



Global Smart Energy Federation
Formerly known as Global Smart Grid Federation

NEWSLETTER

January 2023

A NEW ELECTRICAL REVOLUTION FOR DECARBONIZATION



While emissions from fossil fuel combustion and industrial processes account for nearly 85% of the world's CO2 emissions, using green electricity is a priority for achieving carbon neutrality, in parallel with energy efficiency measures and efforts to reduce energy consumption. Think Smartgrids has published a manifesto supporting a new "electrical revolution" for decarbonization.

The authors point out that even with strong measures of energy efficiency and consumption reduction, electricity production will have to increase significantly in the coming decades, by deploying decarbonized production means, whether nuclear or renewable. The electrification of energy uses will primarily concern the three main greenhouse gas emitting sectors, i.e. transport (approximately 30% of emissions), buildings (23%) and industry (25%).

The widespread use of new energy and digital technologies will be necessary for better management and optimization of electricity flows, which must guarantee the "flexibility" that will support the proper functioning and resilience of the electrical system.

The recommendations detailed in the document include:

- The massive deployment of heat pumps to decarbonize buildings;
- The electrification of thermal processes and other fossil fuel processes in industry;

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- The development of the charging control of electric vehicles and a strategy concerning the durability and the recycling of batteries;
- The development and deployment of digital tools to modulate in real time the production and consumption of electricity, and thus guarantee the future balance of the network;
- Standardization and interoperability of tools and data formats;
- The need for R&D and R&I, as well as better coordination between academic and industrial stakeholders, in order to make progress on flexibility and power electronics;
- The need for investments both for R&D and for the development and adaptation of the electricity network.

For Think Smartgrids, investing in new digital solutions to enable flexible management of the electricity production, consumption and storage, as well as of the electricity grids themselves, will be essential to achieve the energy transition and guarantee the resilience of electricity networks.

Link to the article: <https://bit.ly/3lqHOMr>

Article contributed by Think Smart Grids, France



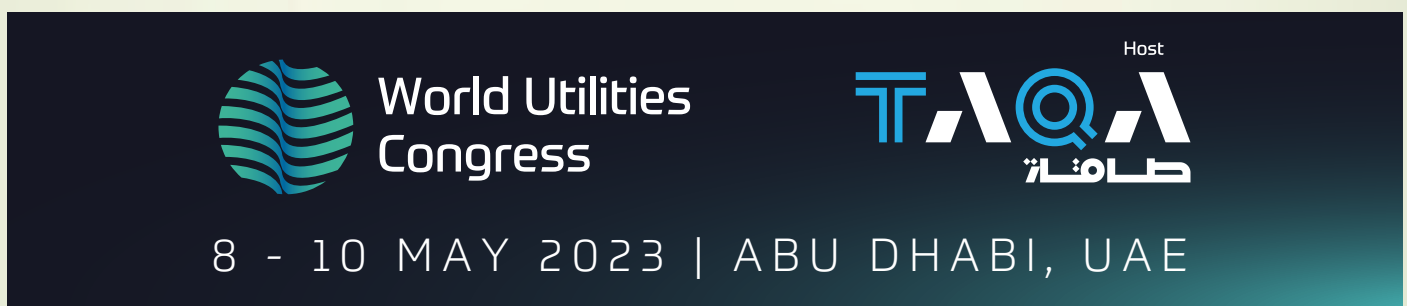
India SMART UTILITY Week 2023
28 February - 04 March 2023
The Lalit Hotel, New Delhi

ORGANIZER
ISGF
 India Smart Grid Forum

ISUW 2023
 9th Edition of
 India Smart Utility Week
 An International Conference
 & Exhibition on
 Smart Energy & Smart Mobility
www.isuw.in

