an impartial energy system that reaches all levels of society, which requires a balanced distribution of benefits using a strategic roadmap to implement operational technologies (e.g., infrastructure development, system design, procedures, and policies).

Building the framework

Environmental justice and energy equity are new to the arena and have yet to be widely adopted. However, we are starting to see policymakers, labs, and utilities address energy burden disparities through community outreach, research and development (R&D), focused initiatives, and legislation.

Federal investments directed to environmental justice

The Biden-Harris administration has made a national commitment to environmental justice through Section 223 of EO 14008, which established the Justice40 Initiative. This initiative directs 40% of the overall benefits of certain federal investments to flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution. The Department of Energy (DOE) is playing a major role in Justice40, which will apply to a large fraction of its programs, including many R&D programs.

R&D through our national labs

Several national labs are conducting innovative research and development to improve the nation's electrical grid infrastructure. The Pacific Northwest National Lab is laying the groundwork for incorporating equity and environmental justice as a central pillar of grid modernization initiatives. The National Renewable Energy Laboratory is developing and evaluating technologies and systems that enable electric grids to function more efficiently, integrate more renewable energy, and be more resilient and secure under all operating conditions.

Utilities forging their own path

Utilities have an opportunity to be a major change agent in the drive toward energy equity. One state's approach is building a just and regenerative energy system that prioritizes the health and well-being of communities at each stage of the process. In 2021, Washington State's Clean Energy Transition Act (CETA) came into full effect—mandating that all utilities ensure an equitable distribution of benefits and burden reduction in achieving the law's goals.

Addressing energy inequity

Initiatives to address energy equity are starting to take root. Many examples exist of states creating opportunities for low- and moderate-income households to participate in the clean energy economy. Energy equity solutions are surfacing throughout various government organizations, academic institutions, and communities nationwide. For example:

- DOE has developed the Low-Income Energy Affordability Data (LEAD) Tool to illustrate housing and energy characteristics for low- and moderate-income households. Strategic analytics is vital to helping stakeholders make data-driven decisions when planning energy goals.
- The University of Michigan's School for Environment and Sustainability has developed the Energy Equity Project (EEP) Framework. This holistic guide and accountability tool focuses on measuring and advancing energy equity and ensuring measurable progress.
- For over 15 years, the American Council for an Energy-Efficient Economy (ACEEE) has published scorecards and other progress reports to benchmark and drive clean energy action among states, cities, and utilities. In February 2021, ACEEE started a two-year Leading with Equity Initiative to define and develop equitable energy efficiency policies and programs.

[1] U.S. Energy Information Administration (EIA), "U.S. electric system is made up of interconnections and balancing authorities," <https://www.eia.gov/todayinenergy/detail.php?id=27152>, July 2016.

[2] U.S. Energy Information Administration (EIA), "In 2020, 27% of U.S. households had difficulty meeting their energy needs," [https://www.eia.gov/todayinenergy/detail.php?id=51979&src=%E2%80%B99%20Consumption%20%20%20%20%20%20Residential%20Energy%20Consumption%20Survey%20\(RECS\)-b6](https://www.eia.gov/todayinenergy/detail.php?id=51979&src=%E2%80%B99%20Consumption%20%20%20%20%20%20Residential%20Energy%20Consumption%20Survey%20(RECS)-b6), April 2022.



FEATURED ARTICLE



Distributech International 2023 Takeaways

By Dr. Mani Vadari

The 2023 Distributech (DTech) was back in its familiar surroundings at the San Diego Convention Center February 7-9. The word on the street was that this may have been the largest attendance at a DTech ever, possibly as a result of the pent-up release from the pandemic. The breakdown of attendees shows that this is truly an international event.

Here are the figures from Clarion Events who organize this exhibition and conference.

- 17,000+ total attendance
- 3,500+ conference delegates
- 500+ Exhibitors
- 400+ speakers
- 76% Decision makers

My biggest objective, as always at these conferences, was to catch up with old and new friends. Going to different booths and catching up with people, some of whom we hadn't seen in two years. Several people had changed jobs, some had just retired, and others had just started their own companies/consulting companies. When you have that many friends, all in one place, almost every 30-minute slot gets taken away either at a coffee event with an old colleague, at a booth learning something new about a product, or at a vendor event in the evening.

