

# OFFSHORE MARINE

A newsletter of Keppel Offshore & Marine

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## INNOVATIVE POWER AND TECHNOLOGY SOLUTIONS

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During the Circuit Breaker period in Singapore, Keppel O&M continued to work on certain essential work such as vessel repair, maintenance and overhaul services

## Resilience in adversity

Mr Loh Chin Hua, CEO of Keppel Corporation and Chairman of Keppel Offshore & Marine (Keppel O&M) discussed the Group's performance and operations amid the COVID-19 global pandemic at Keppel Corporation's 1Q 2020 financial results announcement on 29 April 2020. Below are highlights of his speech on the offshore and marine division.

Over the past two months, oil prices have been roiled by shrinking global demand caused by COVID-19, as well as the price war triggered by Saudi Arabia. The International Energy Authority estimated that global oil demand could fall by 9% this year due to COVID-19. Brent hit a low of below US\$20 per barrel, a level not seen since the early 2000s. The weak demand for oil coupled with overflowing storage capacity even resulted in WTI plunging into negative territory last week. Given the current highly volatile environment and low prices, oil majors are curtailing E&P spending,

which will push back the nascent recovery that we had just begun to see in the O&M sector.

We expect the O&M business to face very challenging conditions in the near future. We would also need to keep a close watch on customers and associates who would be affected if there is a prolonged downturn in oil prices. Nevertheless, Keppel O&M is in a stronger position to weather the crisis today, compared to 2015, when the last crisis began. Over the past few years, Keppel O&M has undertaken extensive rightsizing and reduced

its overheads. Today, it is a leaner, more efficient, and more diversified business, compared to the situation a few years ago, when the offshore rig building business ground to an abrupt halt after years of rapid growth.

For 1Q 2020, Keppel O&M made a net profit of S\$3 million. At the operating level, the profit was S\$28 million, higher than the S\$3 million operating profit in 1Q last year; but this was partly offset by losses from associated companies.

*Continues on page 4...*



Continued from page 3.

In Singapore, Marine & Offshore Engineering companies involved in ship/vessel repair and maintenance and overhaul services have been defined as essential services. Our Singapore yards have continued to provide these essential services during the circuit breaker, but with reduced manpower and various precautionary measures in place. Our overseas yards are also operational, except for those in the Philippines, due to the lockdown imposed by the Philippine Government.

Arising from the lockdowns in various countries and disruptions to international supply chains, several of Keppel O&M's projects have been delayed. We have served force majeure notices to customers of the affected projects and are working closely with them to mitigate the impact of COVID-19.



Keppel Nantong Shipyard was the first to experience the challenges due to Covid-19, but now the yard is back in operation

As at end-March 2020, our net orderbook stood at S\$4.0 billion. While progress in securing new orders has slowed due to COVID-19 and the fall in oil prices, Keppel O&M continues to have a sizeable orderbook which will keep our yards occupied for the next two years. We continue to focus on execution and delivered two newbuild projects and an FPSO modification and upgrade project in 1Q 2020, despite COVID-19.

Our pivot away from oil has helped Keppel O&M remain resilient, with renewables and gas-related solutions making up the majority

of our orderbook. We will continue to actively pursue opportunities in gas and renewables, and also repurpose Keppel O&M's technology for other floating infrastructure uses.

Earlier this month, Keppel O&M signed an MOU with the Energy Market Authority (EMA) to develop sustainable energy solutions. Keppel O&M is also setting up a Floating Living Lab off its Tuas shipyard, which will serve as a platform to testbed and commercialise promising power and technology solutions for the marine sector.

## IN CONVERSATION

*OffshoreMarine* shares highlights from Keppel's management responses to questions from the media and analysts at the results conference call.

### **Q: How are the downturn and current oil prices impacting new order flow for Keppel O&M?**

**LCH:** The current situation with the oil price has obviously created some challenges for the offshore sector. Fortunately for Keppel, our existing orderbook is quite decent. We have almost \$4 billion of net orders that will keep us busy, at least for the next two years.

We have also pivoted away from oil since 2015, so you will find that the majority of orders in our orderbook are in renewables, gas solutions and non-oil and gas. Going forward, you would expect that unless oil prices recover faster, there will be an impact on the Exploration & Production spending by the oil majors.