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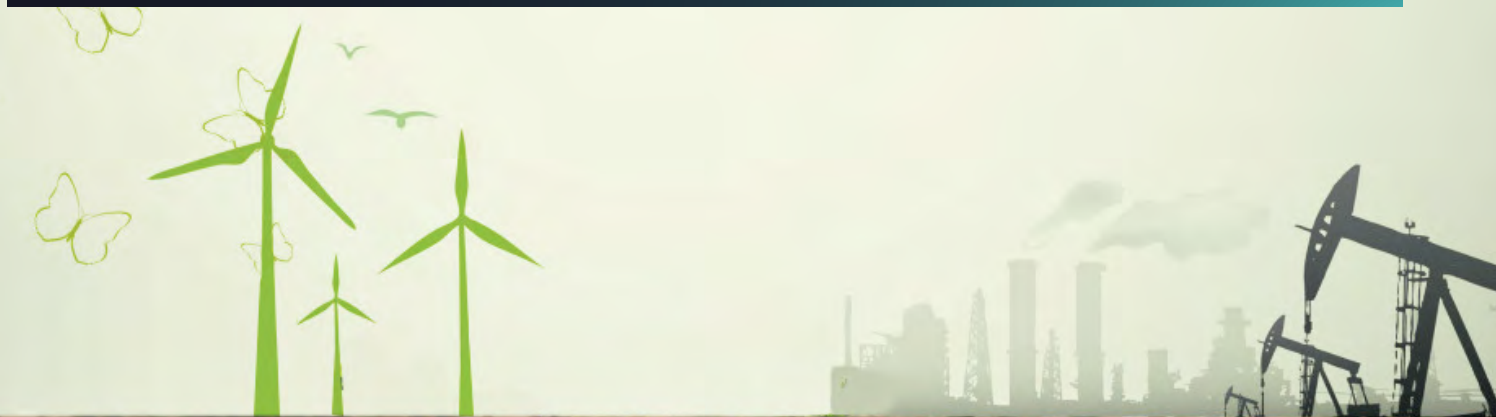
ISGF INNOVATION AWARDS : 03 MARCH 2023



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Global Stories on Smart Grid

1. Electric Charging Corridor for E-Trucks Launched in Europe

BP Pulse is launching Europe's first public electric charging corridor for trucks. Eight dedicated e-truck charging stations are located at key sites. The corridor connects key North Sea ports in Belgium and the Netherlands with the Mediterranean port of Genoa, Italy, connecting through a network of total of 1,300 km. The new chargers have been installed on Aral retail sites in Germany between the Rhine-Neckar metropolitan area and the Rhine-Ruhr metropolitan region. BP claims the 300 kW charging stations to be each capable of charging more than 20 e-trucks, per charger each day. An e-truck's range can reach up to 200 km in around 45 minutes using the ultra-fast charge points.

Read More: <http://bitly.ws/ztgg>

2. Altech and Fraunhofer Finalize Plans for 100 MWh Sodium Solid State ESS Battery Plant in Germany

Altech Chemicals and research institute Fraunhofer have progressed plans for a 100 MWh plant in Germany to produce the latter's energy storage-focused sodium solid state battery technology. The joint team headed by Altech's have finalized the design basis for the 100 MWh plant in Saxony, which would produce 1,600 60 kWh battery packs a year.

Read More: <http://bitly.ws/ztgK>

3. Enhancing and Hardening the U.S. Power Grid

It's no secret that the U.S. power grid needs some work. According to the U.S. Department of Energy (DOE), nearly 70% of the nation's grid is more than 25 years old. The DOE says the U.S. needs to expand electricity transmission systems by 60% by 2030—and may need to triple current capacity by 2050—to accommodate the country's growing renewable energy sector and meet increasing power demand for electric vehicles (EVs) and electric home heating.

On Nov. 18, the Biden administration, through the DOE, announced \$13 billion in new financing opportunities for the expansion and modernization of the nation's electric grid. Funded by the Bipartisan Infrastructure Law, the Grid Resilience Innovative Partnership program and the Transmission Facilitation Program together represent the largest single direct federal investment in critical transmission and distribution infrastructure ever.

