GSGF
Global Smart Grid Federation

NEWSLETTER

July 2020

Asia-Pacific Must Set Loftier Electrification Goals — ADB Expert

THE Asia and Pacific region should set more aggressive targets for universal electricity access over the next decade, an energy sector expert from the Asian Development Bank (ADB) said.

Around 200 million people in developing countries within the region had no access to electricity in 2018, down from 351 million in 2017, based on a progress report on the United Nations' Sustainable Development Goals.

Despite the improvement, significant challenges continue to prevent full electrification, according to the Energy Sector Group of ADB's Sustainable Development and Climate Change department.

These include unreliable supply, limited capacity of microgrids and solar home systems, and the need for more electricity services beyond household consumption.

"While Asia and the Pacific (are) well on track to achieve 100% electricity access, the region must aim higher and seek to achieve 24/7 electricity supply with good quality and sufficient quantity to maximize economic and human development benefits," said Yongping Zhai, the head of ADB's Energy Sector Group

Yongping Zhai further said that the key is to pursue an integrated approach to electrification, which includes credit support from banks and the use of smart systems that allow households to inject their surplus electricity into the grid.

"From a technological point of view, individual solar home systems can be connected to each other to share extra solar generation and battery capacities to form a microgrid; while a microgrid can be connected to the national grid," he added.

"With smart energy management systems using digital technologies, microgrids can be operated as a standalone system to maximize solar and other renewable energy generation at minimum cost, or be switched to the national grid when there is a deficit of supply within the microgrid," he added.

He backed the formation of specialized rural energy service companies via public-private partnership "to coordinate, operate, and maintain the integrated electricity supply system."

"Asia and the Pacific should take the lead to show the world how innovation will take us to the next level of electrification," said Mr. Zhai .

Article contributed by:
Dr. Ir. Cheong Kam Hoong
GSGF Ambassador (Asia Pacific Region)

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

Table of Contents

Global Stories on Smart Grid

Subsidizing Electricity During a Pandemic: Lessons from Ghana

A number of countries have offered free or reduced-price electricity as a stimulus measure during the pandemic. US utilities have not gone that far, but many are forgiving fees on late payments and have moratoria on shutoffs. In Ghana, the government announced an electricity subsidy program in early April. Existing energy subsidies have long been the subject of policy debate: the high costs are often not worth the benefits, especially since these tend to accrue to wealthier households, and subsidies can reduce productivity due to increased power outages. However, it is often politically infeasible to dial back energy subsidies once they have been established.

Read More: https://bit.ly/2OlilSb

Australia's Energy Storage Capacity to More Than Double in 2020

Australia is set to add 1.2 gigawatt-hours of energy storage capacity in 2020, more than double the 499 megawatt-hours installed in 2019, thereby increasing the country's cumulative storage capacity to 2.7 gigawatt-hours this year.

For the first time, front-of-the-meter (FTM) capacity, at 672 megawatt-hours, will overtake the 581 megawatt-hours of behind-the-meter (BTM) capacity in 2020, a result of funding from state and federal government programs as well as the Australian Renewable Energy Agency. With the Australian Renewable Energy Agency's advanced renewable funding phasing out, storage developers are pressed to seek private equity to cover 10% to 50% of initial project investments. Revenue uncertainties and risks of grid connection may prevent projects from attracting funding. The FTM market is most acutely affected by this and is likely to contract in 2022.

As Australia gradually phases out its 31-gigawatt coal fleet, it will need to look for alternatives. Project developers, both domestic and international, are clearly unfazed by the challenges. The number of Australian developers active in the market has doubled to 40 this year. By 2025, Australia's cumulative energy storage investment is expected to hit $6 billion (USD) which translates to 12.9 gigawatt-hours of cumulative storage deployments.