Having said that, we continue to see quite strong enquiries and interest in the renewables space; and I believe that demand for production assets like FPSOs and FLNGs will remain quite robust.

**Q: On your existing O&M contracts, have any of the clients asked you to postpone the delivery? Or, may you have to**



**postpone the delivery because of COVID-19? How are you managing these things in the light of COVID-19?**

**LCH:** Obviously, it is a very challenging time and we are facing some supply disruptions and disruption to the workforce. We first experienced that in China, in our yard in Nantong; but now the yard in Nantong is back in operation. At the present time, the six shipyards in Singapore are still operational. But we are operating under some constraints because of the measures introduced, and rightly so by the government, to ensure that this pandemic is controlled. Our two shipyards in

Philippines are under shutdown, as enforced by the Philippine government, so it varies across countries.

I would say there will be some disruptions. Where it is necessary, we have to serve force majeure (FM) clauses on some of the projects. Besides having to serve FM notices, we also have to work closely with the customers, and they all understand the situation. They understand that safety comes first, so generally I don't sense that there is a big issue.

Depending on how long this is going to last, there is always

a chance we can do catch-up work, after work is resumed. So this is the state of play as of now. But it is challenging. For example, if we want to do commissioning, and some of the commissioning engineers have to come from a country in Europe and unfortunately, they can't travel, we have to think of creative ways to overcome some of these challenges. These are things that the Keppel O&M team is very focused on.

**LCH – Mr Loh Chin Hua,  
CEO of Keppel Corporation**

## New contract for wind turbine installation vessel

In March 2020, Keppel Offshore & Marine (Keppel O&M), through its wholly owned subsidiary Keppel FELS, secured a contract for the partial engineering and construction of the leg components for a self-elevating offshore wind turbine installation vessel.

Keppel's scope of work includes the detailed engineering, fabrication, assembly, and painting of four legs with delivery scheduled for 2Q 2022. When completed, the vessel will be able to operate in up to 65 metres waters depth.

This project extends Keppel O&M's track record in providing solutions to the offshore wind industry.



Keppel O&M's track record in offshore wind turbine installers includes the Blue Tern which was delivered in 2012

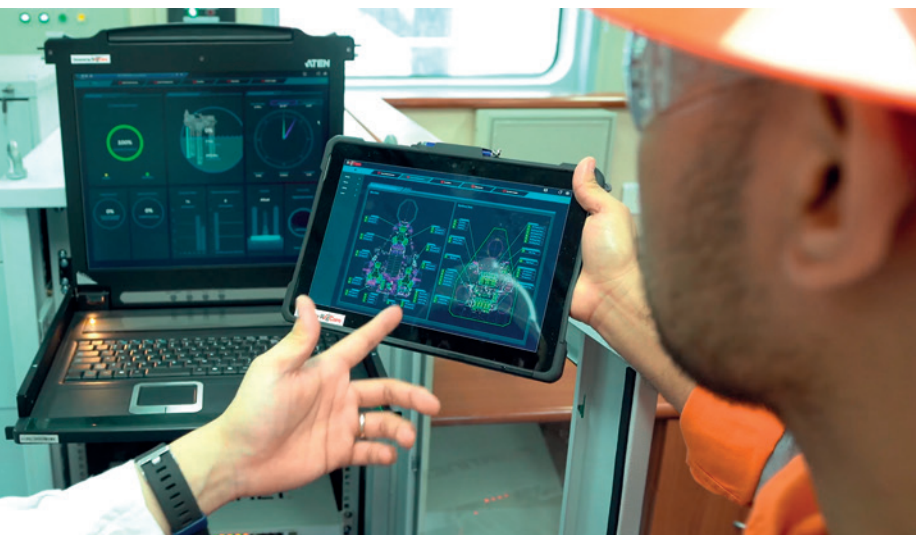
It previously designed and built one of the world's largest and most advanced multipurpose offshore wind turbine installers for

the UK North Sea and is currently constructing offshore converter stations and substations for wind farms in Germany and Taiwan.

# Remote survey of offshore rig



AssetCare collects data from a range of sensors to track equipment performance and structural health, increasing efficiency and assisting in operations



The Cantarell III jackup rig was outfitted with AssetCare which leverages the Industrial Internet of Things (IIoT) to support remote survey and provide real-time virtual monitoring services

As the world's first shipyard to attain Service Provider recognition for integrating smart functions into rigs, Keppel Offshore & Marine (Keppel O&M) leverages the Industrial Internet of Things (IIoT) to support remote survey and provide real-time virtual monitoring services through its AssetCare Digital Solution. Such activities support social distancing efforts amidst COVID-19.