Read More: <http://bit.ly/3RiAyVJ>

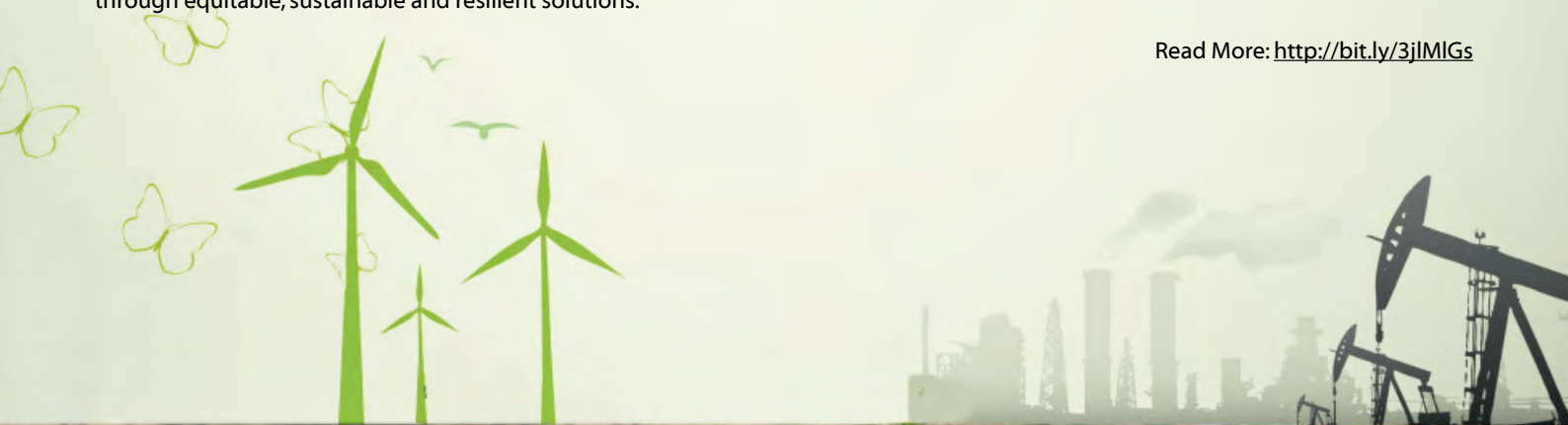
4. DOE and FEMA Release One-Year Progress Report on Joint Effort to Modernize Puerto Rico's Grid With 100% Clean Energy

The U.S. Department of Energy (DOE) and the Federal Emergency Management Agency (FEMA) today released a one-year progress report for the Puerto Rico Grid Resilience and Transition to 100% Renewable (PR100) Study. PR100, which launched in February 2022 with funding from FEMA, is a two-year study designed to help inform infrastructure investments that will provide Puerto Rico with clean, reliable, and affordable power. The study aims to generate community-driven pathways to meet Puerto Rico's target of 100% renewable electricity by 2050 and improving the resilience of the power system against future extreme weather events. The Biden-Harris Administration remains committed to helping states and territories reach their clean power targets to move the nation closer to achieving President Biden's 2050 goal of a net-zero carbon economy.

"DOE is supporting Puerto Rico in executing grid improvements that will deliver a better energy system that boosts reliability and savings for its residents," said U.S. Secretary of Energy Jennifer M. Granholm. "For far too long, Puerto Ricans have lived with an outdated and expensive electric system where needless obstacles and long delays have prevented critical improvements. We know that access to renewable energy can help save lives and I am proud of the DOE and FEMA teams that are working tirelessly to help put Puerto Rico on a path to a more resilient and reliable energy future."

"FEMA's investment in the PR100 study reiterates our shared commitment to building resilient infrastructure and creating clean energy solutions for Puerto Ricans that will have long-lasting benefits to communities and generations to come, said FEMA Administrator Deanne Criswell. "Thanks to the partnership the Department of Energy has with FEMA, we were able to evaluate and help fund the development of clean energy alternatives for the reconstruction of the power grid to help Puerto Rico meet its renewable energy targets. This study is one of several strategies that FEMA is collaborating with Puerto Rico on to support the recovery of the energy grid through equitable, sustainable and resilient solutions."

Read More: <http://bit.ly/3jIMIGs>



Global Stories on Smart Grid

5. Grid Modernization is Key Decision for Public Regulation Commission in New Mexico (PRC)

New Mexico's grid-modernization statute authorizes the Public Regulation Commission to approve grid-modernization projects. In evaluating utility-proposed projects, the PRC must consider the reasonableness of the project and whether a project would advance certain objectives, such as a reduction in greenhouse gases, facilitation of grid access for renewable and other forms of clean energy, and improved reliability and resilience.