Read more: https://bit.ly/3gZ3Xkh

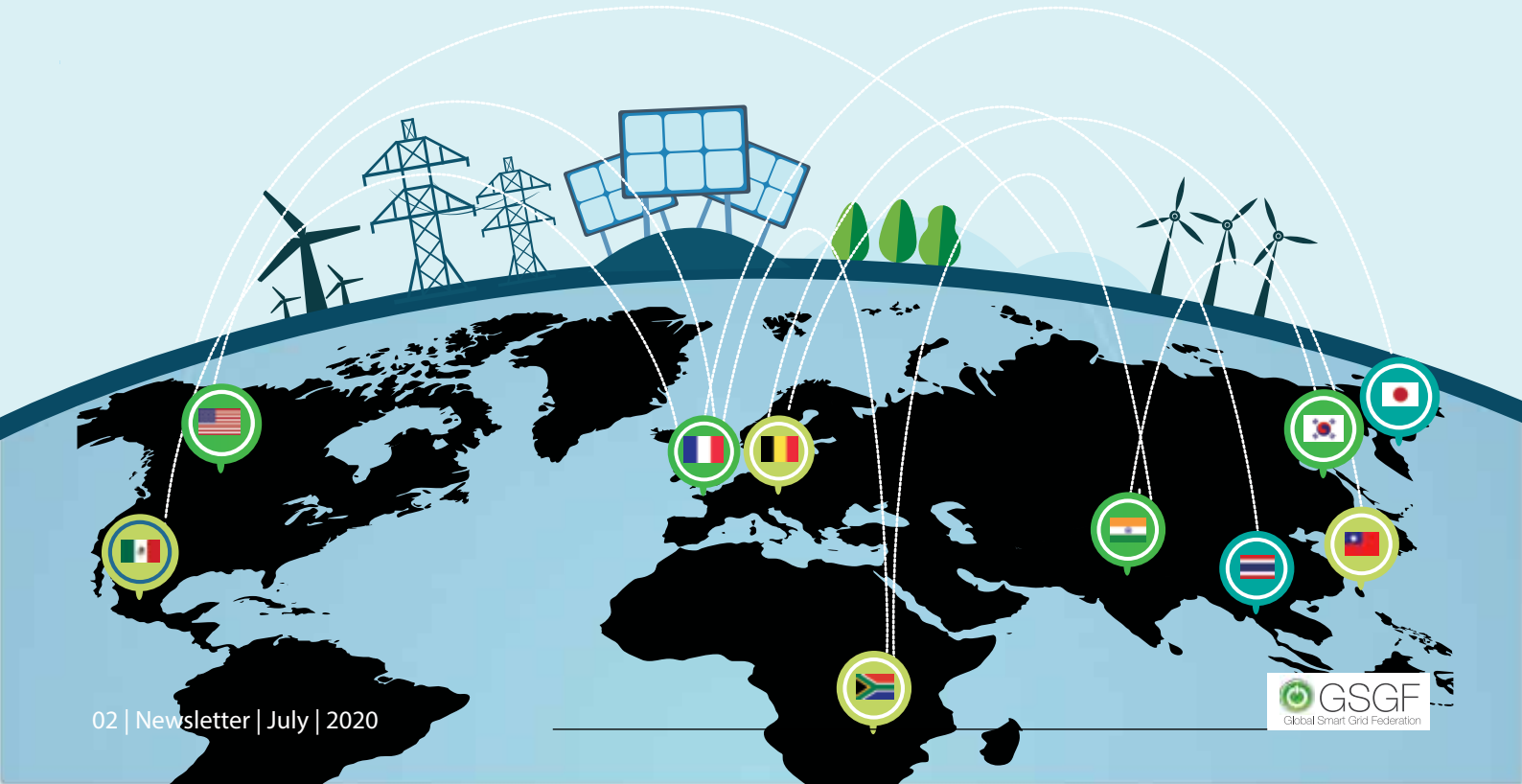
British Battery Storage Sector Takes a 'big Step' as Ministers Remove Size Limit Barriers

Barriers have been removed allowing for battery storage projects five times the size as the current limit in Britain, in a move hailed as a significant, positive and well-timed step. Secondary legislation was passed by ministers on 14 July that will allow for projects above 50MW in England and 350MW in Wales. The move could triple the number of battery storage projects on the grid according to the Department of Business, Energy and Industrial Strategy (BEIS). It is hoped that removing the barrier will help to encourage bolder investment decisions, allowing more batteries to balance the grid as the number of intermittent renewables continues to grow. The need for greater flexibility – such as that provided by battery storage – has been thrown into focus by the COVID-19 lockdown, as demand fell by around 20%, leading the transmission system operator National Grid ESO to develop additional tools for flexibility.