In May 2020, Keppel O&M completed a remote survey from Singapore to certify that Cantarell III, a jackup rig operating in offshore Mexico, was fit for service. It was as part of an annual survey on Smart Notation with Classification Society American Bureau of Shipping (ABS). Delivered by Keppel O&M in 2019, Cantarell III is one of the industry's first drilling rigs with Smart Notations equipped with AssetCare.

AssetCare collects data from a range of sensors to track equipment performance and structural health, increasing efficiency and assisting in operations. With AssetCare, the rig achieved significantly increased uptime, and virtual support of experts reduced maintenance costs and the need for on-site inspections and verifications. Workforce safety, operational continuity and connectivity amongst stakeholders also improved.

With current travel restrictions, AssetCare demonstrated that certain operating practices can not only be conducted remotely, but in a more expedient, safe, and environmentally-friendly manner.





The redelivery of Ocean Monarch was completed ahead of schedule, within budget and with zero lost-time incidents

## Re-delivery of Ocean Monarch

Leveraging its engineering expertise and extensive project management experience, Keppel Offshore & Marine (Keppel O&M) once again exceeded the expectations of its long-standing customer, Diamond Offshore, with the early completion of the Ocean Monarch.

The Enhanced Victory class semisubmersible oil rig was redelivered on 25 March 2020 after undergoing three weeks of repair works at Keppel O&M.

Keppel O&M's scope of work

included repair works relating to the accommodation unit, underwater hull repairs, as well as the rig's special periodic survey. It was completed ahead of time and within budget.

In recognition of these achievements, an early redelivery bonus was awarded by Diamond Offshore to Keppel O&M.

The Ocean Monarch had undergone major upgrading at Keppel O&M in 2008, enabling the rig to operate in up to 10,000 feet of water in a moored configuration.

The redelivery of Ocean Monarch follows the redelivery of Ocean Onyx by Keppel O&M at end-December 2019 and furthers the partnership between both companies. The Ocean Monarch is contracted to drill in Myanmar for Posco International.

Keppel O&M's partnership with Diamond Offshore spans more than a decade. The yard's reliability and versatility in providing value-added solutions have been instrumental in building trust with customers.



The second of two 7,500m<sup>3</sup> LNG carriers for Avenir LNG was launched in mid-April 2020 in Keppel Nantong Shipyard

## Marking quality and reliability

As a world leader in providing solutions to the offshore energy industry, Keppel Offshore & Marine (Keppel O&M) has an unwavering commitment to safety, quality and reliability. Notwithstanding the impact of COVID-19, it marked several milestones in the past few months.

### **MID-WATER SEMISUBMERSIBLE**

In mid-March 2020, the lower hull for a semisubmersible drilling rig was completed without any lost-time incident in Keppel Nantong Shipyard in China.

The drilling rig is specially designed, configured and outfitted for mid-water operations of up to depths of 1,500m. Boasting a low environmental footprint, it is designed for operations in harsh environments, including the Norwegian Continental Shelf, UK Continental shelf and Barents Sea.

### **LNG CARRIER**

A month later in mid-April 2020,

Keppel Nantong Shipyard successfully launched the second Liquefied Natural Gas (LNG) carrier for Avenir LNG Ltd.

When completed, the 7,500m<sup>3</sup> LNG carrier will deliver LNG to various ports across Brazil. This is part of a collaboration between Avenir and Golar Power Limited to develop the small-scale LNG market in Brazil.

The vessels, which will come equipped with engines that can run on both diesel and LNG, will have a class notation for bunkering which adds to their versatility to not only transport but also provide LNG bunkering services if required.

### **ISO CERTIFICATION**

Testament to its commitment to sustainability, Keppel O&M's New Build Division in April 2020 successfully achieved the ISO 14001:2015 certification for Environmental Management Systems.

The certification process began in late-2019 with a series of trainings and briefings conducted by the classification society American Bureau of Shipping (ABS). This was followed with gap analyses and site inspections conducted by ABS on the New Build Division's environmental management system and framework to ensure compliance to the ISO's standards.

