



Smart Energy, Sustainable Future



MEDIA RELEASE

13 July 2022

Singapore's First Energy Storage System at PSA's Pasir Panjang Terminal

Singapore's first Energy Storage System (ESS) to enable more energy efficient port operations has been deployed at Pasir Panjang Terminal and will be operational in Q3 2022. This ESS is part of the Smart Grid Management System (SGMS) which has the potential to improve the energy efficiency of port operations by 2.5% and reduce the port's carbon footprint by 1,000 tCO₂e per annum, the equivalent of removing around 300 cars off the road annually. The project is part of the \$8 million partnership between the Energy Market Authority (EMA) and PSA Corporation Ltd (PSA) to transform PSA's energy usage in port operations through the use of smart grid technologies and energy management systems.

2 Port operations involve the use of energy-intensive equipment such as cranes and prime movers. Due to the dynamic nature of port activities, the energy demand can fluctuate throughout the day. EMA and PSA have awarded a consortium led by Envision Digital to develop an SGMS which includes an ESS and solar photovoltaic panels managed by Envision Digital's EnOS™.

3 The EnOS™ platform uses machine learning to provide real-time automated forecasts of the terminal's energy demand. This enables long-term planning of port assets, short-term scheduling and real-time energy management within the terminal to reduce overall energy costs and carbon footprint.

4 Whenever there is a forecasted surge in energy consumption, the 2 megawatt/2 megawatt-hour battery ESS is activated to supply energy to help meet demand. With this enhancement to Pasir Panjang Terminal, spikes in energy demand of the port will be minimised.

5 During periods when the ESS is not used to manage demand, the ESS will also participate in the National Electricity Market of Singapore to provide ancillary services to the power grid and to generate revenue. Insights from the project may also validate the possibility for commercial and industrial users to adopt ESS to serve multiple

purposes, such as demand management on-site and providing commercial ancillary services to support power systems.

6 Ms Jeanette Lim, Director of the Industry Development Department at EMA, said, “Electricity demand will grow in the next decade with increasing electrification. The adoption of innovative demand-side technologies such as smart energy management systems and energy storage systems will help us optimise our energy supply and power grid capabilities. We are pleased to partner PSA to support this project to reduce the overall energy usage and carbon emissions of Singapore’s port operations. Innovative digital solutions such as this project will play a part in making our energy systems more efficient and resilient.”

7 Mr Alvin Foo, Head of New Technologies and Sustainability at PSA, said, “As a premier hub port driving innovation, digitalisation and sustainability, PSA can play an active role in contributing and co-creating Singapore’s smart grid architecture and energy systems. We are excited to partner EMA in unlocking the full potential of battery energy storage solutions to achieve cleaner and more efficient energy for our operations. As PSA enhances efficiency with port automation, we will continue to drive collaborative innovation with our partners for greater resilience in our energy future.”

8 “We are pleased to work with PSA and EMA to further their digitalisation for decarbonisation agenda. With energy, machines, and systems orchestration through the use of EnOS™, our jointly developed SGMS solution will support PSA in its sustainable development initiatives such as large-scale electrification and enable better management capabilities when PSA adopt different green energy sources. Our joint work with PSA will result in a reference model for ports embarking on sustainable development journey,” said Mr Tan Joo Hong, Head of Global Ports Solution at Envision Digital.

9 Insights from the SGMS can also be applied for advanced energy management and optimisation at the Tuas Port, which would be the world’s single largest fully automated terminal upon completion in the 2040s. For greater sustainability, retired batteries from port equipment such as Automated Guided Vehicles can be repurposed into second-life ESS.

10 The EMA-PSA partnership is part of EMA’s Accelerating Energy Storage for Singapore (ACCESS) programme to facilitate ESS adoption in Singapore by promoting use cases and business models. This project will also go towards supporting EMA’s target of deploying at least 200 MW of ESS beyond 2025. For more information, please visit: https://www.ema.gov.sg/Energy_Storage_Programme.aspx

Annex A: Photos of Awarded Project

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About the Energy Market Authority

The Energy Market Authority (EMA) is a statutory board under the Singapore Ministry of Trade and Industry. Through our work, we seek to forge a progressive energy landscape for sustained growth. We aim to ensure a reliable and secure energy supply, promote effective competition in the energy market and develop a dynamic energy sector in Singapore. Visit www.ema.gov.sg for more information.