Read more: https://bit.ly/3fqfj0t

Commission Sets out Plans for the Energy System of the Future and Clean Hydrogen

European Union adopted two strategies namely Energy System Integration Strategy and Hydrogen Strategy which will pave the way towards a more efficient and interconnected energy sector, driven by the twin goals of a cleaner planet and a stronger economy. The EU Strategy for Energy System Integration will provide the framework for the green energy transition whereas as hydrogen can support the decarbonisation of industry, transport, power generation and buildings across Europe, the EU Hydrogen Strategy addresses how to transform this potential into reality, through investments, regulation, market creation and research and innovation.



Global Stories on Smart Grid

Digital Substation Initiative Launched to Modernize Power Grid Infrastructure

Key Highlights: Digital Substation Automation Systems (DSAS) initiative to enhance the power grid's modularity, interoperability and scalability to accelerate the global effort toward carbon neutrality by 2050.

LF Energy, a Linux Foundation nonprofit coalition that seeks to improve power grid infrastructure through open-source project, launched its Digital Substation Automation Systems (DSAS) initiative to enhance the power grid's modularity, interoperability and scalability to accelerate the global effort toward carbon neutrality by 2050. LF Energy, in partnership with GE Renewable Energy, Schneider Electric, RTE, Alliander, and other organizations in the energy sector, also launched the first project under DSAS: CoMPAS, or Configuration Modules for Power industry Automation Systems. LF Energy's DSAS initiative seeks to alleviate these challenges by optimizing electrical substations through open-source technology. These substations form crossroads of the grids, connecting grid users and grid voltage levels.

Read More: https://bit.ly/2CtTOO3

New York to Invest $750 Million to Expand Electric Vehicle Infrastructure

Key Highlights: The aim is to create more than 50,000 charging stations and will largely be funded by the state's investor-owned utility companies, with the total budget capped at $701 million through 2025.

New York Governor Andrew Cuomo on 16 July 2020 (Thursday) announced an investment of $750 million to build charging stations and other electric-vehicle infrastructure as part of the state's long-term goal to reduce emissions. The aim is to create more than 50,000 charging stations and will largely be funded by the state's investor-owned utility companies, with the total budget capped at $701 million through 2025. An additional $48.8 million is allocated from a 2017 settlement with German carmaker Volkswagen AG over its diesel emissions cheating scandal to fund electric school and transit buses, as well as charging stations. New York's announcement comes on the heels of a similar measure by Florida, which on July 10 announced an $8.6 million investment to expand charging stations.

Read More: https://bit.ly/2ZJlxD9

Texas A&M Leads Project Advancing Cybersecurity, Energy Efficiency in Smart Buildings

The United States Department of Energy (DOE) is supporting a Texas A&M University College of Engineering project to improve the cybersecurity and energy efficiency of commercial buildings. The Securing Grid-Interactive Efficient Buildings through Cyber Defense and Resilient System project, led by Zheng O'Neill, received $3.5 million from the DOE's Building Technologies Office to research, develop and demonstrate a real-time advanced building-resilient platform through multi-layer prevention and adaption mechanisms. Texas A&M's partners on the three-year project include Raytheon Technologies Research Center, Drexel University, Arizona State University, Pacific Northwestern National Laboratory and Northwestern University.

