**GSEF**
**Global Smart Energy Federation**
Formerly known as Global Smart Grid Federation
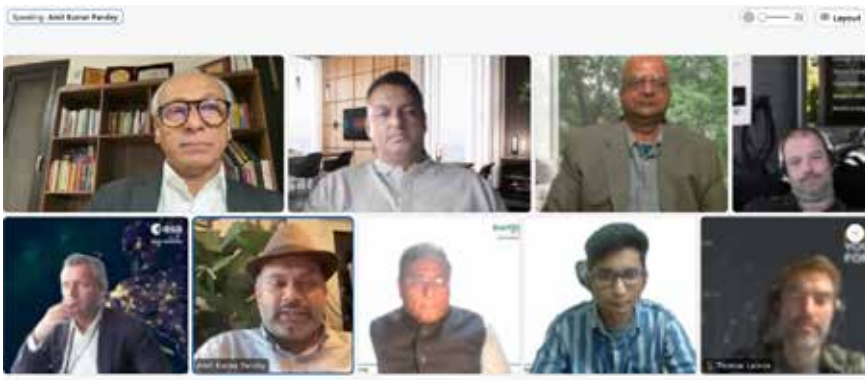
# NEWSLETTER

October 2022

## GSEF SUCCESSFULLY CONDUCTS A VIRTUAL WEBINAR ON ARTIFICIAL INTELLIGENCE AND ROBOTICS IN POWER SECTOR



Global Smart Energy Federation (GSEF) successfully conducted a virtual Webinar on **Artificial Intelligence and Robotics (AI & R) in Power Sector** on 3rd November 2022.

Global experts shared their insights and knowledge on different applications of AI&R technologies in the Power sector and explained them with successful use cases.

Topics of the webinar included Machine Learning and Deep Learning for Energy Forecasting, Advanced Analytics for Metering Billing and Collection, Network Monitoring through Drones, Asset Management, Digital Twins and Metaverse, Quality Assurance and Solar Panel Inspection, Land and Facility Service Through Robots etc.

Reji Kumar Pillai, Chairman Global Smart Energy Federation; Ravi Seethapathy, GSEF Ambassadors for Americas; Amit Kumar Pandey, Co-Founder, being AI Limited and Head of the Working Group on AI & Robotics of GSEF; Nick Singh, Head of CoE for Smart Grids, ESKOM; Laurent Schmitt, CEO, Dcbel Europe; Davide Coppola, Head of Space Application Initiatives, ESA Space Solutions; Sumit Gupta, CEO AssetPlus, India; Jayanth Balaji, Application Engineer Mathworks; Thomas Lacroix, CTO CosmoTech were the expert panelists at the webinar.

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The webinar highlighted the need to create empowered teams on AI&R technologies that could critically evaluate different solutions for their business needs. Webinar promoted capacity building in the industry, academia, and amongst the student, community to design and implement AI&R solutions in utilities.

The webinar was a huge success and recorded an impressive 500+ registrations. It was concluded that Robotics, IoT and AI can help to simulate the entire ecosystem better than human senses. It reduces lots of risk and makes deployment faster and also takes care of the security concern. Digital Twins have been playing very critical role in larger simulations, and also help to achieve net zero in the energy sector. The space sector can be a very good reference for the energy sector to achieve adequate automation.

Link for the Webinar: https://www.youtube.com/watch?v=N74GksdQ11k



Pls remove the above banner and start the global stories from this page

# Global Stories on Smart Grid

### 1. Tunisian Utility Planning 600 MW Pumped Hydro Energy Storage Plant

Tunisian utility STEG is planning to build a 400-600 MW pumped hydro energy storage plant, for a 2029 commissioning date. STEG, or the Société tunisienne de l'électricité et du gaz (Tunisian Company of Electricity and Gas), is currently undertaking studies for the project. The project is being planned for a location on the Oued El Melah river, 17km from the nearest town, Tabarka, and will have a power of 400-600 MW. A MWh capacity was not revealed, but pumped hydro energy storage technology's typical duration of between 6-20 hours would equate to potentially anywhere between 2.4 GWh and 12 GWh. The French Development Agency (AFD), the European Investment Bank (EIB) and the German Development Bank (KfW) are all contributing to the cost of the studies.