Grid-modernization investments involve myriad technologies that digitize a utility's distribution system. This allows a utility operator to improve its ability to monitor grid conditions, analyze those conditions with software, and take appropriate action in near real-time. Such investments are modular in that a utility can spread out components over a number of years. They have the potential to produce large benefits; but they also have high costs. There is high uncertainty over the benefits and costs of grid-modernization investments. Costs overruns are common and benefits are difficult to quantify and require different methods of varying complexities.

New Mexico has lagged behind the country in adopting smart meters and other components of grid modernizations. Along with Utah and West Virginia, New Mexico has the smallest number of smart meters in the country.

Read More: <http://bit.ly/3DCReSf>

6. FERC Takes Steps to Bolster Reliability Standards for Monitoring Grid Cyber Systems

The Federal Energy Regulatory Commission on Jan. 19 directed the North American Electric Reliability Corporation to develop and submit reliability standards requiring internal network security monitoring for high-impact bulk electric system cyber systems and medium-impact systems with high-speed internet connections. The final rule, Order No. 887, issued at FERC's monthly open meeting, also directs NERC to study the risks posed by the lack of internal network security monitoring at bulk electric cyber systems that would not be addressed by the new or modified standard, and the feasibility of extending monitoring to those systems.

Read More: <https://bit.ly/3S54uVF>

7. New Smart Meter Technology to offer UK Households Tailored Energy Efficiency Solutions

The Department for Business, Energy & Industrial Strategy (BEIS) has backed the SMS plc-led research project that uses 'Internet of Things' (IoT)-enabled smart meters to provide tailored solutions and allow consumers to improve the energy efficiency of households. The trial uses a temperature sensor to record real-time temperature data inside homes, as well as the corresponding temperature outside taken from weather reports. The sensor will be built into a smart meter's in-home display (IHD) supplied by Chameleon Technology. These figures will then be compared to data obtained from gas smart meters to make a highly accurate calculation of a household's heat efficiency.

Read More: <https://bit.ly/3I5M8z8>

8. Alternate Energy to speak of looks promising for SA

Smart Meters and solar power sharing are two future-forward technologies that are a promising solution to the Eskom crisis and the billing problems in local municipalities. With a rise in residents and businesses pursuing alternative energy options in response to the worsening Eskom and load shedding crisis, alternate energy industry experts are predicting a possibility of solar power sharing in the future. Solar sharing refers to the financing of solar energy, wherein the solar power produced can be shared and sold to other entities, such as municipalities and the government.

Read More: <https://bit.ly/410DhHZ>

9. Rethinking Energy Security in the Transition to Net-Zero

As we look back at 2022, energy security has reclaimed its spot as the top concern of energy policy-makers and industry leaders. Since the oil crises of the 1970s, broad complacency set in about energy security. People developed a collective amnesia about the risks to energy security in an era of abundance and affordability.

As concern has grown over the dire state of the climate, the risks to energy security have not gone away; in fact, new ones have emerged, and 2022 offered a reminder that energy security demands attention not only to avoid economic and geopolitical turmoil but also to avoid undermining the energy transition itself.

Read More: <https://bit.ly/3k0bBSM>

Member Updates

ENEDIS, THE FRENCH DSO, RETAINS TOP SPOT IN GLOBAL SMART GRID RANKING

Singapore Power Group's (SGI) Smart Grid Index 2022 ranks Enedis the main French DSO as the world's smartest Distribution System Operator for the second year running.

Enedis retains the top spot in the SGI 2022 ranking with an overall score of 98.2% (+1.8% compared to 2021). With 38,000 employees, 1.4 million km of power lines, the electricity utility manages the largest number of connected objects, notably with more than 35.6 million Linky smart meters installed in France.

The Smart Grid Index compares 94 distribution network operators in 39 countries, based on 7 criteria: monitoring and control of network equipment, data analytics, supply reliability, integration of distributed energy resources, integration of renewable energy, cybersecurity and customer satisfaction.