A comprehensive review was subsequently conducted internally by Keppel O&M management to address the gaps identified, corrective measures required as well as its implication on internal processes, taking into account the multiple stakeholders including employees, customers, subcontractors, and vendors.

A two-stage audit was conducted by ABS Quality Evaluations, and included document reviews, site inspections, and interviews with Keppel O&M personnel.

The ISO 14001:2015 International



Standard is a systematic approach to environmental management and creates options for contributing to sustainable development. This includes enhancing environmental performance, achieving financial and operational benefits that can result from implementing environmentally-sound alternatives that strengthen the organisation's market position, and communicating environmental information to relevant interested parties.



As part of its sustainability efforts, Keppel O&M installed 21,000 solar panels with a peak capacity of 8.8 MW at its yards in 2019 to offset its energy demand

## Growing offshore wind capabilities

In line with Keppel's increasing focus on renewable energy, Keppel Offshore & Marine (Keppel O&M) is collaborating with Hitachi ABB Power Grids (HABB PG), a global leader in power technologies, to deepen capabilities in the offshore wind sector, particularly in the research and development of complete offshore substation designs tailored to meet the rapid growth of offshore wind farms.

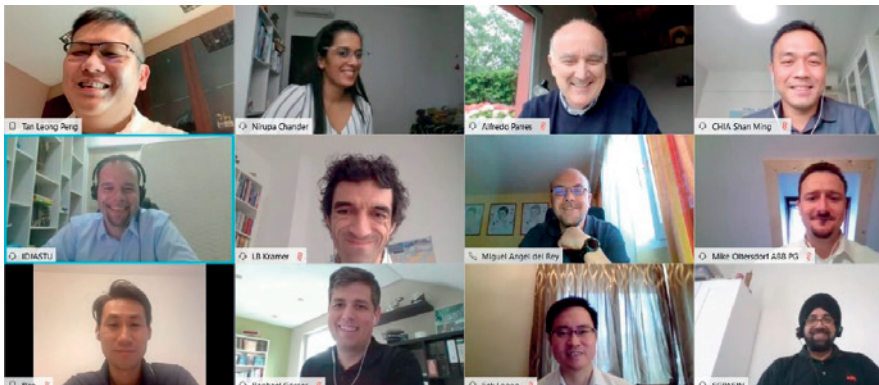
The partnership will tap on Keppel O&M's offshore expertise and HABB PG's pioneering technologies in smarter and greener power grids.

Keppel O&M has been expanding its offerings in the offshore and marine industry by collaborating and fostering partnerships to become a total solutions provider across the offshore wind

infrastructure value chain. The collaboration with HABB PG will add to Keppel O&M's portfolio of offshore renewable offerings such as turbine foundations, substation platforms as well as installation and support vessels.

Last year, Keppel O&M secured its first contracts in the renewables sector, as part of a consortium for a converter station as well as two offshore wind farm substations, with project scopes comprising of detailed engineering, procurement, construction, testing and commissioning, and are currently continuing to pursue various opportunities worldwide.

Driven by an increasing share of renewable energy in the energy mix, the offshore wind market is projected to be worth almost USD60 billion by 2025, up from around USD32 billion in 2019.



Despite the challenges posed by Covid-19 restrictions, Keppel O&M and HABB PG have been able to successfully finalise collaboration plans on the offshore wind sector through channels such as virtual teleconferences



The team will continue their research on the polymetallic nodules and the deepsea environment in pursuit of cleaner energy alternatives



Remotely Operated Vehicles (ROVs) were navigated by skilled pilots to collect useful images of the seafloor and deepsea life

## Fuelling future energy demands

For five weeks starting from 15 February 2020, a Keppel-supported research expedition set out to conduct feasibility studies on the collection of metal-rich polymetallic nodules from the seabed in an environmentally-friendly way. These nodules can help generate and store wind and solar energy to power smart cities of tomorrow.

The expedition is part of Keppel subsidiary Ocean Mineral Singapore's (OMS) 15-year contract with the International Seabed Authority (ISA) for seabed exploration within the Clarion-Clipperton Fracture Zone of the Pacific Ocean. OMS, which signed the contract in 2014, is the only Singapore company awarded an exploration contract for polymetallic nodules. The approved area for exploration, off the coast of Mexico, spans 58,000 sq km, roughly 80 times the size of Singapore.

