Season's Greetings

Wishing you a Dynamic and Sustainable 2023

GSEF
Global Smart Energy Federation
Formerly known as Global Smart Grid Federation

NEWSLETTER

December 2022

Chairman's Message

Over the last six years, I have been privileged to Chair the Global Smart Energy Federation (GSEF) to promote energy transition and electric grid modernization. I am confident that GSEF will grow stronger with the support from our members. GSEF will always work towards achieving goals with vigour in mind, while staying true to our core values.

2022 has been an exciting year for GSEF with Korea Smart Grid Association, Smart Grid Ireland and Texas State University joining the community. We will expand the scope of the Global Smart Energy Federation to include other regions of the world in order to accelerate the growth of a new market for clean, sustainable energy. GSEF is actively expanding its membership globally. Delighted to share that Think Smart Grids, France has agreed to join back GSEF from 2023.

GSEF completed the "Study of Comprehensive Benchmarking of Best Utility Practices on the Impact of Smart Grid Features for Distribution Network Master Plan (DNMP)", for Tenaga Nasional Berhad (TNB), Malaysia which was our first advisory engagement and will engage in more such projects in time to come.

The year 2022 witnessed the publication of a whitepaper on Artificial Intelligence and Robotics for Utilities aimed to demonstrate the value proposition of AI & Robotics as well as its use cases in utilities. GSEF renewed Memorandum of Understanding (MoUs) with International Smart Grid Action Network (ISGAN) and the MoU with the Association of Power Utilities of Africa (APUA).

GSEF is honored to provide an expert jury for the selection of the ISGAN Award of Excellence – for the past 8 years. GSEF also participated in many webinar workshops, side events, and other initiatives to accelerate clean energy deployment in various international events.

GSEF made its presence at Enlit Europe in Frankfurt, Germany. Various utilities companies and directors/managers of energy utilities, electricity & gas companies visited us. GSEF is reaching out to a larger audience through Website, Newsletter, Twitter Linkedin to increase our visibility and coverage.

On behalf of GSEF Team I wish you all a Happy New Year and successful days ahead!

Reji Kumar Pillai

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Global Stories on Smart Grid

1. Swiss Researchers Say Raised Perovskite Cells' Stability at 24.9% Efficiency

A team of researchers from École polytechnique fédérale de Lausanne (EPFL), Switzerland, have developed a method that improves both power conversion efficiency and stability of solar cells based on pure iodide as well as mixed-halide perovskites.

The new approach resulted in power-conversion efficiencies of 24.9% and 21.2% for two perovskite compositions. The team claimed about 90% and 80% of the initial efficiencies were retained after 1,200 and 250 hours of continuous operation, respectively.

"By addressing the critical issue of stability, our results represent an important step towards large-scale practical applications of PSCs," the researchers said.

The research was carried out by Michael Grätzel and Ursula Rothlisberger at EPFL and led by Essa A. Alharbi and Lukas Pfeifer.

Read more at: bit.ly/3i3qjHz

2. Ministry of New and Renewable Energy (MNRE) (MNRE), India Issues Draft Tender to Lease Sea Bed for 4 GW of Offshore Wind Projects

Ministry of New and Renewable Energy (MNRE) has issued a draft tender to select wind power developers for leasing sea-bed areas to develop 4 GW of offshore wind power projects off the coast of Tamil Nadu.

Grid connectivity, long-term open access, and access to the grid under the general network access (GNA) framework will be under the scope of the tender.

The energy generated from offshore wind power projects will be for sale through open access, captive, bilateral, third-party, or merchant sale modes.

The evacuation of power – from the offshore pooling delivery point to the onshore meeting or interconnection point – will be the responsibility of the central transmission utility (CTU) for all offshore wind project development models.

The developer should set up offshore wind projects, including the offshore pooling station, at a voltage level of 220 kV and be responsible for acquiring the land near the coast from the state or port authorities to set up the projects.

Read more at: bit.ly/3jBkKAu

3. World Bank to Provide $311 Million for Solar and Storage Projects in West Africa

The World Bank Group has approved $311 million in International Development Association (IDA) financing from its new Regional Emergency Solar Power Intervention Project (RESPITE) to install and operate solar, battery energy storage systems (BESS), and hydroelectric projects in West African countries.

The financing includes a grant of $20 million to help facilitate future regional power trade and strengthen the institutional and technical capacities of the West Africa Power Pool to undertake its regional mandate.