The Singapore Power Group's Smart Grid Index highlights the following achievements by Enedis:

- Increased digitalization of network operating equipment and facilities (source substations, distribution substations, fault indicators, etc.), as well as the application of methods based on artificial intelligence to promote the development of an efficient network;
- Ever finer and more responsive data analysis thanks to more than 35.6 million Linky smart meters deployed in France, and numerous connected objects installed on the network infrastructures. These connected objects are now demonstrating their added value in terms of savings for the French people and control of the electricity network;
- The easier integration of renewable energies into the public distribution network (almost 90% of renewable energies are connected to the network operated by Enedis);
- Cybersecurity, one of Enedis' priorities, with the successful transposition of European standards and directives into the information systems framework

Acceleration of the ecological transition for citizens with services around electric mobility, self-consumption, local flexibilities...

Learn more about the official SGI 2022 ranking: [Smart Grid Index \(spgroup.com.sg\)](https://spgroup.com.sg)

Article contributed by Valerie-Anne Lencznar GSEF Ambassador–Europe & Francophone Africa Regions



Member Updates

U.S. COMMERCIAL SERVICE AND INDIA SMART GRID FORUM JOINTLY ORGANIZED U.S. INDIA SMART GRID ROUNDTABLE AT DISTRIBUTECH INTERNATIONAL 2023 IN SAN DIEGO



India Smart Grid Forum (ISGF) participated at DistribuTECH, International held from 07 February to 09 February 2023 in San Diego.

DISTRIBUTECH International® is the leading annual transmission and distribution event that addresses technologies used to move electricity from the power plant through the transmission and distribution systems to the meter and inside the home.

The conference and exhibition offered education, information, products and services related to electricity delivery automation and control systems, energy efficiency, demand response, distributed energy resource management systems, renewable energy and EVSE interconnection, advanced metering, T&D system operation, resiliency and reliability, communications technologies, cybersecurity, sustainability, and more.

U.S. Commercial Service and India Smart Grid Forum jointly organized a U.S. India smart grid roundtable on February 8th, 2023, to discuss about the energy transition and grid modernization, and to explore opportunities for collaboration between U.S. and India.

The opening keynote was delivered by Michael Pesin, Deputy Assistant Secretary, Power Engineering Systems Research and Development, U.S. Dept of Energy.

The speakers for the panel discussion were:

Chair: RP Singh, Chairman, Uttar Pradesh Electricity Regulatory Commission

Speakers:

1. BN Sharma, Chairman, Rajasthan Electricity Regulatory Commission
2. Rohit Nair, Director, Engineering Standards & Grid Modernization, Pacific Corp, USA
3. Andres Carvallo, CEO & Founder – CMG Consulting LLC; and Author of “The Advanced Smart Grid”
4. Gajanan Kale, CEO, Tata Power Western Odisha Distribution Ltd
5. Suresh Kotha, CTO, SMUD
6. Mani Vadari, Founder and Chairman, Modern Grid Solutions
7. Pranab Kumar Sinha, Executive Director, PFC Ltd
8. Abhay Gupta, Co-Founder and CEO, Bidgely
9. John Hansen, Powerledger, USA

Next Edition of DistribuTech International will be held in Orlando, Florida from 27th -29th February 2024.

Visit the event website for more information: <https://www.distributech.com/welcome>

DEFINING SMART POWER ASSETS OF TOMORROW

I have been advocating for some time now and more recently the past few months (GSEF Newsletters Nov, Dec 2022) on the importance of climate change and the need for internal temperature mapping of power assets to manage thermal headroom. Rising ambient temperatures and extreme weather swings, requires asset maneuverability based on dynamic real-time thermal capability. Recently, I have been actively engaged in this area offering solutions and mentoring such technologies. In this article, I will concentrate on the need for defining Smart Power Assets and link it back to better thermal management.



Climate Change and rising ambient temperatures is causing all infrastructure assets (electric, water, gas, telecom, transport) to be suitably de-rated. This means existing assets should be managed well below their old thermal standards to meet today's load demand and extreme temperature swings. If this is not done, a generic name-plate derating (say 10-15%) needs to be imposed, which in-turn will strand trillions of dollars of existing asset values. This imposed derated capacity in turn will give rise to higher operating risk and capacity constraints.