A team of research engineers from Keppel, international scientists from UK Seabed Resources, as well as Keppel's scientific partners from the National University of Singapore, Nanyang Technological University, University of Geneva

and the Natural History Museum, London, explored almost 6,400 sq km of the ocean to study these polymetallic nodules and the deepsea environment.

To help the team plumb the depths of the ocean's mysteries, boxcores, which are marine geological sampling equipment, are lowered using a motorised fibre rope winch to collect nodule samples from the seabed. In some instances, Autonomous Underwater Vehicles (AUVs) or Remotely Operated Vehicles (ROVs) navigated by skilled pilots were also deployed to collect

useful data from the seafloor and deepsea life.

Once the boxcores are back on deck, biologists retrieve the sediment and the surrounding samples to preserve the delicate nature of the specimens. This process includes removing every nodule from the top 10cm of the sediment and meticulously checking the surface of each nodule for micro-organisms. The remaining sediments are then checked for nodules. All nodules are weighed and photographed before being tagged for storage.



Autonomous Underwater Vehicles (AUVs) carry a variety of equipment for sampling and surveying such as cameras, sonars and depth sensors, which help to indicate nodule locations



Learning more about the seabed helps our scientists better understand and preserve the deepsea climate by exploring means to harvest nodules with minimal impact.

Overall, these findings not only help to build a more complete picture of habitat connectivity, but also inform future technology on the sustainable collection of nodules to support green urbanisation.

## Collaboration on deep sea nodule collection technology

Keppel Offshore & Marine (Keppel O&M) has signed a memorandum of understanding (MOU) with Global Sea Mineral Resources NV (GSR) of Belgium, part of the DEME Group, for the development of a deep sea riser and support vessel to collect, transport and store polymetallic nodules from the deep sea in an environmentally responsible way.

Engineering work will commence this year, with a deepwater test planned in approximately three years' time. This test will then inform the design of a full-scale seabed mineral support vessel. Keppel O&M will be focusing on vessel technology development to support seabed mining operations, and GSR on seafloor mineral exploration, including collector technology development.

Mr Aziz Merchant, ED of Keppel Marine and Deepwater Technology Pte Ltd said: "Keppel is committed to sustainable urbanisation and we are conducting feasibility studies to ensure that deep-sea mineral collection can be conducted with minimal disruption to the environment. We are pleased to collaborate with GSR to develop innovative solutions that can be combined with our capabilities in