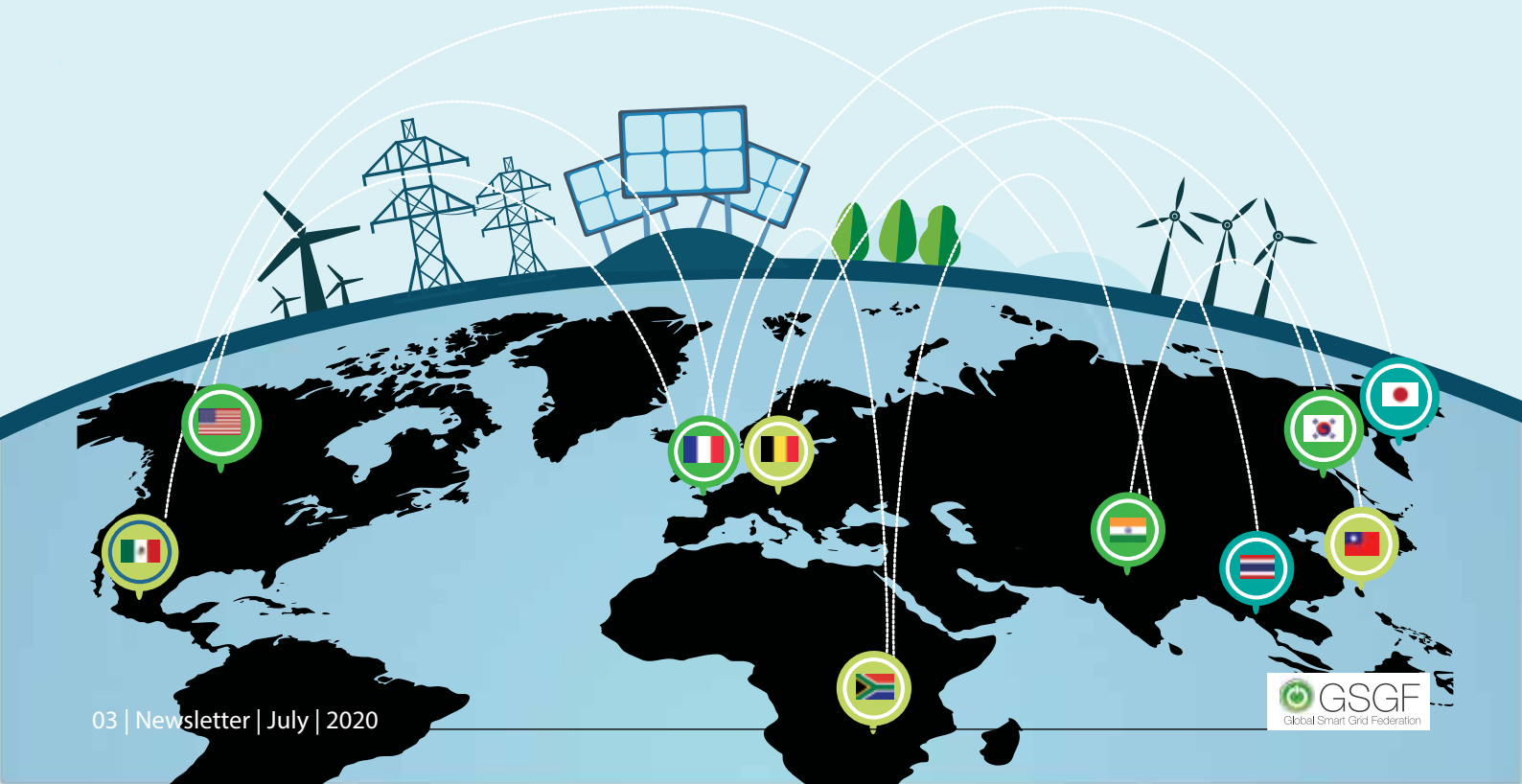
Read More: https://bit.ly/2E6e5tB

China Mulls Hiking Nuclear Capacity to 40% by 2025

The country's installed nuclear capacity grew 9% in 2019

China plans to increase its nuclear capacity by more than 40% between 2020 and 2025, with six to eight nuclear reactors commissioned per year. It will raise total nuclear power capacity from 48.7 GW in end-2019 to 70 GW in 2025. 12 nuclear reactors totalling 12,244MW are currently under construction and another 42 reactors are planned with a combined capacity of 48,660 MW. According to the National Energy Administration, China's nuclear power generation rose by more than 18% in 2019, raising the share of nuclear in the power mix from 4.1% to 4.9%.

Read More: https://bit.ly/30aXsnZ



Global Stories on Smart Grid

Berlin Showcases Future Living in Energy-Saving Smart City Quarter

Key Highlights: Panasonic claims the pumps run almost carbon-free when powered by the renewable energy provided by the 600 Panasonic HIT panels, which supply a capacity of 195kWp.

Berlin is the location for a new CO2-saving smart city project by Panasonic, which aims to help decarbonize society. Future Living Berlin, which is initially focusing on residential apartments, will be a showcase for connected and sustainable green living and is one of the EU lighthouses projects. The development of 90 households combines heat pumps with other efficient, green Panasonic technologies, such as photovoltaic (PV) panels, that have been integrated into an energy-saving solution, controlled and constantly optimised by an intelligent energy management solution. The solution is a world-first, developed as a joint-venture with leading research institutions for decentralized energy management. Panasonic is partnering in the smart city project with GSW Sigmaringen, the building owner of Future Living Berlin. Panasonic claims the pumps run almost carbon-free when powered by the renewable energy provided by the 600 Panasonic HIT panels, which supply a capacity of 195kWp.