The biggest takeaway continued (from last year) to be DERs, DERMS, storage, and distributed renewables – the ability to manage Distributed Energy Resources (DERs). This was a continuation from 2022, and we could not go to a single booth without discussing DER Management. Everyone needed to tell us how their offering was different, better, and/or solved some specific nuance of the problem that others did not. Everyone's product/offering was improving, and new features were being added at the request of one customer or the other. The bottom line is (and I made this statement in my book in 2012), this area has not yet stabilized, the products still need to mature, and even the utility industry does not have a good enough handle on what its needs are. Everyone is still looking at the solution from their own custom needs perspective (which absolutely makes sense) – but, as a result, vendors are also going from one custom implementation to another.

Some front-runners are pulling ahead - some through their own developments, some through acquisitions, and some through a combination of both.

The term DER continues to mean different things to people. As you all know, there are several dimensions to this discussion:

- Transmission, distribution, or behind the (residential or small-commercial) meter (BTM)
- Renewable – solar, wind
- Storage – grid-scale or small scale
- Solar (or wind) paired with storage (AC-coupled or DC-coupled)
- Demand response
- Microgrids, Virtual Power Plants (VPPs), nanogrids
- Electric vehicles, Vehicle-to-grid (V2G).
- And others.

But all of this DER talk is for another article in a future newsletter – Stay tuned.

The next fun area for us to explore was some of the newer vendors/solution providers we met with looking to learn something from them and even understand how their solutions/approaches could be useful to our clients in

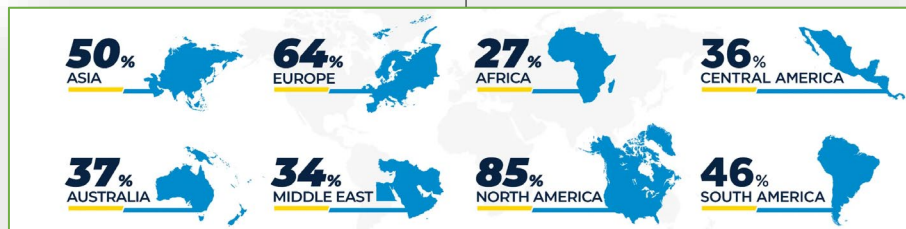
the utility industry. We met several of them, including Itron, Accurant, Hitachi Vantara, and Integral Analytics to name a few. There were many others!

Overall DTech 2023 was an excellent conference for MGS to attend. We came

back significantly smarter, better educated on some of the newer technologies and services, and, most importantly, much more capable of providing better services to our clients. Our industry is in the throes of a change in dimensions, scale, and speed with a future whose end state is still somewhat unknown. We can all agree that the future will be better, nimble, greener, and much more exciting than it has been in the last 100+ years. We saw a level of excitement that we had not seen before at this event, giving me even more optimism about our collective future!

Mark your calendars for Distributech International 2024 which is being held February 27-29 at the Orange County Convention Center in Orlando, FL.

You can find out more information about the event [here](#).





WHAT's on MANI's MIND?

Decarbonization and Electrification: The perfect match?

Two buzzwords in the electric industry these days are “decarbonization” and “electrification.” These two words are in the minds of policymakers, legislators, researchers, academics, and others. I want to start a dialogue about what they are, what their impacts are, and how utilities and individual customers should think about them, respond to them, and get ready for them.

These words are related but shouldn't be conflated. Let's unpack them by first defining the terms and putting some limits around them to better understand their relationship - with each other and separately - in the context of our ongoing energy transition conversation.

In an oversimplified nutshell, decarbonization is about removing fossil fuels, and electrification is about what we could use instead of those fuels, although there are other alternatives besides electricity.