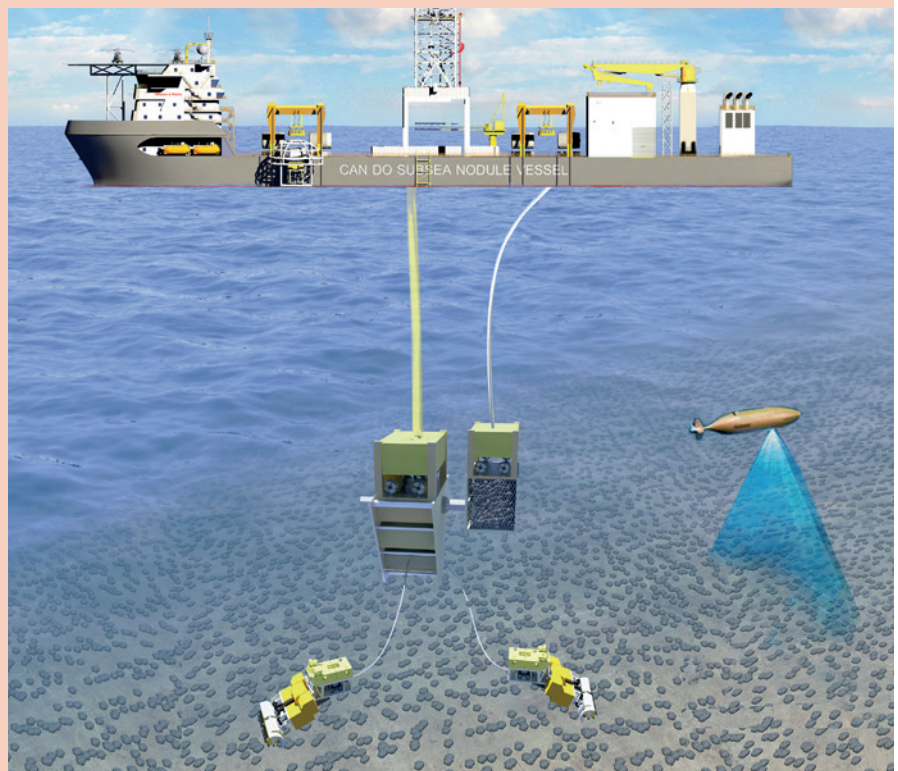


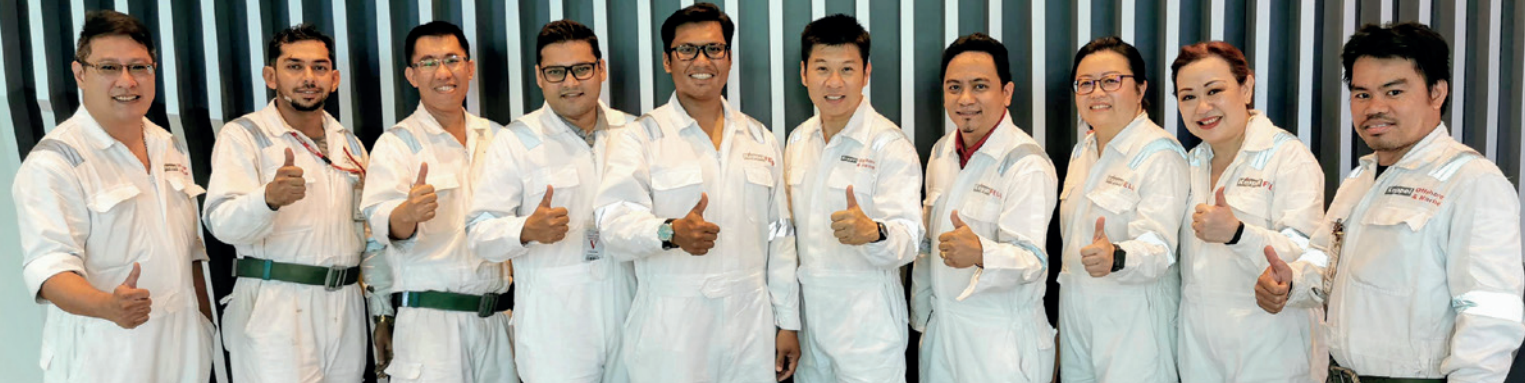
Illustration of subsea nodule collector with deepsea mining ship, a proprietary and patented technology of Keppel Offshore & Marine

repurposing offshore technology for mineral exploration vessels and our construction expertise to develop integrated solutions."

The Keppel O&M/ GSR partnership is focused on polymetallic nodules found in the Clarion Clipperton Zone (CCZ) of the Pacific Ocean. It is estimated that the nodules found in the CCZ contain 1.2 times more manganese, 1.8 times more nickel and 3.4 times more cobalt than all known land-based reserves combined. These metals

are never found together on land, meaning that one seafloor deposit is the equivalent of three mines on land.

Mr Kris van Nijen, MD of GSR, said: "We are delighted to be working with such a reputable partner. Not only is Keppel a world leader in offshore construction, it shares our vision for a more sustainable future and the important contribution responsibly sourced seabed minerals can make."



Keppel O&M hosted personnel from SMRT Corporation on 4 February 2020 to a yard visit and exchanged pointers on strengthening safety culture

## Cultivating safety leadership

Safety is a core value at Keppel. Underpinning a robust safety strategy is growing safety leadership at all levels. All personnel, from the workers to supervisors, undergo comprehensive trainings and regular refresher courses to ensure they are at the forefront of safety best practices.

### TRAINING

Since March 2019, Keppel Offshore & Marine (Keppel O&M) has held enhanced training in safety leadership for supervisors and managers. Conducted by Mr Yong Chee Min, Advisor and former Director of Health, Safety and Environment at Keppel O&M, the course provides insights to effective safety leadership and communication, as well as its importance in strengthening safety culture.

As at end-March 2020, the one-day programme has been conducted over 30 times. It has been attended by over 3,000 supervisors and managers

from Keppel O&M's local and overseas yards, as well as its subcontractors. The remaining training sessions have been postponed until further notice due to COVID-19.

### SHARING BEST PRACTICES

Recognised as a leader in safety in its industry, Keppel O&M is regularly consulted on its best practices across industries.