RESPITE's main goal is to expand the grid-connected clean energy capacity in the participating nations while improving regional integration in Chad, Liberia, Sierra Leone, and Togo. Sub-Saharan Africa has one of the lowest electrification rates coupled with some of the highest power costs. RESPITE is World Bank's response to the ongoing energy crisis in West Africa to accelerate the deployment of more clean energy in the region.

The IDA financing will fund the installation and operation of ~106 MW of solar photovoltaic with BESS, and the expansion of hydroelectric capacity to 41 MW. It will further bolster power distribution and transmission interventions across the four countries.

Read more at: bit.ly/3PVwZUR

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Global Stories on Smart Grid

4. Hithium LFP Cells Used in China's Largest Standalone Battery Storage Project

A 200 MW/400 MWh battery energy storage system (BESS) has gone live in Ningxia, China, equipped with Hithium Lithium Iron Phosphate (LFP) cells. The facility stores energy at times of abundant generation from solar PV and wind, putting it into the grid during times of peak demand. It will also help regulate grid frequency. At 2022 year's RE+ 2022 solar PV and energy storage trade show in California, Hithium launched its new 300 Ah prismatic cell and a 46 mm cylindrical cell, touting the prismatic cell's capability to go through 12,000 cycles in its lifetime and to operate without capacity fade for the first three years of use.

Read More: http://bitly.ws/y9oQ

5. Gotion JV Plans EV and BESS Battery Pack and Module Gigafactory in Thailand

Gotion High-Tech's aims to build a battery pack and module gigafactory in Thailand targeting the electric vehicle (EV) and stationary storage markets. Gotion has agreed to form a joint venture (JV) with a pair of Thai power companies, Arun Plus and Global Power Synergy. The plant's initial production capacity will be 1 GWh/year, with plans to double that by the middle of the decade. The plant will be built in Thailand's Eastern Economic Corridor (EEC) which spans three provinces. Thailand's government is targeting 37% renewable energy in the energy mix by 2037, equivalent to just under 2.8GW of renewable generation. Longer term, carbon neutral status is being pursued for accomplishment by 2050 and net zero emissions by 2065.

Read More: http://bitly.ws/y5o4

6. High-Voltage Transmission Grid Critical to Meeting Electric Vehicle Charging Demands

Electric vehicle (EV) charging needs along Massachusetts and New York highways will require interconnection to high-capacity transmission lines in the next decade, finds a first-in-the-nation study. The Electric Highways Study (https://www.nationalgrid.com/us/EVhighway) provides a blueprint for the strategic buildout of fast-charging sites along highway corridors to meet an upcoming surge in demand from the electrification of passenger vehicles and commercial trucks. The study examined current traffic patterns and expected charger use to forecast charging demand at 71 highway sites across New York and Massachusetts. The analysis included relevant electric vehicle sales goals and mandates in National Grid's home states — considering scenarios where all light-duty vehicle sales are electric by 2035 and all medium-and heavy-duty vehicle (MHDV) sales are electric by 2045.

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

7. Powercast and KYOCERA AVX Team on Battery-Free Solutions that Harvest Power from Established RFID Sources to Power ESLs, Sensors & Other IoT Devices

Powercast Corporation, the leader in radio-frequency (RF)-based over-the-air wireless power technology, and KYOCERA AVX, a leading global manufacturer of advanced electronic components, are teaming to create sustainable, battery-free solutions capable of harvesting power from industry-standard RFID readers to power ESLs (electronic shelf labels), RFID Sensor Tags and other battery-free IoT devices. A tiny Powercast PCC110 Powerharvester® receiver chip embedded in electronic devices harvests RF out of the air when it comes within range of a UHF RFID reader, converts that RF to DC (direct current), and then stores it in a KYOCERA AVX supercapacitor for discharge when needed.

Read More: https://prn.to/3IhnLAn

8. H2GO Power gets AI and Hydrogen Storage Technology Funding From UK Government

H2GO Power is headed toward a world first as a part of a collaboration with Baxi, and will be receiving UK government funding to lead an industrial scale demonstration of its artificial intelligence and hydrogen storage technology. The heat-in-a-box heating solution demonstration from H2GO Power will involve the supply of gas pre-heating in a carbon-neutral way that has been deemed safe and has the potential to also offer renewable heating solutions for other applications as well. This will involve the use of artificial intelligence (AI) and unique hydrogen storage technology.

Read More: https://www.hydrogenfuelnews.com/hydrogen-storage-technology-h2go/8556572/

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THE SWEDISH PRESIDENCY OF THE COUNCIL OF EUREOPEAN UNION WILL CONTINUE THE ELECTRIFICATION OF EUROPE

Implementing long-term energy market reform, providing the right regulatory framework to attract investors in innovative energy transition industries, and supporting the electrification of the EU are some of the focuses of the Swedish Presidency of the Council of the EU, from 1st January to 30th June 2023.

