GSGF
Global Smart Grid Federation

NEWSLETTER

April 2019

Thailand's new solar plants to float on dams and reservoirs

Thailand solar energy plans are ambitious and revolutionary. The largest and oldest cement and building material company in Thailand and Southeast Asia aims to install a giant 45-megawatt floating solar farm at the Sirindhorn Dam — the first of eight dams that may receive the treatment. Floating solar farms provide the benefits of solar energy without taking up valuable space on dry land in densely populated areas. Other advantages include their comparative ease of installation and decommissioning, along with helping to reduce evaporation as a result of partially covering the water surface. During the approximately 10 years that floating photovoltaics have been around, they have garnered a particularly enthusiastic response in populous countries such as China, Japan, India, and South Korea. It appears that Thailand is now eager to begin installing the panels as well.

Siam Cement Group (SCG) is among Southeast Asia's biggest manufacturers of building materials. It has developed its own proprietary floating solar panels that it promises to build, install, and maintain. The company's panels are made from high-density polyethene, which is both durable and recyclable. The company claims that its panels will last for around half a century and take up approximately 10 per cent less space than the floating plants developed by rival companies. The company plans to build a floating solar plant at Sirindhorn Dam is the first part of an ambitious floating solar panel project announced by Thailand's state-run Electricity Generating Authority of Thailand (EGAT). The department has plans to build floating solar panels, with a total capacity of 1 gigawatt, across eight and reservoirs dams over the next couple of decades.

The Sirindhorn Dam will be the first of these, with four other projects to follow on soon after. EGAT hopes to begin construction as soon as April 2019, although it has yet to reveal which company it is going to award the contract to.

Currently, Thailand generates around 12 per cent of its energy from sustainable sources. Thailand's government hopes that initiatives, such as its floating solar plants, can help increase this to 37 per cent by 2036. If everything goes according to plan, around 6 per cent of the country's total power could come from floating solar farm projects such as this one.

The state-run utility Electricity Generating Authority of Thailand (EGAT) has announced earlier that it planned to facilitate 1GW of hybrid floating solar-hydro projects across eight dams throughout the country. The deputy governor stated that the plans complement the fact that Thailand already has a hydropower plan and the country wants to have a test bed for floating PV, he added. EGAT sees a potential water surface area of 16 sqkm^2 across the eight dams earmarked for this first phase.

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https://www.nst.com.my/business/2019/02/460976/government-opens-tenders-rm2bil-large-solar-projects

Global Stories on Smart Grid

Navigant: Remote Microgrids Have Huge Market Potential Globally

Remote microgrids are becoming the key source for delivering power to global regions that are either tough to traverse or where the main grid is not reliable. And some companies are finding this to be an attractive business model, not only because they can initially limit their capital outlays but also because they can eventually scale up their projects. In 2018, the global market for remote microgrids totaled $3 billion. By 2027, it is expected to be $10.2 billion, says Navigant. That's according to the Navigant Research Leaderboard, which bases its examination on how much revenue within the "value chain" companies can capture — from origination to project development. Some vendors are more focused on integration and controls and others zero-in on engineering, procurement and construction. In other words, some businesses might score well in strategy but not that well in execution.

Read More: https://bit.ly/2U2iPGK

New rules for greener and smarter buildings in Europe

As a part of the Clean Energy for All Europeans package, new rules for energy performance in buildings came into force (Directive (2018/844/EU, amending existing Directive 2010/31/EU). These new provisions will make the buildings of the future greener and more comfortable, making them consume less energy. Apart from this, investments in energy efficiency can also stimulate the economy, particularly the construction industry, and the new rules will also help SMEs from a boosted renovation market, as they contribute more than 70% of the value added in the EU building sector

Read More: https://bit.ly/2W0WeIo

New York City funds clean-energy electric grid modernization

New York City has announced up to $30 million support to projects to improve the resiliency, flexibility, and integration of renewable energy resources onto New York's electric grid. Project proposals will be evaluated based on how they improve overall grid performance, reduce energy costs, and support the state's nation-leading clean energy goals to combat climate change. The New York State Energy Research and Development Authority (NYSERDA) is administering the initiative through its High Performing Grid program that seeks proposals from electric grid technology companies, New York's utilities, universities, and researchers, to advance smart grid technologies.