Read More: https://bit.ly/3hhu9qv

Energy Efficiency Services Ltd. (EESL) Signs Agreement with NOIDA Authority to Install EV Charging Units

Key Highlights: This project aim is to save over 3.7 tonnes of CO2 emission per e-car per year. Noida authority has been sanctioned 162 Public EV Charging Stations under the FAME India Scheme Phase-II of Department of Heavy Industry (DHI).

EESL has signed an agreement with new Okhla Industrial Development Authority (Noida) to promote electric vehicle and install public EV charging stations and related infrastructure. An upfront investment will be made on services pertaining to operation and maintenance of public changing infrastructure. The aim is to save over 3.7 tonnes of CO2 emission per e-car per year. Noida authority has been sanctioned 162 Public EV Charging Stations under the FAME India Scheme Phase-II of Department of Heavy Industry (DHI). So far, EESL has installed 20 EV chargers, 13 are commissioned and 7 are under commissioning.

Read More: https://bit.ly/2OD4ixb

Events Supported by GSGF

Enlit Asia

23 - 25 March 2021 | ICE, Jakarta, Indonesia

Formerly POWERGEN Asia and Asian Utility Week

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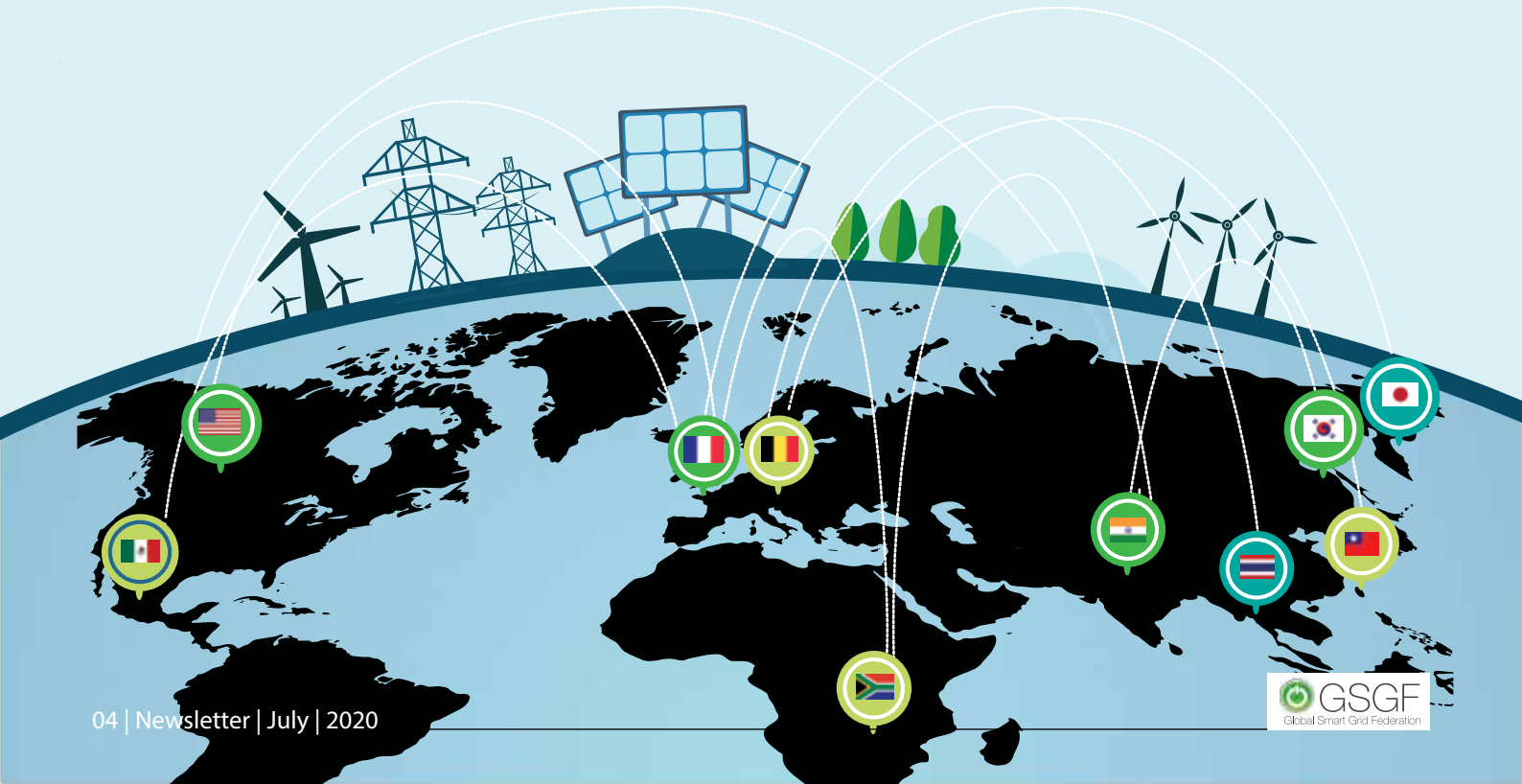