"Sweden takes over the EU Presidency at a time when the Union is facing historic challenges. Swedish Prime Minister Ulf Kristersson announced his priority for Greener, Safer and Freer Europe.

The role of the Council of the EU is to examine the European Commission's legislative proposals and to negotiate with the European Parliament in order to reach decisions. Sweden will lead the discussions in the Council throughout its Presidency.

Sweden's Energy Agenda will also include:

- Tackling high and volatile energy prices
- Supporting joint European efforts to achieve independence from fossil fuels
- Advancing the Fit for 55 packages, which aims to reduce the EU's CO2 emissions by 55% by 2030
- Advancing work on the proposed revision of the Energy Performance of Buildings Directive, and on hydrogen and the decarbonized gas market

In this respect, in addition to Ursula von der Leyen's announcement of the creation of a €3 billion "Hydrogen Bank", the latest compromise reached by the Council of the European Union on 12 December on the Gas Directive, aims to relax the rules on the separation of network operations from the production and supply of hydrogen.

The agreement also specifies that the rules on the independence of hydrogen network operators do not require functional unbundling from gas or electricity transmission or distribution activities. The idea of a single entity to represent gas and hydrogen network operators is supported within Parliament, with the rapporteur of the text Jerzy Buzek (Poland) going so far as to defend the idea of a single association of network operators covering gas, hydrogen and electricity.

The REPowerEU plan has made it possible to launch several initiatives in 2022 concerning, in particular, major projects of common European interest (PIIEC) which will mobilize a total of 10.6 billion Euros for hydrogen-related schemes.

Article Contributed by Ms. Valérie Anne Lencznar, Ambassador for Europe and Francophone Africa

ARTIFICIAL INTELLIGENCE SERVING ELECTRICAL NETWORKS

The French Association Think Smartgrids recently published a position paper entitled "Artificial Intelligence (AI) serving Electrical Networks". To illustrate the application of AI for the benefit of electrical networks and the challenges associated with its deployment, the authors describe a selection of use-cases for which RTE and Enedis, the French transmission and distribution operators, have already developed industrial-scale solutions. These include network control, operation and planning, predictive maintenance, customer experience and AI support for network management teams.

Experts Cedric Villani, a renowned mathematician and former French deputy, and the philosopher Thierry Menissier, deliver their assessments about the strategic perspectives of AI in France and on the ethical issues related to the widespread use of AI Technologies.

The paper concludes with nine recommendations made by the Scientific Council of Think Smartgrids for the development AI for electricity grids:

- Put data at the heart of the approach
- Hybridize techniques and implement multidisciplinary strategies
- Foster transversality
- Develop skills
- Extend standardization
- Aim for frugality
- Facilitate acceptability
- Ensure inclusion
- Ensure the final responsibility is human

The document can be found out at: TSG_Intelligence_Artificielle_EN_vDEF_WEB.pdf (thinksmartgrids.fr).

Article contributed by Think Smartgrids, France

Think Smartgrids in partnership with IEEE will organize a webinar in the first quarter of 2023 to discuss the principal recommendations of the document, with the French TSO and main DSO, RTE and Enedis, the university INP Grenoble and Quantmetry.

Member Updates

NORTHERN IRELAND COMPANIES COLLABORATE TO ELIMINATE USE OF FOSSIL FUELS

In the wake of the UN Climate Change Conference (COP 27) in Cairo, it is clear that the urgency to mitigate climate change and reduce greenhouse gas emissions has never been stronger than right now. Against this backdrop, biomethane production from agricultural waste and residues not only supports climate change mitigation but also provides an approach for a 'just' transition to a more circular bioeconomy. Biomethane (also known as "renewable natural gas") is a near-pure source of methane produced by "upgrading" biogas (a process that removes any CO2 and other contaminants present in the biogas).

Four leading Northern Ireland companies have established a collaborative cluster with the aid of Queens University Belfast and facilitated by Centre for Competitiveness / Smart Grid Ireland. The purpose of this pilot project is to unleash the Net-Zero innovation potential of their businesses and achieve their Environmental, Social and Governance objectives. The Northern Ireland partnership has been formed between Tobermore Concrete, CemCor, Dale Farm and RSC Group. This novel approach was enabled by the Centre for Advanced Sustainable Energy (CASE) at QUB, which indicated that farming wastes could decarbonise our existing gas grid with profound repercussions for Northern Ireland's capacity to reach Net Zero.