Today, most global infrastructure assets are operating well past its design life. But for recent additions in emerging markets, the global fleet averages would be even older. Thanks to the dedicated efforts of planning, operations and maintenance technical staff, such old assets are still in service. In western economies, particularly North America, the aging fleet is showing its vulnerabilities. Capital investments since the mid-1990s is at a meager 40% mark of total assets that need to be retired and replaced. At some point in the near future, these critical assets will have to be retired and new ones built to replace them.

There are trillions of dollars in new-build waiting to happen in the electrical power sector alone, but there is no serious discussion on their "smart" features. Smart grid has enabled digitalization of interconnections between assets, but the asset themselves (transformers, generators, motors, reactors, cables) remain essentially "black boxes" with measurements only at its input-output interfaces. We have no real-time asset information coming from its core. The upcoming investment cycle offers an opportunity to evaluate "smartness" in future critical assets. Given the long life of power assets, a "like-for-like" replacement effectively delays this discussion by another 50 years. These assets are deployed in other market segments and so such discussions will permeate to other industries as well.

There are a few ways to define "requisite smartness" in assets. These include measuring parameters that (a) prolong asset life (thermal and dielectric); (b) ensure safe operations (severe weather and load); (c) enable optimal asset maintenance; and (d) enable alarms and safe isolation for failures. The business case should lead to (a) better and longer asset usage (ROA, ROI); (b) increased reliability (less forced outages); and (c) optimal preventive and corrective maintenance at a lower cost.

Currently, electrical measurements are being extensively used as a convenient imputed proxy for physical parameters such as temperature (example I²R). Direct physical measurements (temperature, pressure, flows, vibrations) are limited due to its cumbersome architecture. They are difficult and intrusive with many wires needing to be brought out. Other problems include electromagnetic interference and voltage withstand issues. In essence, the high voltage internal environment of power assets is not suitable for low-voltage powered measurements.

If one were to pare back such measurement needs, it comes down to (a) electrical measurements as a proxy for dielectric integrity and system management; (b) vibration/strain measurements as a proxy for mechanical integrity; and (c) temperature measurements as a proxy for material properties, cooling and insulation integrity. These three data sets on a real-time basis can cater to life-cycle, predictive and operative information. While electrical measurements are inexpensive, the same cannot be said for vibration (piezoelectric) and temperature (RTD/thermocouple) sensing. But all this is changing rapidly.

Today, we have fiber optic temperature/strain sensing technology that can provide real-time digital temperature and mechanical strain profiles inside the core of an asset. This new sensor technology, operating on a laser principle, is capable of thousands of measurements (every 30 seconds) on a single long fiber (up to 20 km long) with high accuracy (<1%) at about every meter length along the fiber. A single fiber therefore is enough for most large electrical asset and possibly many more inside a substation. Since the fiber is a hair-sized strand, it can be inserted with the conductor, placed inside slots, attached to inner walls etc. with no electric interference. A laser light through the fiber from the outside of the power asset, results in time-stamped measurements. It also serves as a fault locator.

In envisaging the above, several application examples come to mind:

1. **Machines:** Placing these fibers in winding slots of MV and HV machines (transformer, motor, generator) will enable a good insight into internal hotspots, insulation temperatures and mechanical strain in real-time. Placing fibers between the laminations will provide insight into hysteresis and eddy-current hotspots.
2. **Cables:** Laying these fibers alongside HV and MV underground cables provides a real-time temperature profile along the cable route to assess hotspots in the cable, cable-joints, terminations and manholes. This method completely avoids any need for local auxiliary power for measurement and testing along the cable route.
3. **Battery Energy Storage:** Placing these fibers at the cell, pack, battery levels together with PCS, enclosure, and HVAC provides a single comprehensive real-time temperature and strain mapping system for the entire BESS.
4. **Heavy Duty Electric Vehicles:** The above technique could be employed on a large EV bus or truck as a real-time on-board system or have the information sent out using vehicle telematics for fleet management and performance comparisons across OEMs, travelled routes, Lithium battery chemistries and vehicle types.