Read More: https://bit.ly/2DkJ8P7

China slashes subsidy program for lithium battery-powered electric cars

China's Ministry of Finance, Ministry of Science and Technology, and other agencies jointly announced changes to the subsidy program for lithium battery-powered electric cars, slashing subsidies by 67 percent. The research and development (R&D) subsidies are now shifting to vehicles with hydrogen fuel cells, a new technology that, according to industry, is cleaner and more efficient than lithium battery-run cars.

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

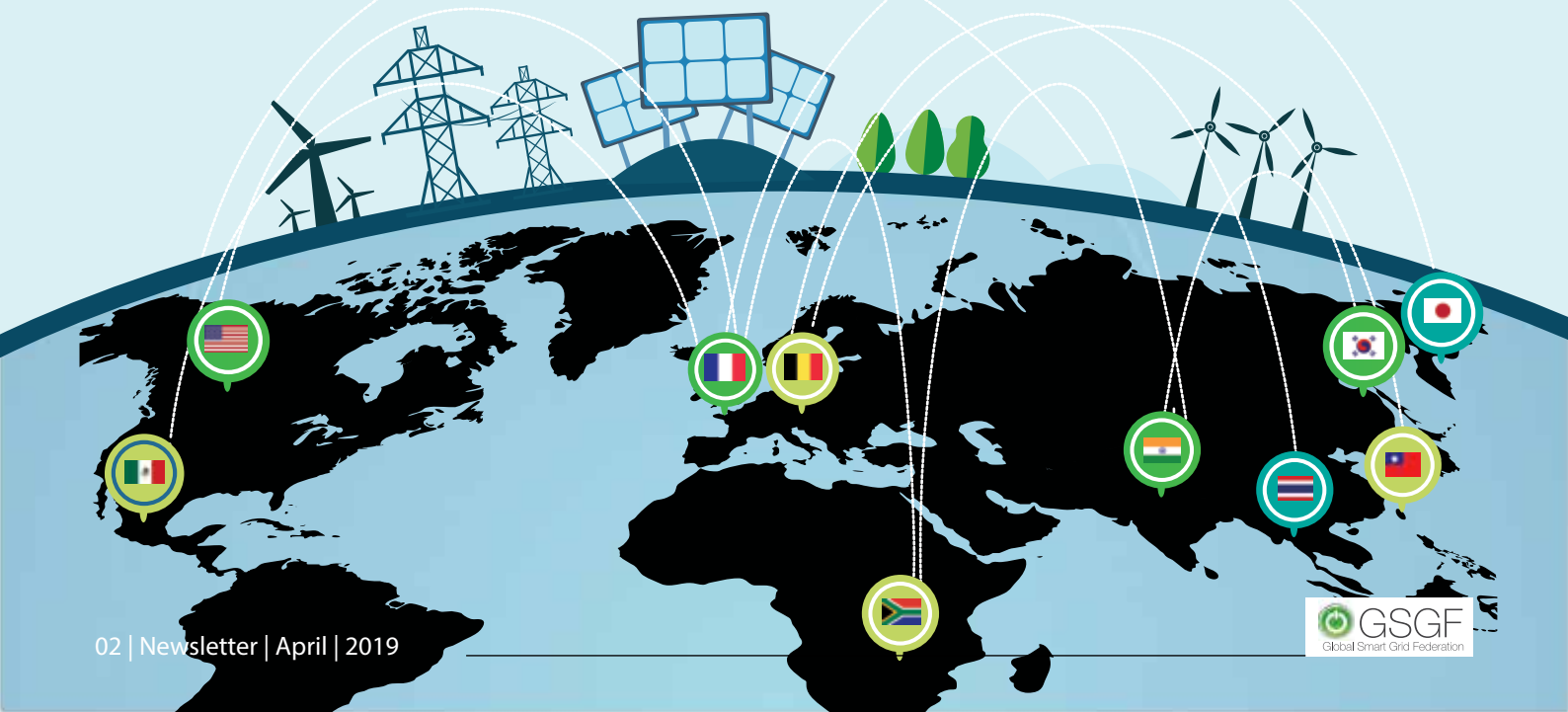
GE to develop DC-Coupled Solar and Battery Energy Storage Hybrid System in Upstate New York

GE Renewable Energy has reached an agreement with Helios Energy to deliver two energy storage systems to be integrated with solar arrays for the Lenox Solar / Energy Storage project in Lenox, NY. The hybrid system will be installed in upstate New York at the end of 2019 and is expected to reach commercial operation in the second quarter of 2020. The project will enable dispatchable renewable energy penetration into the grid, helping power New York state with reliable renewable energy. The system will use a direct DC coupled configuration with a single inverter and single point of interconnection shared by the solar array and the storage system, helping improve the overall energy output of the hybrid system while optimizing equipment and installation costs and increasing the overall system reliability.