GSGF Global Smart Grid Federation

Member Updates

Nick Singh: New GSGF Honorary Ambassador for Anglophone Countries in Africa

To expand the mission of GSGF to develop cleaner energy systems and clean transportation in the African Continent on 01st May 2020, Nick Singh, Smart Grid COE Manager from ESKOM, was elected as the Honorary Ambassador for Anglophone Countries in Africa

The New Honorary Ambassador during his tenure will initiate and maintain strategic alliances with other organizations that will advance the vision, mission and goals of the GSGF. Mr. Singh also aims to capture key developments taking place in promotion of clean energy and clean transportation in the Anglophone Counties in Africa.

Mr. Nick Singh has been at Eskom Research Testing and Development since Jan 1998, specialising in Smart Grids and Control Systems. He leads a team of engineers and scientists, and facilitates laboratories in the Smart Grid domain, equipped to service the requirements of the power utility, which starts at Generation, Transmission, and Distribution ending at the customer. He currently holds the position of Head of Smart Grids Centre of Expertise. Nick is involved in centre management, technical support and strategy for Research Testing & Development and Line divisions. Nick is also a member of the Study Committee of Technology Technical advisory Committee (SCOT TC), South African Smart Grid Initiative (SASGI), ISGAN & EPRI. He is an Industrial mentor at a number of Universities local and abroad.

Nick has 21 years of experience in the Field of Electronic Engineering and Project Management; Graduate School of Business Leadership (UNISA, SBL), and Wits Business School and is the lead on Smart Grid Collaborations between ERDF(France), ISGF (India), EPRI (USA) in the respective areas. Nick's team has recently launched the 1st Smart Rural MicroGrid in the Freestate combining Battery Storage, Renewables and a DERMS system that actively manages supply and demand. Other demonstration Pilots include residential PV in Stellenbosch, Enhanced situational Awareness and Advanced Analytics (ESA3) and a Smart Home demonstration at RT&D incorporating IOT, Smart inverters and PEV integration. Nick is presently managing DER implementation within the Commercial, Industrial and Agricultural sectors, as well Renewable Containerised Off-grid applications for rural areas.

Think Smart Grid Recovery Plan, 2020

Think Smartgrids, which represents the French Smart Grid ecosystem, publishes a recovery plan with 14 concrete recommendations that highlights the role of smart grids for a green recovery through Energy Transition, in order to meet the imperative of carbon neutrality while creating jobs.

The document addresses electric mobility as well as the Decarbonization of buildings, Energy data through the creation of sovereign clouds and data architecture, storage of renewable energies, behavioural changes, multi-energy networks and the international arena.

Written under the Direction of Philippe Vié, Global Head of Energy, Utilities and Chemicals at Capgemini

View the document here:

https://www.thinksmartgrids.fr/wp-content/uploads/2020/07/Think-Smartgrids-Recovery-Plan-2020.pdf

Small Island, Power Systems and Smart Grids on Indian Ocean Islands

Indian Ocean Islands are fully engaged in the Energy transition. Their vulnerability to climate change is high and their dependance to fossil fuel is equally high. Developing new RES Generation will need to better integrate them into the system. In addition to RES, demand side management are key elements to succeed in the transition. Hydro Energy is secure and well adapted to customer expectations but it is not present everywhere, investments are huge, construction delays are long, and annuel production cycles are variable. Wind Energy is available thanks to strong and regular trade winds but cyclones can limit the use of this technology. Solar Energy Generation is favored by high insolation ratios.