On 4 February 2020, Keppel O&M hosted personnel from SMRT Corporation to a yard visit to share on operational safety. Despite the differences in operations, there were processes, systems and culture-building measures that could be employed in a variety of situations.

Consisting of operational and safety personnel, the delegation observed the yard's processes, such as the permit-to-work system and vessel safety coordination meetings, and exchanged pointers on strengthening safety culture.

### RECOGNISING SAFETY CHAMPIONS

Ravi Desetti, Production Welding Superintendent from Keppel O&M, New Builds, exemplifies safety leadership.

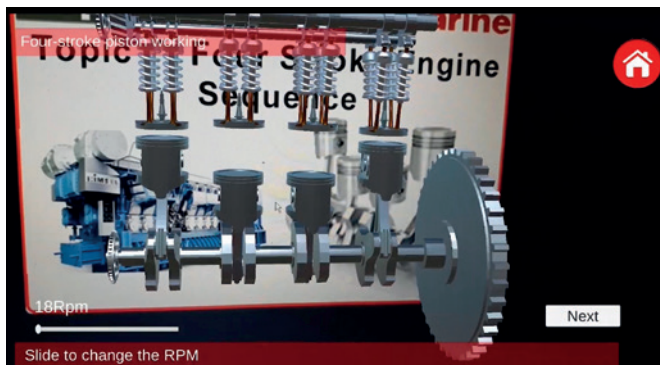
Going above and beyond his duties, Ravi looks beyond his own job scope to ensure the working environment is always safe. He inspects tools used by sub-contractors and takes the initiative to review and suggest improvements to the Risk Assessment process and Standard Operating Procedures of the Welding Department.

"I believe that everyone deserves to go home safe, and I am committed to make it happen." Ravi said.

He was lauded at the 13th Keppel Group Safety Convention held in late 2019 with the Outstanding Supervisor Award which recognises employees for going the extra mile and for their stellar contributions to improve workplace safety and health culture.



# Virtual learning



The AR learning aid for the four-stroke engine sequence (L) and VR simulation of scenario-based safety decision making (R) provide trainees with an immersive learning experience

Keppel Offshore & Marine (Keppel O&M) actively leverages technology to improve and adapt its talent development programmes in grooming future-ready employees. Augmented Reality (AR) and Virtual Reality (VR) have been integrated into the training curriculum to enhance employees' learning experience, while a combination of on-the-go bite-sized content and virtual live classes (VLCs) have been incorporated into online learning initiatives. This has been even more useful with social distancing and work from home measures.

## VR AND AR

The nature of the offshore and marine industry often renders hands-on and in-person training necessary for many employees. VR and AR offer a realistic yet safer environment for employees to continuously upskill themselves.

Over 40 AR learning aids have been produced by Keppel O&M to enhance training methodologies in piping, mechanical, electrical, hull and scaffolding modules. Trainees can access the modules and interact with virtual 3D models

using tablets provided by the Training Centre. This immersive learning experience allows for a deeper understanding of work processes and improves trainees' technical core competency.

To heighten safety awareness among employees, VR-enhanced training is available at Keppel O&M's safety journey hall. Training sessions simulate the safety decision making process that employees are likely to face onsite. Through various safety scenarios, trainees can virtually experience the impact of falling from height, flash fires, and being hit by moving objects if

they do not follow safety guidelines.

## E-LEARNING

On top of VR and AR enhanced trainings, VLCs on a variety of topics such as nutrition, cybersecurity industry guidelines and technical courses were also launched in May 2020. As of end June 2020, 12 sessions were conducted and a total of 944 training places were utilised. Weekly curated bite-sized training content was also rolled out via the Learning On-the-Go initiative in June 2020, allowing staff to balance work while learning at their own convenience.



Keppel O&M has integrated Augmented and Virtual Reality in various training modules

# Exploring innovative energy solutions

With the world increasingly adopting cleaner energy and prioritising environmental sustainability, Keppel Offshore & Marine (Keppel O&M) and the Energy Market Authority (EMA) have forged a \$10 million partnership to develop energy solutions in areas of distributed energy resources, digitalisation and emerging low carbon alternatives.

As part of this partnership, they have launched a grant call for solutions relating to energy storage systems and smart power grids for the offshore and marine environment. To augment research and development in this area, Keppel O&M will be setting up a first-of-its-kind Floating Living Lab (FLL) to testbed and commercialise promising power and technology solutions for the marine sector. Selected solutions from the grant call will have the opportunity to testbed their solutions on the FLL.