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

SenSen launches GeminEYE - AI smartphone app for smart city management

SenSen Networks has launched a smartphone app for city council staff that it says will contribute to the development of smart cities by making operations related to civic compliance, asset management, traffic data collection and analysis, security and surveillance more



affordable, accessible and versatile. GeminEYE has been launched with two applications for parking restriction enforcement and illegal dumping detection. For parking enforcement, SenSen says a council employee simply mounts their smartphone on their motorbike or the dashboard of their vehicle and GeminEYE's AI-powered software will recognise the number plates of parked vehicles and determine whether or not they violate parking restrictions. Similarly, for illegal dumping, SenSen says the app analyses feeds from the phone's sensors and cameras in real-time and uses its proprietary AI-powered software to detect the activity and evidence of interest, such as illegal dumping.

Read More: https://bit.ly/2Vc6i44

University of Nevada, Reno and Filament using blockchain IoT tech for autonomous vehicle smart city

A project at the University of Nevada, Reno is developing a new blockchain-powered autonomous vehicle project. The Intelligent Mobility project, coordinated by the University of Nevada, Reno and the Nevada Center of Applied Research (NCAR), has chosen enterprise blockchain and Internet of Things (IoT) firm Filament to develop an autonomous vehicle smart city project. The new blockchain-enabled initiative is designed to improve safety and communication between driverless connected cars and the surrounding infrastructure. The university will soon launch simulated testing of Filament's Blocklet technology, a tool designed to empower connected machines with transactive value through distributed ledger technology. The integration of the tech will reportedly enable a trustworthy record of events by enabling attested data exchange via blockchain transactions.

Read More: https://bit.ly/2GDRun1

ADB and ASEAN Announce $1 Billion Green Finance Facility

The facility will see contributions from KfW, European Investment Bank, and Agence Française de Développement

The Asian Development Bank (ADB) along with Southeast Asian governments and major development financiers has launched the "ASEAN (Association of Southeast Asian Nations) Catalytic Green Finance Facility," a new initiative that aims to mobilize more than $1 billion in green infrastructure investments across Southeast Asia. The initiative is expected to provide loans and technical assistance for sovereign green infrastructure projects such as sustainable transport, clean energy, and resilient water systems. It also aims to accelerate private capital by mitigating risks through innovative finance structures. The facility includes $75 million from the ASEAN Infrastructure Fund (AIF), $300 million from ADB, €300 million ($336 million) from KfW, €150 million ($168 million) from the European Investment Bank, and €150 million ($168 million) from Agence Française de Développement. The Organisation for Economic Co-operation and Development and the Global Green Growth Institute will support knowledge sharing and capacity building on green finance. The Overseas Private Investment Corporation has expressed interest in potential financing for emerging projects.