Read More: http://bitly.ws/vL2n

### 2. Singapore to Introduce New Emissions Rules for Fossil-Fuel Power Plants

Singapore's energy regulator will be introducing new emissions standards for new and repowered fossil fuel-fired power generation units in 2023. The new rules are part of the implementation of a law the city-state passed last year that allowed the EMA to set greenhouse gas emissions standards. The measure also follows Singapore announcing plans to reduce its emissions target for 2030 to 60 million tonnes of carbon dioxide ($CO_2$). The city-state will also enhance the efficiency of its power plants "by requiring all new generation units to use the best-in-class technology available," said Low, without elaborating on the technology required.

Read More: https://bit.ly/3UN3dmm

### 3. Government to Start Testing Technology Aided Electricity Mini-Grids

The Ministry of Energy and Mineral Development is considering the use of Artificial Intelligence to locate sites and suitable energy modes for mini-grids in different rural areas. A recent household survey by the Uganda Bureau of Statistics indicates that the national electricity access rate stands at 57%. This comprises 19% and 38% of on-grid and off-grid connections respectively. 43% of households remain in the dark. Data from the pilot project in Lamwo District in Northern Uganda once validated will be scaled countrywide paving the way for more mini-grids in the country.

Read More: https://bit.ly/3Ab26Fj

### 4. Holographic Digital Twin Aids Infrastructure Planning in Florida

New holographic digital twin technology has been announced for three counties in the state of Florida to better enable utility infrastructure planning and decision making. The Orlando Economic Partnership (the Partnership) is funding the fully realised digital twin that will showcase the entire region with input from multiple stakeholders. The 3D tech is claimed by the Partnership as the first to allow users to incorporate real-time, interactive data that can help them map out different scenarios with climate change, infrastructure, available real estate and more.

Read More: https://bit.ly/3O7VL35

### 5. LF Energy Launches Open-Source Smart Meter Data Gateway

Linux Foundation (LF) Energy has announced the Super Advanced Meter (SAM), an open-source specification and reference software project focusing on a widely applicable smart meter data gateway. The new software is hoped to boost the development of the meter as a reliable virtual node in the energy grid and drive the energy transition. The project focuses on a widely applicable smart meter data gateway. It aims at the central device that is installed with almost every energy consumer and thereby serves as the edge device to provide services to customers world-wide. The SAM distinguishes itself by adhering to open interfaces, modularity, and customer empowerment..

Read More: https://bit.ly/3X8ZbqD

### 6. Adani Transmission Secured a Deal to Install and Maintain 10.80 Lakh Smart Meters for BEST Undertaking, Mumbai

The deal value for the multi-year-old engagement by Adani Transmission's distribution platform at Rs 1,300 crore. The current contract involves installing the smart meters over a 30 months period and maintaining them for 90 months. The smart metering project, undertaken on a design, build, finance, own, operate, transfer (DBFOOT) basis also involves setting up of communication and other cloud-related infrastructure. It will also provide an option to opt for pre-paid billing and net-metering facility for housing societies and commercial buildings with the roof-top solar facility.

Read More: https://bit.ly/3g0LQj6

# Global Stories on Smart Grid

### 7. GridPoint Partners with SMG Energy to Drive Sustainability Solutions

GridPoint, a leader in building energy management and optimization technology that decarbonizes commercial buildings and drives grid modernization partners with SMG Energy, a leading provider of customized energy and sustainability solutions designed to lower costs, manage risk and improve branding, delivering sustainability solutions to small- and medium-sized businesses (SMBs). A referral partner supporting GridPoint through its install network, SMG Energy works to understand individualized sustainability goals, costs and energy consumption profiles to create unique solutions tailored to specific financial and environmental targets.

Read more: https://yhoo.it/3TIFhQB

### 8. Mahindra & Mahindra Partners with Statiq for EV Charging

Electric vehicles-network provider Statiq has partnered with automobile giant, Mahindra & Mahindra for EV infrastructural solutions. As part of this collaboration, Statiq will help Mahindra with charging point operations and the two entities will together focus on various e-mobility tech integration projects. This partnership will provide EV users a robust, accessible, affordable, and reliable mobility network across the country.

Read more: https://bit.ly/3MJOQMH

### 9. Bharat Electronics Signs MoU with Triton Electric Vehicle

Bharat Electronics has signed an MoU with Triton Electric Vehicle (TEV), for manufacture of Hydrogen Fuel cells by BEL with technology transfer from TEV, to meet the requirements of Indian market and mutually agreed export markets. The MoU aims at tapping the demand for clean energy solutions for various applications including for E- Mobility, by leveraging Government of India's thrust for adoption of clean energy fuels for applications in transport, energy storage etc.