Such internal temperature measurements would capture dynamic spot-temperature violations and provide an insight into an asset's health and hence its remaining useful life. Even small vibration in larger MV rotating machines (the cause of many failures) can also be detected early. This can then be used in 3-D digital twinning applications or in real-time to manage thermal headroom and asset condition at a more granular level than what is available today.

Field trials and demonstrations using this fiber sensor technology were conducted in Canada over the last several years on (a) a utility MV transformer; (b) a utility air-cooled HV reactor; (c) an industrial MV motor; (d) an underground mine MV cabling; and (e) in US/Canada on a few underground utility MV cables in cable ducts. Thus far, the technology has proven its worth. More commercial deployment will drive standardization and specifications amongst utilities and OEMs. While the fiber placement is an easy retrofit on cables in cable ducts (placed externally alongside the power cable), on other assets, it requires internal access during major overhauls or manufacture. This brings the need for the OEMs to support this as well.

The immediate next steps would be for system operators, utilities and OEMs to define such "smart" requirements for critical power assets (cables, motors, transformers, generators, reactors, BESS, STATCOM, DER) and arrive at a high-level consensus to enable a unified specification for the future.

The technology is here. The question is when.

Article contributed by Ravi Seethapathy, GSEF Ambassador for Americas



The banner features a purple background with a stylized wave logo in yellow and orange. The text reads: "Middle East Energy Dubai", "7 - 9 March 2023 | Dubai World Trade Centre", and "Less than a month to go!".



Smart Grid Events

01st - 4th March, 2023

India Smart Utility Week 2023
New Delhi, India
<http://isgw.in/>

20th - 21st March, 2023

1299th International Conference on Green Energy and Technology, Istanbul, Turkey
<http://researchfora.com/Conference2023/Turkey/2/ICGET/>

8th -10th May, 2023

World Utilities Congress
Abu Dhabi, UAE
<https://www.worldutilitiescongress.com/>

13th-16th June 2023

Asia Clean Energy Forum 2023
Manila, Philippines
<https://asiacleanenergyforum.adb.org/>

11th -13th October, 2023

4th SEERC Conference
ISTANBUL
<http://www.seercturkiye2023.com/>

28th- 30th November 2023

Enlit Europe
Paris, France
<https://www.enlit-europe.com/>

27th-29th February 2024

DISTRIBUTECH International
Florida, Orlando
<https://www.distributech.com/>

07th - 9th March, 2023

Middle East Energy Dubai
Dubai
<https://www.middleeast-energy.com/en/home.html>

22nd – 23rd March 2023

Enlit Australia, MCEC
Melbourne
<https://enlit-australia.com/>

17th - 19th May 2023

Future Energy Asia 2023
Bangkok, Thailand
<https://bit.ly/3X9xHkC>

12th -15th June, 2023

CIRED 2023
International Conference & Exhibition on Electricity Distribution, Rome, Italy
<https://www.cired2023.org/>

14th-16th November 2023

Enlit Asia
ICE, BSD City, Jakarta, Indonesia
<https://www.enlit-asia.com/visit>

4th - 7th December, 2023

26th World Energy Congress
The Netherlands
<https://bit.ly/3VSCndm>

GSEF at a glance

Charter Members



Think Smart Grids



India Smart Grid Forum



Korea Smart Grid Association (KSGA)



Prakarsa Jaringan Cerdas Indonesia (PJCI)



GridWise Alliance

Regular Members



Japan Smart Community Alliance



Smart Grid Ireland

Utility Members



Electricity Generating Authority of Thailand (EGAT)



Electricity Supply Commission of South Africa (ESKOM)



EDM Mozambique



Tenaga Nasional Berhad (TNB) Malaysia



European Distribution System Operators (E.DSO)



Botswana Power Corporation

Associate Members



Green Business Certification Inc.



Florence School of Regulation (FSR)



Energy BlockChain Consortium



Caribbean Electric Utility Services Corporation



Electric Power Research Institute



Texas State University

Current Working Groups

- Blockchain for Utilities
- Regulatory Changes or Regulatory Reforms for the post Covid Digital Utility
- AI and Analytics for Utilities
- Grid Integrated Buildings

Working Groups in Pipeline

- Green Recovery Playbook for Utilities

Contact us for more information.

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