Read more: https://bit.ly/2P4vLHn

One Belt One Road initiative to expand renewable energy

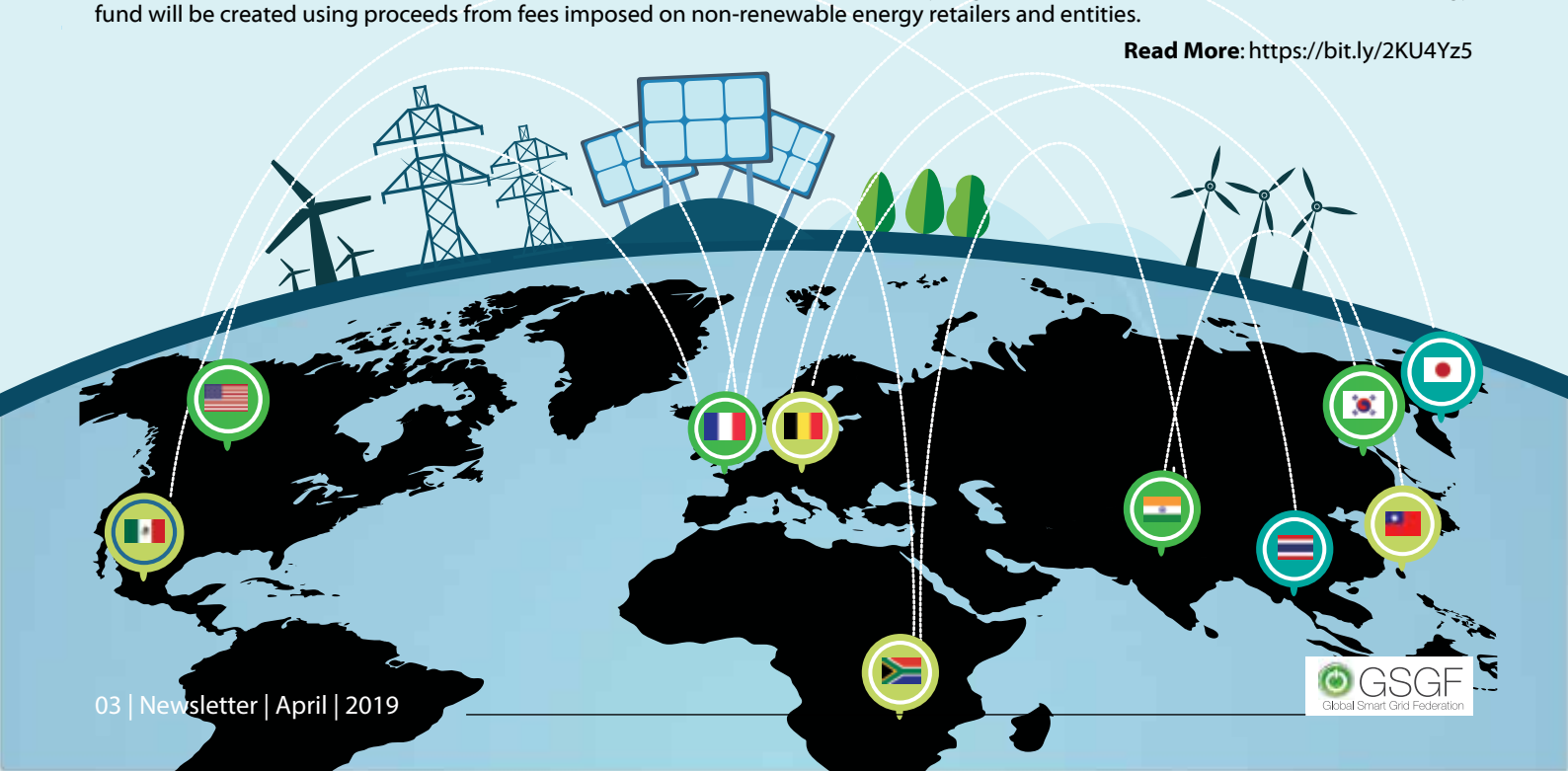
China plans to utilize its ambitious One Belt One Road (OBOR) initiative to expand renewable energy along the economic belt. The Belt and Road Green Development Research Project released its latest report which explains the policy conditions, industrial conditions and existing opportunities and challenges affecting the international cooperation of the Belt and Road renewable energy. Development of renewable energy in these countries will not only help to reduce the adverse effects of climate change, protect the environment and the health of the people but will also accelerate the transformation of energy structure.

Read More: https://bit.ly/2D9H9Nx

Revised renewable rules for Taiwan

Taiwan government has accepted the amendments to the Renewable Energy Development Act, according to which the Ministry of Economic Affairs (MOEA) will review the renewable energy development goals for next year and 2021 and local governments will evaluate the development potential of renewables in their jurisdiction. Local governments will have the ability to build power generation facilities of up to 2,000 kW and MOEA will be responsible for facilities with a capacity larger than 2,000kW. In addition, a renewable energy fund will be created using proceeds from fees imposed on non-renewable energy retailers and entities.