Decarbonization

This is about taking all carbon-based fuels out of the system. These fuels are used in a variety of ways:

- Built environment: Residential/commercial buildings for use in cooking, heating, and so on
- Transportation: Cars, buses, trucks, LCVs [Light Commercial Vehicles], and others
- Industrial/Power generation: Coal-fired, and/or Combined-Cycle Gas Turbine [CCGT] plants, or others

Different parts of society are impacted differently based on legislative and/or regulatory changes. For example, Washington State will require all-electric space and water heating in new commercial and multifamily construction, making it the first state to incorporate building electrification mandates into statewide energy codes. On April 22, 2023, The Washington State Building Code Council, or SBCC, also voted to advance proposals that would restrict fossil fuel use in residential buildings, which would go into effect in 2023 alongside the commercial code updates.

The vote is a milestone for building electrification advocates, who have worked to restrict natural gas use in buildings in towns, cities, and counties in several states since 2019.

Electrification

Electrification is about moving the consumption of energy from “whatever-it-is-right-now” to electricity. This also has multiple dimensions similar to decarbonization.

- Built environment: Replacing technologies or processes in residential and other buildings from fossil fuels (i.e., natural gas) to electricity-powered equivalents.
- Transportation: Replacing gas-burning (ICE) vehicles with Electric Vehicles (EVs) across all types, such as cars, light commercial vehicles, buses (school buses, and metro buses), and trucks.

- Industrial/Power generation: Moving electric generation from fossil fuels towards renewable sources, such as wind and/or solar.

So what?

Removing carbon and replacing it only with clean electricity sounds great, but the reality is much more complicated. Each of these segments (transportation, power generation, built environment) has its own alternatives beyond electricity, spanning everything from Renewable Natural Gas (RNG) to hydrogen.

In the next edition of this newsletter, I'll get into the nuances of various solutions and expand on the complexity of meeting the growing demand for clean electricity.



MEET THE EXPERTS

Catherine Koch brings over 32 years of utility experience in electric grid and gas pipeline operations planning, engineering, and real-time response. She has served as an executive at the Director level for the past 11 years at Puget Sound Energy, most recently as the Director of delivery system planning at Washington state's largest energy company, which serves 1.5 million customers and is a leader in renewable energy. Catherine's career is highlighted by her game-changing leadership that proactively drives culture and process



Catherine Koch

transformation and solutions through the evolution of the energy landscape. Her accomplishments include broadening the energy delivery infrastructure planning processes across utility organizational boundaries to increase the value of planned investments that leverage modernized electric assets and decarbonized natural gas pipelines. Other highlights include:

- Transformational leader with a successful record of leading and partnering with stakeholders and teams to achieve great results while navigating uncertainty and disruption.
- Strategic systems thinker who translates big-picture vision and builds consensus across diverse perspectives to achieve successful outcomes.
- Creative problem solver who cuts through clutter and beyond departmental boundaries to generate options and secure broad buy-in and resources for solutions to complex business challenges.
- Inspirational leader taking people to new heights and accomplishments, leaping beyond incrementalist improvement approaches and instilling pride and confidence in the culture.

Catherine is currently supporting clients in rate case strategy, testimony development, and data requests coordination as well as providing expertise in AMI. She is also consulting in the development of integrated system planning processes which include engagement with customers and incorporation of equity considerations.



MORE ABOUT MODERN GRID SOLUTIONS

Modern Grid Solutions

Modern Grid Solutions (MGS) is a cost-effective, global, supplier of deep expertise and board-experienced domestic resources. Our team members have been industry colleagues for over 25 years. Our approach focuses on delivering actionable guidance, direction, and value based on the depth of our team's expertise in North America and worldwide.

MGS has assembled a team of leading experts all having between 25 - 45 years of experience delivering complex, innovative technology, business, regulatory and finance solutions to electric utilities, corporate clients and policymakers. Our experts bring expansive breadth and tremendous depth in engineering, technology, economics, operations, and commercial areas directly applicable to utilities, suppliers, regulators and policymakers.

At MGS, our focus is on our clients and helping them connect the dots to make the modern grid possible. This is our obsessive passion and we've mastered the details so that our clients can keep their main focus on their businesses. And, in return, our clients value our boutique consultancy because of our unique value proposition. At MGS, all our consultants are seasoned experts offering their undivided attention and treating our clients' businesses as if they were our own.