The relatively small size of electric power systems compared to large utility scale systems created new specific problems such as the issue of Grid Stability due to RES Generation development. Smart grids technologies could bring solutions to these challenges. Therefore Indian Ocean Islands are a true innovation zone. Among different problems, the number one issue is how to manage Solar PV Generation Intermittence. Intermittence has a double effect : first : A strong and sudden potential variability along the day which requires to install new tools for balancing supply and demand. Second a time difference between production periods (middle of the day) and consumption periods (end of the day). Storage solutions can solve this problem. The most common options are Centralized storage solutions with various technology operated by the DSO.

Another key issue is the reduction of the power system Inertia due to a lesser share of rotating machines in the production system. In case of an outage, the frequency variation can be much higher compared to current ratios in larger power systems. DSOs have to defend against frequency load shedding due to simple faults such as the loss of one production unit. Batteries with short term response can be a solution. A detailed grid code must define the connecting conditions and the acceptable performances of new generation means. In terms of responsibility, the implication of the producers in the management of the power system in a key success factor. Hybrid Systems with a mix of various energies can be a good way to incentivize the producer to optimize primary energy use while garantying the contractual capacity. Demand management is the other direction. Since the average consumption is still low and growing rapidly, it's the right time to choose low energy processes. For instance, lighting and cooling are a significant share of the consumption. This leads to favor LEDs for lighting and to develop thermal insulation to limit cooling needs. Different avenues can be explored : through regulation, standardisation, taxation, and finally invest in training for building construction jobs.

The management of consumption can be developed with smart meters only if appropriate functionalities exist and the deployment is complete over the territory of the island . It is not the case everywhere. Reunion Island has engaged a smart meter deployment plan which will be completed by 2024. Beside benefits in terms of CO2 emissions reduction, these initiatives will reduce the imports of fossil energies where the electricity price is sold under its real cost for social reasons. The example of Mauritius is a good illustration of RES integration while maintaining the quality of supply. This example showshow the success can be obtained with the engagement of the country government, the development of local competencies, a good local management of energy project and a financial support by the international community.

Article By : Alain Doulet, Senior Expert- Distribution and Smartgrids, Algorus Consulting & Marc Boillot, Ambassador for Europe and Africa (Francophone Countries), GSEF July 30, 2020

The Challenge of Integrating Variable Renewable Energy Sources on the National Grid in Mauritius.

Mauritian power system is relatively small with a peak demand of 507.2 MW as experienced in December 2019. Such a power system has low system inertia and therefore is more sensitive to changes in the individual components of the system. For such a power system, the imbalances produced by a sudden rise of the load demand, the loss of one generator or a sudden variation in the solar generation is significant compared with the size of the system. This would lead to significant frequency excursions in the event of loss of generation or a big sudden load change.

By Chavan DABEEDIN, Transmission and Distribution Manager, Central Electricity Board, Mauritius

Read More: https://bit.ly/31vUcUL

Battery Energy Storage Systems: Enhancing Safety

By
Ravi Seethapathy P.Eng., MBA, FCAE
"Ambassador for the Americas", Global Smart Grid Federation, USA
Executive Chairman, Biosirus Inc., Canada

I have been involved in battery energy storage systems (BESS) architecture and protections since 2007 (till 2014 in utility) and since then as an advisor. I have been privileged to know details of its evolution, chemistries, designs, field issues and also a few operational fires. Thanks to its falling costs (last 5 years), BESS has proliferated in many sizes, construction and end-use applications. These offerings now range from tens of KWh to many MWh and include both grid-connected, behind the meter and off-grid applications. Containerized battery systems have enabled modular/scalable designs.

In the early days of BESS development, almost every manufacturer experienced at least one fire and so industry standards were developed to ensure safety assurance. The utility scale BESS involved managing additional risk due to their larger capacities. Today, growth in urban/remote container-sized applications, as well as smaller off-the-shelf residential/commercial applications, has added extra dimensions to the risk factors. This plug and play business opportunity (while very encouraging), has seen a resurgence in BESS fires globally in 2019. Despite all the progress made in safe designs, the BESS protection systems were unable to prevent (or limit) the catastrophic losses in the 2019 fires.