Read More: https://bit.ly/2KU4Yz5



Japan's Efforts to Promote Hydrogen Use in Tokyo 2020 Olympic and Paralympic Games and Realize a Hydrogen-Based Society

The Government of Japan released its Basic Hydrogen Strategy in December 2017. During the second meeting of the Ministerial Council on Renewable Energy, Hydrogen and Related Issues, Prime Minister Shinzo Abe said, "Through innovation, hydrogen energy will become a trump card to solve the issues of energy security and global warming. […] The Fukushima Plan for a New Energy Society, which is the pioneer of this Basic Strategy, has already begun its activities. In Namie Town, a hydrogen production project of the world's largest scale, using renewable energy with zero CO2 emissions, started last summer. In 2020, this clean hydrogen made in Fukushima will be used for the Tokyo Olympic and Paralympic Games. We will show the world a new aspect of Fukushima's recovery as a 'Reconstruction Olympic and Paralympic Games.' Japan will lead the world in materializing a hydrogen society."

Tokyo, having been chosen to host the 2020 Olympics, is working toward becoming an eco-friendly and disaster-resilient city by incorporating hydrogen energy in city planning while ensuring its safe use.

a) Potential benefits of hydrogen energy (based on the report published by the Tokyo Metropolitan Government in February 2015)
b) Environmental load reduction
c) Hydrogen is a clean energy that emits only water when used. Since it emits no CO2, it helps to greatly reduce environmental load.
d) Diversification of energy sources
e) Hydrogen can be produced from diverse resources, such as fossil fuels, water, gas byproducts and woody biomass, and therefore its use will promote stability in the supply of energy.
f) Beneficial economic ripple effects
g) Since the hydrogen and fuel cell industry is composed of a wide range of companies, increased use of hydrogen energy is expected to create new demand and new jobs.
h) Improvement in disaster preparedness
i) Residential fuel cells could be used as emergency power sources in the event of a disaster and/or a power outage.

Examples of actions taken by the Tokyo Metropolitan Government (TMG)

a) TMG has been offering subsidies to private businesses to promote the use of fuel cell vehicles and the installation of hydrogen fueling stations, aiming to provide strong support during the early stages of deployment.
b) TMG used CO2-free hydrogen produced in Fukushima to power fuel cell vehicles for the first time in Tokyo in January 2019.
c) TMG has been providing support for small and medium-sized gas station businesses planning to install and operate hydrogen fueling stations.

The New Energy and Industrial Technology Development Organization (NEDO), one of the largest public research and development management organizations in Japan, is playing an important role in realizing a hydrogen-based society. In collaboration with the Ministry of Economy, Trade and Industry (METI), NEDO, together with Toshiba Energy Systems & Solutions Corporation, Tohoku Electric Power Co., Inc. and Iwatani Corporation, has started construction of Fukushima Hydrogen Energy Research Field (FH2R), which upon completion will be the world's largest hydrogen energy system using renewable energy. The hydrogen produced in this plant will be used in Tokyo 2020 Olympic and Paralympic venues.

Japan is increasing and diversifying its efforts to utilize hydrogen energy, which will lead to wider adoption of hydrogen as a next-generation energy source.

Find more details at Smart Japan (in Japanese)

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please write to info@globalsmartgridfederation.org

Failed Smart Grids - Improper Communication Network

By
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Executive Chairman, Biosirus Inc., Canada

Over the last two decades of my involvement in Smart Grid initiatives/architecture as a Power Systems engineer, I have now learnt enough to become a part-telecom engineer. This has not been by choice, but rather by compulsion. My global consulting travels in the last five years, examining "failed or ROI problematic" Smart Grid investments, often lands me at the foot of improperly selected communications network. It is not that the telecom engineers did not design things well, but rather no one asked the tough questions with respect to data requirements and throughputs (current and future), which resulted in a cheaper, non-scalable and often a useless communications network infrastructure in less than 10 years. For this, the electric utility is squarely to blame.