Ongoing Modern Grid Solution Projects

BUSINESS EXPERTISE AREAS	TECHNICAL EXPERTISE AREAS
For Utilities and Policy Makers <ul style="list-style-type: none"> • Strategy, tactics, and process redesign • Business, technical and enterprise architecture • Transmission and distribution roadmaps • Grid modernization plans • Project and program management • Strategic change management • RPS Support For Suppliers and Corporate Clients <ul style="list-style-type: none"> • Business model design and analysis • Electricity market entry and go-to-market • Market analysis, volumes, and trends • Competitive landscape analysis • Alliances, divestitures, and acquisitions • M&A, Project finance, structured products 	For Utilities and Policy Makers <ul style="list-style-type: none"> • T&D system operations – EMS, DMS, OMS • Generation operations • Energy markets – design and deployment • Energy and REC tracking system • T&D Automation and smart grid solutions • GIS and asset management solutions • Generation planning and renewables integration • Big data management and analytics • Solution and vendor selection For Suppliers and Corporate Clients <ul style="list-style-type: none"> • Solutions design and implementation • Portfolio review and analysis • Adjacency analysis and technology management • Energy, REC and emissions trading

- Assisting a major Northwest utility with transforming their planning capabilities to address the influx of Distributed Energy Renewables, Non-Wires Alternative solutions and to address the needs of the Washington State Clean Energy Act (SB 5116)
- Assisting the Pacific Northwest National Laboratory on a DOE project - development of a distribution application development platform (GridAPPS-D).
- Assisting with a major multi-OpCo distribution operations transformation – Control center consolidation, ADMS implementation and operations standardization.
- Business Architect role at a major East Coast multi-jurisdictional, multi-state utility with implementing a DER dispatch (People, Process and Technology) solution across Transmission and Distribution

- Assisting a major multi-jurisdictional utility with defining and updating their Digital Field and Grid Operating Strategy.
- Assisting a major northwest utility with overhauling their innovation process to make it business-as-usual – across delivery system planning, operations, and beyond through the inclusion of wired and non-wired alternative solutions on the grid.
- Assisting multiple startup companies in the areas of IoT and Blockchain.
- Assisting a major east coast gas utility with their decarbonization strategy.
- Assisting several system operations vendors with the development of their product implementation strategies.

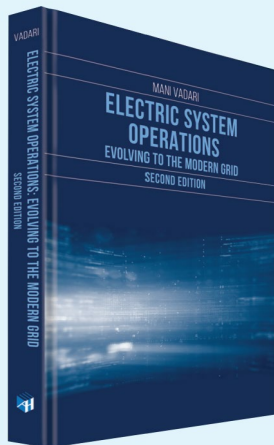
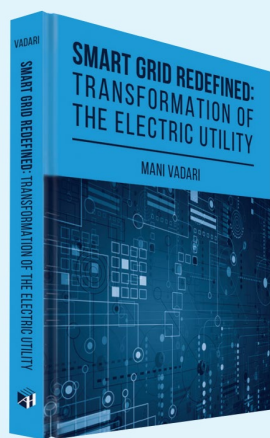
Electric System Operations – Evolving to the Modern Grid, Second Edition

Dr. Vadari's book "[Electric System Operations – Evolving to the Modern Grid, Second Edition](#)" is available now. The key chapters covering EMS, OMS, ADMS, and DERMS now include industry case studies to move the discussion from theoretical to evidentiary with real-world, relatable content.

Smart Grid Redefined: Transformation of the Electric Utility 3.0

The book has been released and is now available in all leading bookstores and [online](#). The Chinese edition is out now and available in China.

Both of Dr. Vadari's books are regularly used as text books in several universities in the U.S. and abroad.



ABOUT THIS NEWSLETTER

This quarterly newsletter is a production of Modern Grid Academy under the auspices of Modern Grid Solutions. Please send all comments and inquiries to info@moderngridsolutions.com.