Read more: https://bit.ly/3CMZoX4

### 10. PNM Files Grid Modernization Plan for Resilient Electric System

Public Service Company of New Mexico (PNM), wholly-owned subsidiary of PNM Resources, filed a plan with the New Mexico Public Regulation Commission (NMPRC) to modernize its grid through infrastructure investments designed to use state-of-the art technology for a resilient, reliable, efficient and decarbonized electric system. The plan is part of a longer-term grid modernization deployment and identifies the investments necessary to achieve New Mexico's clean energy transition, including smart meters and greater physical security and cybersecurity infrastructure to protect the data and information generated by the new metering capabilities.

Read more: https://yhoo.it/3MQPcRT

# Member Updates

## GLOBAL SMART ENERGY FEDERATION @ ENLIT EUROPE 2022, FRANKFURT

**STAND NO. 12.1.A162**

Enlit Europe formerly known as European Utility Week (EUW) is the largest event in Europe for the entire smart utility sector, accumulating over 10,000 international smart energy stakeholders and 500+ exhibitors.

Enlit Europe offers a notable multi-track strategic conference programme, a free 3- day utility case study programme on the exhibition floor and a highly revered innovation hub.

The 2022 edition scheduled from **29 November to 01 December 2022 in Frankfurt**, Germany, will see the launch of new initiatives including the Energy Revolution, Intelligent Buildings and a revamped Innovation Programme, all under one roof.

GSEF and many more of its members will be exhibiting at this event along with its Charter Member.

Visit the event website for more information: https://www.enlit-europe.com/welcome

# Member Updates

## SERTAINTY ANNOUNCES COLLABORATION WITH TEXAS STATE'S CIEDAR CONSORTIUM

Sertainty Corp, based in Nashville, Tennessee, is has recently collaborated with the Connected Infrastructure for Education, Demonstration, and Applied Research (CIEDAR) Consortium, the newest research strategy for Texas State University.

As a multi-disciplinary industry research consortium, CIEDAR involves studying technology with application to the lifecycle monitoring of infrastructure resources. "The projects under development at CIEDAR have the potential to revolutionize infrastructure and Sertainty is ready to provide those projects with the critical privacy and security they need to reach fruition."

Sertainty and Texas State recently hosted a successful industry seminar that showcased the partnership's cutting-edge approach to data security. Dr. Brad Nadji, Sertainty's, VP of Core Technologies discussed how Data was traditionally protected by placing it in a secure environment and continued to differentiate the status with Sertainty's cutting-edge solution to data security — by putting the access controls, policies, risk mitigations, and defensive mechanisms within the data file itself. This radical new data solution will be the cornerstone of the partnership between Sertainty and CIEDAR, illustrating the need for every organization to protect, monitor, and monetize their technological and digital assets while ensuring privacy.

For further information, please visit https://www.marc.txstate.edu/CIEDAR.html
Link to the article: https://bit.ly/3NXDvcM

# Member Updates

## PLN COLLABORATES WITH JICA IN STUDY TO ACCELERATE ENERGY TRANSITION IN INDONESIA

PT PLN (Persero) and the Japan International Cooperation Agency (JICA) are collaborating on a study to accelerate the energy transition in Indonesia. This was stated in the signing of a Memorandum of Understanding (MoU) between PLN and JICA in a series of Energy Transition Day events, in Bali. PLN President Director Darmawan Prasodjo stated that the purpose of signing this MoU was to update the estimated electricity demand in 2060 to achieve Net Zero Emission (NZE). Mr. Darmawan explained that the collaboration between PLN and JICA is also expected to produce a stable electrical power system planning with the use of new and renewable energy.

Both parties agreed to sign an MoU as a basis for accelerating the Energy Transition in Indonesia in accordance with the capabilities, experience and resources in the field, by exchanging data and coordination with stakeholders to support the interests of the study. JICA is the implementing agency of Japan's official development assistance or Official Development Assistance (ODA) with the aim of supporting socioeconomic development, economic recovery or stability in developing countries.

