MEDIA RELEASE

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Energy Storage Solutions Deployed in Singapore For a More Sustainable Future

The Energy Market Authority (EMA) has partnered industry stakeholders, the research community and other government agencies to co-create Energy Storage System (ESS) solutions which will help support the growth of solar deployment. This includes the deployment of Singapore's first utility-scale ESS at a substation in October 2020, and distributed ESS at electrical switchrooms for five Housing and Development Board (HDB) blocks in Punggol.

2. Solar is the most viable renewable energy source for Singapore. With ESS, the intermittency challenges of solar energy due to cloud cover and rain in our tropical climate can be mitigated. ESS enables the storage of solar energy for later use. The fast response nature of ESS will also help to maintain a reliable source of power supply when solar installations are affected by weather changes. These advantages are key enablers for Singapore to maximise solar as one of the four switches in Singapore's Energy Story.

Singapore's First Utility-Scale Energy Storage System

3. Singapore deployed its first utility-scale ESS at a substation this month, through a partnership between EMA and SP Group, has a capacity of 2.4MW/2.4MWh, which is equivalent to powering more than 200 four-room HDB households for a day. The ESS will participate in the wholesale electricity market to provide services necessary to mitigate intermittency caused by solar, as well as reduce peak demand. The utility-scale energy storage system will also provide insights into ESS' performance under

Singapore's hot and humid environment and will aid in establishing technical guidelines for such deployments which are currently not available.

4. EMA Chief Executive, Mr Ngiam Shih Chun, said: "Energy storage systems are one of the most promising solutions to help Singapore integrate more solar energy into the power grid. We have been working with partners to facilitate the deployment of different ESS solutions. This is critical in supporting Singapore's target of at least 2 gigawatt-peak of solar deployment by 2030."

5. Mr Stanley Huang, Group Chief Executive Officer, SP Group, said, "SP Group is committed to supporting our transition to a low-carbon, smart energy Singapore. The deployment of ESS, designed for local conditions, will enable us to incorporate a greater amount of renewables and other sustainable energy solutions into our electricity grid."

Deployment of Energy Storage System at Punggol HDB Estate

6. EMA has also worked with Sunseap and HDB to deploy distributed ESS at electrical switchrooms for five HDB blocks in Punggol. This project seeks to address solar intermittency for large-scale solar installations by using HDB blocks as test sites. Moving forward, insights gained from this project will demonstrate how it can potentially be applied for future deployments in Singapore.

ESS Technology Roadmap, Technical References and Handbook

7. To guide the development of Singapore's ESS ecosystem, EMA commissioned the Energy Research Institute @ NTU (ERI@N) and the Agency for Science, Technology and Research (A*STAR) to develop Singapore's first ESS Technology Roadmap. The roadmap provides insights on the technological trends and economics of ESS, and can be accessed online at go.gov.sg/ess-roadmap-2020.

8. Supplementing the roadmap is Singapore's first set of technical guidelines to educate and guide consumers on the safe and reliable deployment of ESS in Singapore. Formulated by EMA, Enterprise Singapore, the Singapore Standards

Council and key players in the public and private sectors, such as the Singapore Civil Defence Force and SP Group, the Technical Reference 77 (TR 77) is available from the Singapore Standards eShop at www.singaporestandardseshop.sg.

9. Ms Choy Sauw Kook, Director-General (Quality & Excellence), Enterprise Singapore, said, “As Singapore shifts towards increased use of renewable energy, we are glad that TR 77 will help guide enterprises to develop safe and reliable energy storage systems for deployment in a tropical urban environment. The clear communication protocols in TR 77 will also help reduce ambiguities during system integration between ESS and system owners, reducing the cost of implementation.”

10. EMA has also published a Handbook for ESS which serves as a step-by-step guide on the regulatory requirements to install ESS. The Handbook can be accessed online at go.gov.sg/ema-ess-handbook.

11. Over the years, EMA has launched several grant calls and programmes to build the ESS ecosystem in Singapore amongst the industry and research community. These collaborations have led to grant calls that spurred innovative solutions such as the virtual power plant and smart ports. For more details, visit www.ema.gov.sg/Energy_Storage_Programme.aspx.

Annex A: Factsheet for Singapore’s First Utility-Scale ESS
Annex B: Factsheet for Distributed ESS Deployment at Punggol
Annex C: Factsheet for Singapore’s Energy Story

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About the Energy Market Authority

The Energy Market Authority (EMA) is a statutory board under the Ministry of Trade and Industry. Our main goals are to ensure a reliable and secure energy supply, promote effective competition in the energy market and develop a dynamic energy sector in Singapore. Through our work, EMA seeks to forge a progressive energy landscape for sustained growth.