The biggest challenge in the early years, was for the local fire departments to correctly assess the situation (chemical/thermal) and contain such fires without high risk to first responders. Utilities and manufacturers had to work with them to offer better understanding in resolving the various issues. Despite this, in the earlier years, it was not uncommon for a utility sized BESS fire to burn itself to the ground. Since then it has taken municipal fire departments, almost a decade, to bring a common acceptance in developing uniform fire codes. *It has now been accepted that cooling such fires with copious water (much like a burning building) is the best approach to prevent secondary reignition, once the electrical disconnection has been made.*

Incidentally, in the 2019 fires, all the BESS systems burnt themselves to the ground (some before first responders arrived) and in another case, a gas explosion caused physical injuries to attending fire personnel. *Almost all of them were containerized batteries (outdoors/indoors) and almost all were fully charged, but "idle" at the time of the incident (i.e. not discharging or charging). This is a serious new concern for all*. While I have not had access to data related to these fires, my view is that the root cause of such recent fires, may be less with the core battery (cells/BMS/modules) design and more likely in the "outer service layers" (pack, assembly, operating environment, usage and energy management). *It could very well be, that such risks are treated modular (and in isolation from one and another) when built using multiple vendors*.

This takes me back to my earlier years as a power station relaying engineer, where the B-T-G and the unit-transformer protections were overlapped and integrated tightly with duplicate overreaching trips (mechanical, thermal, electrical) to isolate the primary energy source quickly (in milliseconds) and avoid damages. Ideally, BESS protection systems should be designed with a similar approach. *The recent ESS standards are attempting to do this, but their acceptance is still to take hold within the industry*. With the plethora of BESS builders, systems integrators and global supply chains, each may be relying on others for such overall safety assurance (or assuming individual unitized stacks are safe in themselves).

Various standards (North American/IEC/Country) are critical to understanding how the various parts are covered. Recent North American efforts have addressed additional system facets, i.e. UL 1642 (small batteries), UL1973 (stationary batteries), UL1741 (power conversion units), UL9540 (energy storage systems), UL9540A (ESS testing), NFPA 855 (installation), and IFC 2018/Draft 2020-1 (fire code). *At first glance there appears to be safety overlap between elements (and there is for the most part), but there are several "outer service layer" elements that warrant careful introspection (for residual safety risks) based on the BESS assembly, its use and its ambient environment.*

The 2019 fires show a plethora of potential failure modes (a) extreme heat propagation; (b) exploding containers (vent failures); (c) undetected gassing (no fire); (d) improper installation; (e) flawed energy management systems; and (f) little overlap in thermal-mechanical-electrical protections. *In each of the 2019 incidents, the whole BESS was destroyed leading to a total loss in investments.*

Developing countries such as India, Brazil, Mexico, Malaysia, Indonesia, who have an ambitious renewable + storage programs as well as storage programs for increasing last-mile reliability/resiliency, would be well advised to look into this aspect carefully and develop national compliance mechanisms to certify overall BESS build by local system integrators/pack-builders using imported sub-systems. Given extreme ambient/environment conditions (humidity, dust, temperature), challenging operating necessities and people proximity, there could be potential for huge injuries during such BESS catastrophic failures. *Being reactive and relying on fire codes alone will not mitigate risks*. A "whole of system" approach needs to be undertaken in designing BESS protections, particularly for retail systems that are likely to be procured off-the shelf and/or housed inside establishment premises or residences.

In closing, as BESS becomes cheaper, its market proliferation will become a common feature (grid-connected, off-grid and retail customer applications). The containerization of such BESS systems also expands the scope for such scalable/modular applications in both urban and remote locations. In most such cases the cells, BMS, modules, packs, containers and energy management systems may all come from different global vendors. *Thus, the systems integrator and/or the utility/owner needs to ensure overall safety for their location, environment and application.*

In safety assurance, while the safety of the parts does makeup the sum, what is often overlooked is the "residual risk". It is this that causes catastrophic failures.

For participation in the above events please write to **info@globalsmartgridfederation.org**

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- **Smart Grids for EVs:**
  Chair - Think Smartgrids, France
- **Flexible Grid-Towards Customer Enablement**
  Chair- Ambassador, Americas

Working Groups in Pipeline

- Blockchain for Utilities
- AI and Advanced Analytics for Utilities
- Robotic Process Automation for Utilities

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