Read More: https://www.jica.go.jp/indonesia/english/office/others/press220922.html

# Member Updates

## WORLD BANK APPROVES FUNDING FOR R9BN PLAN TO REPURPOSE KOMATI POWER STATION

The World Bank has approved South Africa's request for funding to repurpose Eskom's recently decommissioned coal-fired Komati power station in Mpumalanga by using renewables.

The bulk of the $497 million (R9 billion) Komati Just Energy Transition Project will be financed through a $439.5 million (R8 billion) World Bank loan. There is also a $47.5 million (R870 million) concessional loan from the Canadian-World Bank Clean Energy and Forest Climate Facility, and a $10 million (R183 million) grant from the World Bank's Energy Sector Management Assistance Programme.

The plant, which has been operating since 1961, had its final generating unit taken offline at midday. The repurposing project will convert Komati into a renewable generation site powered with 150MW of solar, 70MW of wind and 150MW of storage batteries.

Read More : https://bit.ly/3zUSxtZ

# GSEF Smart Grid Editorials

## HYDROGEN TRANSPORT: NEEDS COST REDUCTION

*In my long career, I have often wondered how we have managed to assess utility equipment ratings and performance, using copious electrical measurements but limited temperature measurements. The lack of thermal information is putting a trillion-dollar asset base at risk and is still running "thermally-blind" even after 20 years of smart grid investments. In the 2019 and 2020 GSEF Newsletters, I wrote several articles (asset investments, regulatory, renewables, etc.) that directly or indirectly touched the basic tenets of smart grid investments. My continued involvement in this area has not changed my views, perhaps till now.*

*Climate Change and rising ambient temperatures is causing all existing infrastructure assets (electric, water, gas, telecom, transport) to be suitably de-rated. It also requires utilities and OEMs to provide new and add-on designs that can compensate for this higher ambient temperature. One would think that our smart grid investments, would allow adequate real-time thermal measurements to manage a variable load with ambient temperature swings. Unfortunately, this is not the case.*

The fundamental tenets of smart grid investments are to ascertain optimum performance of assets in real-time, under varying operating conditions. The premise is that static assumptions of the past, in equipment, planning and operations (sizing, safety margins, limits, etc.) may be overly cautious or woefully inadequate, under varying conditions. Thus, smart grid investment is about unlocking the "available headroom" in real time for optimized performance and better return on assets. So, it began in 2004, with smart meters, DMS, OMS, data protocols and digital telecom.

Prior to 1990s, equipment manufacturers, system planners, and operators, relied on static margins and limits based on collective shared knowledge, supported by academic research, testing and field experience. Such experiences were openly discussed in associations, committees, conferences and journal papers. The collective best practices made it into standards and codes with utilities providing overrides in their own procurement specifications. The growth of PCs in the 1990s, brought a powerful change in desktop computation. It saw modelling and simulation studies using electrical measurements, but temperature inputs and measurements were minimal.

Microprocessor digital platforms in the 2000s saw proliferation of the distributed power system architecture (metering, control, relaying systems enabled by digital communications). Innovations in network management systems (NMS), distribution management systems (DMS), digital relays, and intelligent electronic devices (IED) were introduced. *Integrated* circuits eliminated logic wiring, while real-time self-checking features reduced *periodic field verification*. This foundational base allowed for the rapid proliferation in distributed renewable energy (PV, Wind), particularly on the distribution network. *Thus, began the challenge of managing bidirectional and variable power flows.*

New ADMS platforms now include sophisticated electrical state-estimation with its electrical single-line diagram linking to its asset location in GIS. The digital twin capability is being leveraged both online and offline to better understand "what-if" scenarios. Digital twins serve many vital functions:

a)      Assessing steady-state and dynamic performance under varying conditions including impact on other assets

b)      Providing comprehensive insights towards asset specifications, standards, guidelines and procedures

c)      Setting operating limits and contingencies based on varying external conditions and near-term forecasts

d)      Leveraging condition-based (non-fixed) maintenance based on cumulative stresses and usage

While digital twins have made good progress this past decade, they have not delivered on the smart grid investment objective related to assessing an asset's "available operating headroom". In over 25 years, these models are still based on electrical parameters with limited temperature measurements. Since most equipment limits are based on its internal thermal and material limits, the lack of thermal measurement is a big risk. *Operating headroom* is determined by an equipment's real-time operating thermal profile and its ability to meet projected load for a given *projected ambient temperature*. All three thermal variables have long time-constants and cannot be changed quickly once the equipment's thermal limits are exceeded. So, knowing the operating headroom is key.