Link to the Article: https://bit.ly/3QqlFAs

Article contributed by Centre for Competitiveness / Smart Grid Ireland

Events supported by GSEF

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GSEF Smart Grid Editorials

REVISITING CABLE ASSET MANAGEMENT

In my previous article (GSEF Nov 2022 Newsletter), I wrote about temperature mapping of assets using fiber sensing to validate real-time "thermal headroom". Rising ambient temperatures and extreme swings requires maneuverability to manage an asset's real-time thermal capability and also to re-assess aging factors. Recently, I have been actively engaged in this area offering solutions and mentoring such technologies. In this article, I will concentrate on cable asset management 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 to allow adequate real-time thermal capability to meet load demand in tandem with ambient temperature swings. Otherwise, a generic name-plate derating (say 10-15%) will likely strand trillions of dollars of existing assets value.

Today, most solid-dielectric MV/HV cables in-service are over 25-years. The high cost of cable replacement (duct or direct burial) is posing a regulatory prudence conundrum to easily allow such end-of-life replacement. The regulatory push-back often takes the approach of (a) "not enough evidence" or (b) "explore remediation options to extend cable life". Despite improvements by the industry over the last 25 years (cable quality, gas-purging, gel-injection, testing) cable asset managers face significant challenges in balancing reliable power delivery with budget priorities. Cable systems continue to be the most expensive and the shortest asset life in the utility.

Cables receive less visibility in monitoring and maintenance than other power assets. The operating conditions (soil, moisture, electrical stresses, temperatures and oxidative surroundings), cause small but cumulative irreversible changes in the dielectric chemical structure and deteriorate their service life. In a Nov 2021 article published by Electric Power Reliability Alliance, titled, "A Scientific Approach to Cable Asset Management", by Ben Lanz, Director Engineering, IMCORP, concludes that power cables are (a) one of the most commonly overlooked power system assets; (b) are typically addressed reactively after failure; and (c) are one of the most misunderstood asset classes. All this, despite decades of published analysis by several national laboratories and agencies to assess cable failure mechanisms.

Climate change is forcing increased use of underground cables. PG&E in California is planning 10,000 miles of MV cables to protect from wild fires. India is converting to underground cables as a relief from coastal storms which cause major power disruptions to its overhead lines. In this year alone, southern USA has seen a huge destruction of overhead poles and wires due to hurricanes while northern USA/ Canada has seen snowstorm and icing causing power disruptions. There are many other examples. Clearly, overhead power delivery is not in vogue.

There are several cable asset management systems in use. The widely held view (for almost three decades) has been that cables fail due to excessive dielectric stresses (over-voltage) and not due to thermal issues, except in high load applications where joints/terminations do get overheated. Based on this premise, most utilities focus on three care areas, (a) cable-care (quality manufacture and installation); (b) dielectric-care (over-voltage limits and less hi-pot "thumping"); and (c) testing-care (partial discharge. tan-delta and IR scans of joints and terminations). Ironically all these measures, have still eluded the question of why premature cable deterioration.

A Feb 26, 2020 article published in T&D World, authored by Korean utility staff, attempts to estimate the typical life of MV underground cables using accelerated aging principals. It is interesting to note that further studies are advised for cable vintages over 25 years. This tends to support a recent regulatory filing by an Ontario utility that its direct buried MV cables (XLPE) are deteriorating in about 30 years and some are in need of immediate replacement. The petition was declined by the regulator seeking further conclusive evidence. While just these two examples may not be substantive evidence (there could be others), but it still begs the question to explore further.