The root problem of telecom (mis) investments, is almost exclusively, in the last-mile communications. What begins as a simple Smart Meter/AMI infrastructure investment decision, is fraught from the very beginning, with a lack of coherent vision of utility needs and expectations. To some it is a simple meter reading, to others it is distribution monitoring and control and to yet another, it is future business offerings. Not enough time is spent (often months needed) to get this vision and requirements aligned across the scores of divisions, departments and hundreds of utility personnel. This strategy exercise (often led by external consultants), is rushed through with a few high-level expert discussions and internal workshops with senior executives. The telcos who are also eager to leverage their existing last-mile infrastructure go along for the ride with no tough introspection. Thus, the communications infrastructure is built, guided by a few telecom and IT executives.

In recent few short assignments in Asia/Middle East, I had to challenge national telcos from proposing (almost imposing) their AMI communications solution onto a large electric utility (non-starter in my view). Planning a communications network, is akin to planning a new highway (or an airport), where traffic volumes, payload, mobility, congestion, latency and throughput must meet a minimum performance objective over a 10-15-year period. This should include business growth, customer aspirations and technology developments.

The following are my views with respect to what needs to be thought through to establish requirements for a robust and scalable last-mile communications architecture for AMI and the bigger Smart Grid initiative:

1. Obtain alignment on information/process requirements across utility departments for various smart grid objectives:
    a. It is all about requirements, requirements, requirements
    b. This visioning exercise could take 6-8 months with more than 30 or so internal workshops.
    c. Hire independent experienced power systems, telecom and IT consultants to guide and shape this effort (ask the tough questions)
    d. Generally, agree on a final set of requirements (corporate roadmap)
2. Assess the functionality of Smart Meters and what it should do:
    a. Simple billing related readings or additional power quality data gathered
    b. Controlling downstream sensors (smart appliance, load control, DR, etc.)
        i. Autonomous controls
        ii. Subscription-based elective customer controls (DR, dynamic pricing)
    c. Additional integrated device data (solar PV, energy storage)
    d. Utility controls (DR, freq., Var control, voltage control)

3. Assess bandwidth required for the above processes:
    a. Transactive input signals, Transactive Feedback signals for control actions (DR, etc.)
    b. Sample interval and Transfer intervals (seconds or minutes)
    c. Data payload, encryptions, cybersecurity, overheads (note: overheads are nonlinear)
    d. Directionality interfaces (upstream and downstream) to the meter (unidirectional/bidirectional)
    e. Data batching and data-transmission frequency (input/outputs)
    f. Data transfer protocols, physical-layer protocols, network protocols, medium overheads
    g. Packet collision/data retransmission, network/routing delays,
    h. Latency in data-transfer to the access medium, saturation delay, access protocol delays
4. Determine Number of Smart Meters per Network Aggregator/Concentrator:
    a. Simultaneous broadcast or scheduled broadcast from meter to upstream
    b. Simultaneous broadcast or scheduled broadcast to meter for downstream controls
    c. Meter "Push" or Aggregator "Pull" data streams
    d. Meter burst capacities from all meters (e.g. last gasp, DR feedback)
    e. Processing latency, reliable connection latency between meter data aggregation
    f. Aggregator upstream traffic requirements to DSO
5. Determine Optimal requirements
    a. Optimize and iterate above data requirements for performance enhancement
        i. Reduce density of meters per concentrator
        ii. Reduce the data packet sizes and transfer times
        iii. Increase data rate
    b. Encryption and cyber security features
    c. Quality of Service, Guarantees
6. Select last-mile communications network technology:
    a. Wired communications:
        i. xDSL, Co-axial have high bandwidth, but are shared systems with heavy, lower reliability tolerant traffic (music, videos, PC networks, TV, etc.). Further, the customer may not want to share access with the utility.
        ii. PLC (utility purposed) could have noise, interference and attenuation issues
    b. Wireless (WIFI, xIOT, GSM, xG, LTE, Wimax, RF Mesh) require careful considerations based on throughput, latency, quality of service (based on the business requirements). Data transmission transfer time (number of seconds or minutes per total meter data payload) and bidirectionality will be key in this selection
    c. Design last-mile architecture and estimate total capex and opex
    d. Reiterate with item 5 for cost optimization

In my frequent travels, I see a need for many aspects of the above being well understood and resolved. The utility best understands its requirements and should lead this effort, otherwise the high capex nature of this communication network will pose a stranded asset risk. Telcos (if involved in a service provider model) should understand AMI is a higher quality of service requirement with much lower everyday revenues.

It is not simple as it seems……

GSGF at a glance

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