*Rising* ambient temperatures and extreme weather swings requires answers to (a) name-plate derating factors; (b) real-time operating limits during extreme weather swings; and (c) assessing performance of *aging assets*. All this needs thermal validation. Today, most assets are operated using 50-year-old static assumptions devoid of any 3-dimensional thermal measurements. For example, a transformer's internal temperature proxy is its top-oil temperature measurement while the core and insulation temperature profile are modelled using I2R heat transfer from the windings. Thus, any hot-spots in the core, windings or insulation themselves, cannot be detected till it becomes a bigger cascading electrical failure. Similar approximations are made in other assets as well. The following examples outline this:

1.  Line and underground cable performance without temperature measurement along its route

2.  Transformer/motor/generator performance without 3-D core/insulation temperature measurement

3.  Battery/Fuel Cell performance without 3-D module and stack temperature measurement

4.  Solar farm inverter and PCS performance without real-time temperature measurements

5.  Fire safety adequacy using few spot aspirator detectors and no comprehensive temperature-rise warning

Until now (barring a few type tests) it was impractical to deploy hundreds of thermocouple/RTD measuring points inside an equipment to do a valid heat-run analysis. *A new technology employing optical sensors to measure temperature (and strain) is showing good results.* The optical sensor (the fiber is the sensor) can now map temperature and strain measurements along its entire length (max 10-20 km loop) with an accuracy of 1 deg C at a spatial resolution of 1 meter (± 1%) along its fiber route. The synchronized periodic measurement is stored and transmitted in DNP3/61850/TCP-IP formats and is IoT enabled (cloud accessible). *This technology changes the way asset "operating head room" can be assessed in real-time. It is now possible to obtain an asset's internal temperature profiles and (a) either store for offline Digital Twin use or (b) feed directly into NMS/ADMS control platforms for real-time operations.*

The optical fiber can be carefully fashioned into an asset's physical size (either embedded into slots, cores, plates, modules, stacks, side walls or wrapped around) to obtain the geometric 3-D thermal profile representation. The tests would then yield copious internal temperature measurements for different operating conditions. The optic fiber being electrically isolated can be embedded safely inside electrical apparatus (cables, lines, transformers, motor/generators, batteries, conveyers, power-plants).

Apart from utilities managing their own assets, the above new technology opens new business models as in (a) by academic research/ test centers for use in offline digital twin models to gain knowledge; (b) by various OEMs (lines, cables, switchgear, transformers, batteries, EVs, SMRs, etc.) for their product design, development, protype and safety testing; and (c) by third-party monitoring centers (NOCs) to send real-time alerts to asset owner/operators in the power, oil & gas, water, telecom, transport, EV-charging, and mining sectors.

In future newsletters, I will elaborate on a few actual use-cases (both offline and online applications) employing this optical thermal technology in underground cables, transformers, motors, and fire-safety in mines; The results are very interesting.

Perhaps for the first time, smart grid investments can achieve its objective of assessing "available headroom". Rising ambient temperatures and extreme weather swings requires answers to name-plate derating, real-time operating limits and assessing performance of aging assets. *All this needs 3-D thermal validation.*

**Article contributed by Ravi Seethapathy, GSEF Ambassador for Americas**

# Smart Grid Events

**6th- 18th November, 2022**
COP 27 Sharm El Sheikh
Egypt
https://www.unfccc.int/cop27

**29 November - 1 December 2022**
Enlit Europe
Frankfurt, Germany
https://www.enlit-europe.com/

**01st January 2023**
Global Conference on Renewable Energy
and Climate Change (GCRECC), Jaipur, India
http://arsss.org/Conference/26046/GCRECC/

**01st - 4th March, 2023**
India Smart Utility Week 2023
New Delhi, India
http://isgw.in/

**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

**15th- 17th November, 2022**
Smart City Expo World Congress
Barcelona, Spain
https://www.smartcityexpo.com/

**02nd -03rd December 20**
1232nd International Conference on Green Energy
and Technology, Putrajaya, Malaysia
http://researchfora.com/Conference2022/
Malaysia/11/ICGET/

**07th -09th February 2023**
Distributech International
San Diego California
https://www.distributech.com/welcome

**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/

# 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

### Working Groups in Pipeline

- Green Recovery Playbook for Utilities

# Contact us for more information.

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