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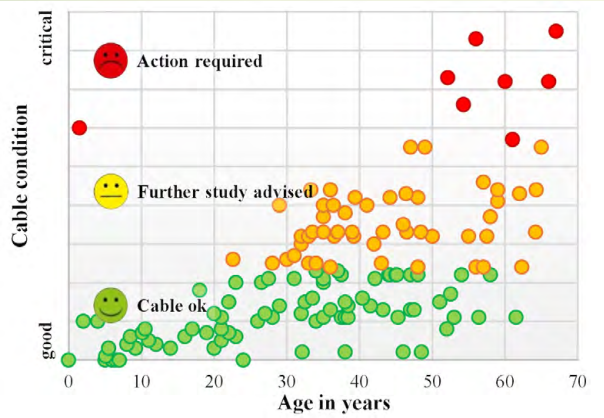
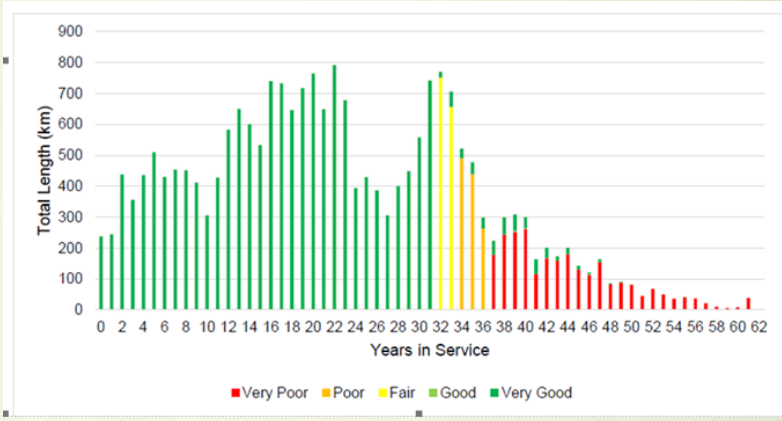
T&D World, 2020



OEB filing 2021



In my view, dielectric deterioration of cables is also due to thermal impact albeit slow and cumulative (like other power assets). Monitoring them over their service life will likely corroborate mid-life deteriorations. In fact, various standards (for over 60 years) have specified ampacity-temperature derating factors (for different soil conditions, cable arrays, ambient temperatures). In addition, there are leading software programs that model temperature profiles given a cable arrangement (ducts, tunnels, trays and direct burial). But these thermal models have largely remained theoretical. We have not been able to validated these through field measurements along the cable route over the life of the cable. We need to make an effort now.

The cause of cable failures lies in two areas, (a) dielectric stresses (overvoltage, switching surges, moisture ingress) and (b) thermal stresses (high load currents, short-term overloading, higher ambient temperatures, lack of heat dissipation in a few spots, harmonics). While dielectric stresses have been well validated, thermal factors remain theoretical without field measurements over its service life. Temperature profiles along cable routes was not feasible till recently, but is possible now using fiber sensing.

Thermal degradation mechanisms could be due to (a) higher surrounding ambient temperature at a few spots leading to localized heat build-up in cable jackets causing slow local dielectric deterioration; or (b) short-term overcurrent and harmonics causing the cable conductor to heat up thus deteriorating the conductor insulation. Collectively, both these mechanisms could then lead to moisture ingress at such points causing the dielectric deterioration to spread. In fact, nitrogen purging in older service cables has yielded copious water. Arrhenius theory states that higher operating temperature results in increased dielectric deterioration, sometimes doubling for just an increase of 10 deg C.

In a few accelerated aging studies conducted in the Middle East [Science Direct, Heliyon Journal, Volume 6, Issue 1, January 2020, e03120] examining aging of XLPE cable using BS 7870-2 and Arrhenius model, found interesting results. While the useful life of XLPE cable is 40-60 years at 90 °C rated operating temperature, the experimental findings show an estimated cable life of just 7-30 years for operating temperatures between 95 and 105 °C. This amounts to 50% drop in cable life for a mere 6-16% rise in cable operating temperature.

Today, we have fiber optic temperature sensing technology to provide real-time digital temperature profiles along the entire cable route. It can be laid alongside the power cable in duct banks in retrofit applications or specifying in-situ optic fibers in the power cable itself in new/replacement applications (direct buried cables replacements should be duct banked given today's horizontal drilling technology). Cable thermal mapping will not only manage cable thermal headroom in real-time but also validate long term impact of cable deterioration due to thermal effects.

A renewed beginning is needed to understand thermal degradation of cables. I realize many operating cables aged 1-40 years would need to be monitored in real-time to build a library of knowledge. But if we do not start now, we will be in the same position 15 years from now, unable to explain premature cable failures before the regulator.

Article contributed by Ravi Seethapathy, GSEF Ambassador for Americas

Smart Grid Events

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

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

4th - 7th December, 2023
26th World Energy Congress
The Netherlands
https://bit.ly/3VSCndm

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/

12th -15th June, 2023
CIRED 2023
International Conference & Exhibition on Electricity Distribution, Rome, Italy
https://www.cired2023.org/

11th -13th October, 2023
4th SEERC Conference
ISTANBUL
http://www.seercturkiye2023.com/

GSEF at a glance

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Think Smart Grids

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Korea Smart Grid Association (KSGA)

Prakarsa Jaringan Cerdas Indonesia (PJCI)

GridWise Alliance

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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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