Website: www.ema.gov.sg | Follow us: Instagram: @EMA_Singapore | Facebook: facebook.com/EnergyMarketAuthority | Twitter: @EMA_Sg

ANNEX A

FACTSHEET FOR SINGAPORE FIRST UTILITY-SCALE ESS

Deployed in a SP Group substation, the 2.4MW/2.4MWh lithium-ion battery ESS is the first utility-scale ESS in Singapore. The project seeks to evaluate the performance and safety of ESS in Singapore's hot, humid and highly urbanised environment. The project was jointly funded by EMA and SP Group, and was implemented by a consortium comprising Sunseap Energy Ventures, Nanyang Technological University and Wärtsilä.

2. Since project commencement, numerous insights were gleaned from the test-bed's findings. These include ESS' technical compliance with local regulatory codes, fire and safety parameters, market registration processes, testing requirements, etc. Examples of policies, regulations and frameworks formulated or reviewed as a result of this test-bed include:

a. ESS Policy Paper (2018);

b. Code of Practice for Fire Precautions in Buildings 2018 – 2nd Batch of Amendments (2019);

c. TR 77-1: Planning and Performance of Electrical Energy Storage System and TR 77-2: Safety Consideration related to Grid Integrated Electrical Energy Storage (2020); and

d. Handbook for ESS (2020).

3. The test-bed is currently undergoing final checks prior to commencing operations in end-2020. It will be tested for performance and compliance for participation in the energy market, as well as for grid operations, paving the way for more ESS to be deployed in the future.

Photos of Singapore's first Utility-Scale Test-bed

ANNEX B

FACTSHEET FOR DISTRIBUTED ESS DEPLOYMENT AT PUNGGOL

Funded under EMA's Energy Storage Grant Call in 2016, a project team was formed by Nanyang Technological University (NTU), Sunseap Leasing and Panasonic Asia Pacific to develop a centralised control system to manage distributed lithium-ion batteries across several sites.

2. Insights gained from this project will demonstrate how distributed ESS (DESS) can potentially be applied for future deployments in Singapore. In addition, two recommendations for the safe and reliable operation of DESS in Singapore have been gathered:

a. Provision of high-level protection for the local energy management system (EMS). While each DESS is equipped with a battery management system to prevent the battery from overheating, it is important to have a local EMS to prevent the battery from over charging/discharging which could damage the battery permanently.

b. Introduction of a safety protocol to cater for loss in communications between the centralised control system and the local EMS. In an event of communications loss between the centralised control system and EMS, the DESS operator will not be able to monitor the system parameters and verify if the DESS is working in safe conditions. The EMS should set the DESS into standby mode if there is a loss in communications for more than 5 minutes to prevent the unsafe operation of the DESS.

Distributed ESS deployed within a switchroom in Punggol

ANNEX C

FACTSHEET FOR SINGAPORE'S ENERGY STORY

To tackle climate change concerns, Singapore has to change the way we consume and produce energy. Minister for Trade & Industry Mr Chan Chun Sing shared Singapore's Energy Story at the Singapore International Energy Week (SIEW) 2019 to map our efforts towards a clean, affordable and reliable energy future.

2. Singapore's Energy Story sets the vision for how Singapore can power our future through four switches (Natural Gas, Solar, Regional Power Grids and Emerging Low-Carbon Alternatives), supported by efforts to improve energy efficiency across all sectors.

1st Switch: Natural Gas

Natural gas is the cleanest form of fossil fuel and will continue to be a dominant fuel for Singapore's electricity in the near future. EMA will continue to diversify our gas sources and work with our power generation companies to improve the efficiency of their power plants.

2nd Switch: Solar

Solar is the most promising renewable energy source for Singapore. Energy storage systems is also vital as it helps us counter the intermittency of renewable energy sources. Singapore is working towards meeting a new solar target of at least 2 gigawatt-peak by 2030, and an energy storage deployment target of 200 megawatts beyond 2025.

3rd Switch: Regional Power Grids

We are studying ways to leverage regional power grids for cost-competitive energy. This could be realised through bilateral cooperation or regional initiatives.

4th Switch: Emerging Low-Carbon Alternatives

We are exploring emerging low-carbon solutions (e.g. carbon capture, utilisation and storage technologies, hydrogen) that can help reduce Singapore's carbon footprint.

We will continue to improve our energy efficiency in the various sectors. We will also empower our households with more information to help them better manage their electricity consumption.

Visit www.beyondthecurrent.gov.sg for more information on Singapore’s Energy Story.