

MEDIA RELEASE

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\$10 Million Partnership Between EMA and Keppel Offshore & Marine to Spark Innovative Energy Solutions in Marine Sector

The energy sector is calling for innovative energy solutions in the marine sector for the adoption of cleaner energy and greater environmental sustainability. The Energy Market Authority (EMA) and Keppel Offshore & Marine (Keppel O&M) have forged a \$10 million partnership and signed a Memorandum of Understanding (MOU)¹ to develop energy solutions in the areas of distributed energy resources, digitalisation and emerging low carbon alternatives.

2. As part of this MOU, EMA and Keppel O&M are launching a grant call for solutions relating to energy storage systems and smart power grids for the offshore and marine environment. These solutions should seek to reduce overall energy usage and carbon footprint while enhancing overall operational efficiency. The grant call serves to encourage innovation and capability building for the wider industry ecosystem in Singapore. The insights derived from the grant call could be translated to potential solutions to enhance the grid.

3. The grant call is open for applications at <https://ema.gov.sg/ema-keppel-partnership.aspx> and will close on 12pm, 24 June 2020. Interested companies, research institutes and institutes of higher learning are welcome to participate. Shortlisted participants will have the opportunity to testbed their solutions through Keppel O&M's Floating Living Lab (FLL), the first-of-its-kind offshore floating testbed in Singapore.

¹ The MOU was established on 23 January 2020.

4. Expected to be operational by end 2021, Keppel O&M's FLL will provide a platform for the industry and the research community to testbed and commercialise promising power and technology solutions for the marine sector. The FLL will have Liquefied Natural Gas (LNG) bunkering facilities for harbour crafts and small vessels. It will also house an embedded power generation system to power Keppel O&M's operations, with excess electricity to be exported to the national grid. (Please refer to Annex A for more information on the FLL.)

5. Mr Ngiam Shih Chun, Chief Executive of EMA, said, "We hope to develop innovative energy solutions for the marine sector through this partnership with Keppel O&M. We are seeking solutions that incorporate the use of cleaner energy, optimise energy consumption and reduce carbon emissions. By doing so, we are building Singapore's Energy Story by co-creating solutions for a more sustainable energy future with stakeholders."

6. Mr Chris Ong, Chief Executive Officer of Keppel O&M, said, "We are pleased to be able to partner EMA on developing innovative solutions for the energy and marine space. Our use of digitalisation and data analytics will reduce energy waste and increase the use of cleaner energy. The insights gleaned can also help us develop integrated solutions across the Keppel Group for sustainable urbanisation. Our Floating Living Lab will help to reduce our carbon footprint by leveraging and test bedding clean floating energy solutions. At the same time, it enables Keppel O&M to provide power for our own operations, support customers in delivering cleaner power, grow our LNG bunkering services and improve the efficiency of the current supply chain, while extending our gas offerings in the floating power segment. Keppel's drive to provide clean floating energy solutions will complement EMA's work in ensuring energy sustainability."

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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

About the Keppel Offshore & Marine

Keppel Offshore & Marine (Keppel O&M) is a world leader in providing total solutions to the offshore, marine and energy industries. Bolstered by a global network of yards and offices, it has extensive know-how across a wide range of capabilities – design & engineering, new builds, conversions & repairs, and support services

A pioneer in offshore solutions, Keppel O&M has a strong track record in designing and building high-performance offshore drilling rigs, production platforms and specialised ships. It is a trusted partner in the conversion, repair and modification of diverse and complex rigs and vessels, and is also a developer of integrated solutions for the offshore renewable and infrastructure industries.

Backed by robust operational excellence, Keppel O&M innovates and leverages new technologies to deliver projects on time, on budget, safely, reliably, and to the highest quality. For more information, visit www.keppelom.com

Factsheet on Floating Living Lab



The Floating Living Lab will have onboard:

- Liquefied Natural Gas (LNG) bunkering facilities for harbour crafts and small vessels. Supported by FueLNG, a licensed LNG bunker supplier in Singapore and Keppel O&M's joint venture with Shell Eastern Petroleum, the FLL will also be able to refuel LNG to FueLNG's bunker vessel;
- Pressurised LNG tanks (IMO Type C) and cargo handling system suitable for simultaneous bunkering and power generation;
- A smart grid and power generation that includes LNG, Solar Photovoltaic and Energy Storage Systems (ESS) such as batteries;
- A Digitalised Energy Management application leveraging Keppel O&M's proprietary IIoT (Industrial Internet of Things) platform, AssetCare, to enable machine learning on energy output optimisation as well as predictive analytics for efficiency and reliability; and
- A dedicated area where Keppel can work with the wider eco-system to testbed and demonstrate innovative technologies in the marine and floating power space, such as biofuels, hydrogen or electrification solutions for harbour vessels.

2. Keppel O&M's FLL will be located off its shipyard and will be able to generate electricity from LNG and other energy sources to meet the needs of its yard in Singapore, with excess electricity to be exported to the national power grid.

3. It will also be able to harness synergies across the Keppel Group, whether through the test bedding of new technologies from across Keppel Group's business units such as IoT-enabled energy storage devices or utilising the power solutions on floating data centres and infrastructures. The FLL will be able to leverage Keppel's smart yard low latency connectivity infrastructure powered by M1 in the digitalisation of the smart grid.

4. The FLL will serve as a proof-of-concept for Keppel's proprietary small-scale LNG to power solution which is more economical and sustainable compared to diesel fuelled power generators. It can be used to meet power demands in areas with limited power infrastructure as well as provide secure power in the event of natural catastrophes.

5. The small-scale LNG market is expected to serve up to 100m tonnes of LNG by 2030, for both the power and marine markets, according to a recent report by APEC Energy Working Group September 2019. Global market revenue for virtual power plants is expected to expand by more than 48% per annum between 2018 and 2028, according to Navigant Research. The FLL can function as a distributed energy solution for this trend of consumers, reducing costs and generating extra revenue.