Instagram: @EMA_Singapore | Facebook: facebook.com/EnergyMarketAuthority |
Twitter: @EMA_sg | LinkedIn: linkedin.com/company/energy-market-authority-ema/

About PSA Corporation Ltd (PSA)

PSA Singapore operates the world's largest container transshipment hub in Singapore, handling 37.2 million TEUs of containers in 2021. With connections to 600 ports globally, shippers have access to daily sailings to every major port in the world, operating 24/7 all year round. Beyond port operations, PSA also offers cargo solutions to customers operating in advanced manufacturing, cold chain, e-commerce, and energy & chemicals. This value adding service is enabled by CALISTA™, a digital platform that facilitates trade and helps shippers to better manage their physical movement of goods, trade financing and compliance.

Visit us at www.singaporepsa.com

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ANNEX A: PHOTOS OF AWARDED PROJECT



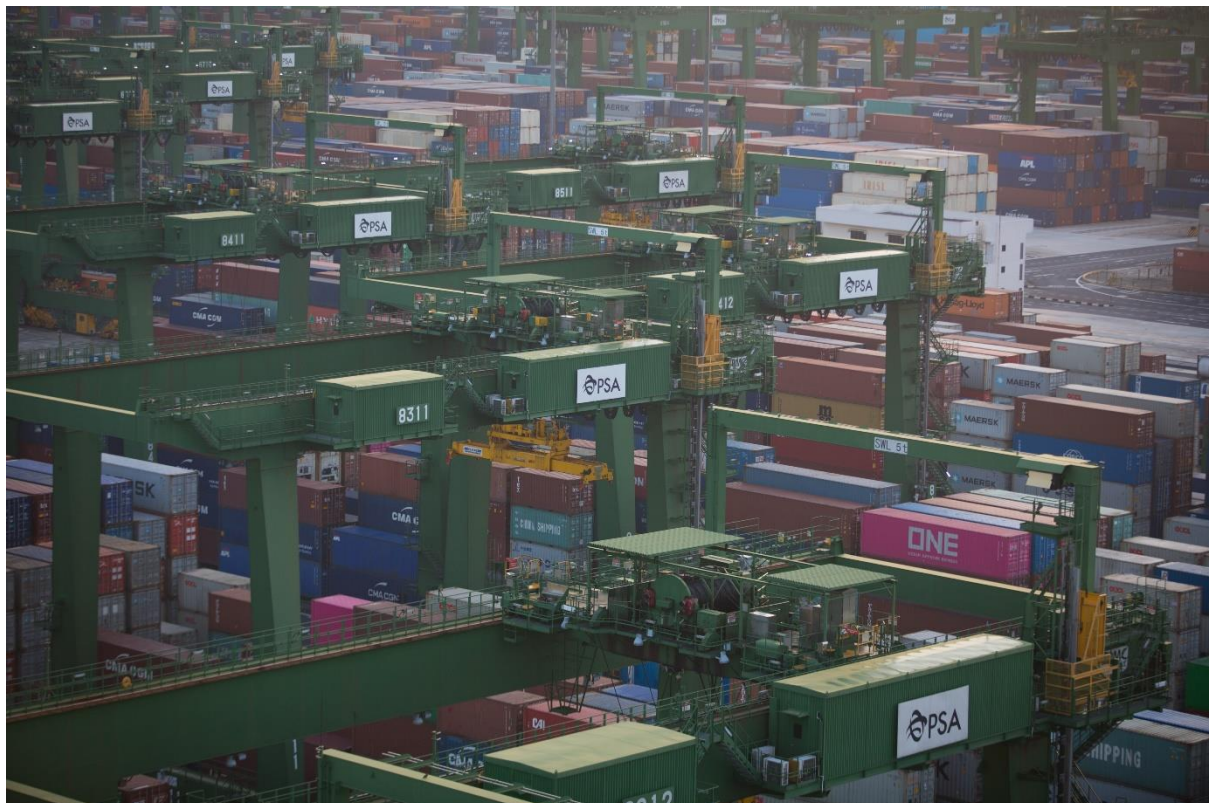
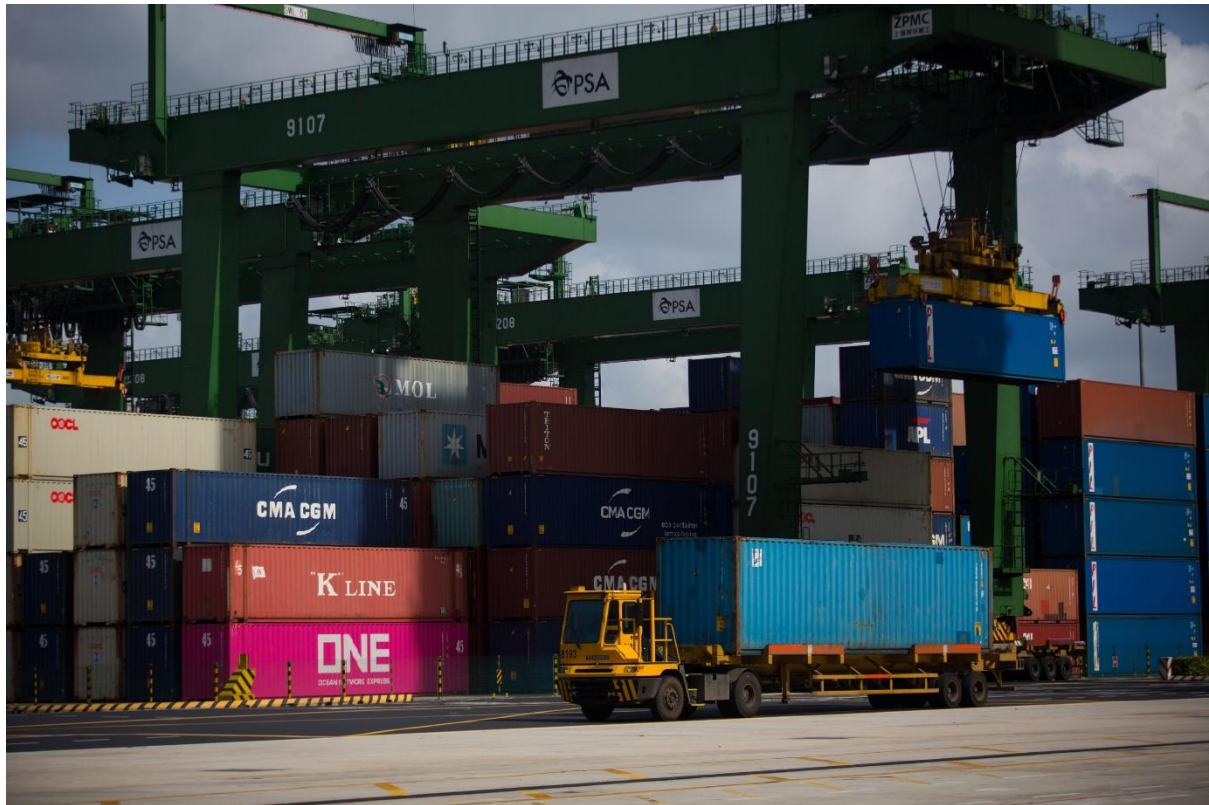
The setup consists of two Battery Containers and two Power Conversion System (PCS) containers.

Photo credit: PSA Corporation Ltd



Battery Modules within the Battery Container

Photo credit: PSA Corporation Ltd



*Use of cranes and prime movers for port operations at PSA's Pasir Panjang Terminal
Photos credit: PSA Corporation Ltd*