Expected to be operational by end 2021, the FLL will have 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.

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."

Mr Chris Ong, CEO of Keppel O&M, said, "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."

Located off its shipyard in Tuas, Keppel O&M's FLL will also harness synergies across the Keppel Group by being a test bed for new technologies from the Group's business units such as IoT-enabled energy storage devices, as well as utilising the power solutions from floating data centres and infrastructure. The FLL will also be able to leverage Keppel's smart yard low latency connectivity infrastructure powered by M1 in the digitalisation of the smart grid.



The FLL will have onboard a digitalized Energy Management application leveraging Keppel O&M's proprietary Industrial Internet of Things (IIoT) platform, AssetCare, to enable machine learning on energy output optimisation



## Interview with the CEO

Mr Chris Ong, CEO of Keppel O&M, shared with Bunkerspot his views on the FLL programme as well as the outlook of LNG as a marine fuel. *OffshoreMarine* reproduces excerpts from the email interview.



Mr Chris Ong, CEO of Keppel O&M, shared his views on the FLL programme and outlook of LNG as a marine fuel

### How does the initiative with the EMA and the FLL programme fit in with Keppel O&M's broader vision for sustainability and low-emission maritime transportation solutions?

Keppel O&M aims to provide solutions for cleaner forms of energy, in line with Keppel Corporation's mission of delivering solutions for sustainable urbanisation.

There is greater awareness for the need for more sustainable solutions in the maritime industry and we are receiving more queries for LNG solutions for new build vessels. We have delivered South East Asia's first dual-fuel tugs and Singapore's first dual-fuel bunker tanker, and are currently building dual-fuel vessels such as

LNG bunkering vessels, dredgers, and containerships. At the same time, we are also able to provide solutions for other segments of the market, such as scrubber retrofit solutions for the current fleet of vessels.

The FLL programme and Keppel O&M's partnership with EMA provide a test bedding launchpad for seamless integration of cleaner sources of energy such as LNG coupled with marinised energy storage for offshore and marine assets. The IIoT technologies in the FLL enable remote monitoring and diagnostics, and this bridges the competencies required to take these solutions one step closer to commercialization. Through all of this, we aim to amplify the

adoption of cleaner sources of energy, and drive innovation and sustainability in the maritime industry.

### How important does Keppel believe LNG bunkering will be to shipping's energy transition? Do you believe that LNG will be an important marine fuel over the coming decades – but then gradually be replaced by other, greener solutions such as ammonia and fuel cells?

The maritime industry is increasingly adopting LNG as a marine fuel and we believe in LNG's long-term prospects. However, the lack of infrastructure in this area is a key challenge and LNG bunkering is only one aspect of it.

With a wide range of capabilities, Keppel O&M is able to stitch up the gas value chain to support the adoption of LNG as a marine fuel. Our solutions range from upstream liquefaction, midstream transportation and regasification, to downstream power generation and LNG bunkering.

FueLNG, a joint venture between Keppel O&M and Shell Eastern Petroleum (Pte) Ltd, provides safe, cost-efficient and reliable solutions in LNG bunkering in Singapore. It has conducted around 225 bunkering operations and is committed to working with industry partners to build a world-class LNG bunkering network.

*Continues on page 16...*



Keppel O&M is currently building dual-fuel vessels such as the LNG bunkering vessel for FueLNG (pictured), dredgers, and containerships

*Continued from page 15.*

FueLNG's decision to build Singapore's first LNG bunkering vessel, which will be delivered at end-2020, demonstrates its confidence and commitment to promoting LNG as a marine fuel.

The FLL, when completed by end-2021, will be an additional location for FueLNG to conduct bunkering at a convenient location for vessels coming out of the shipyards as well as regular LNG-fuelled vessels, and increases the accessibility of LNG as a marine fuel in Singapore.

We are constantly assessing other solutions such as fuel-cells in the market, but this technology has its own set of challenges too, such as cost and infrastructure. In 2019, Keppel O&M signed a framework agreement with DNV GL to boost the uptake of LNG as a marine fuel; this agreement covers LNG-related assets employing battery and hybrid technologies. Our partnership with EMA allows us to further explore these technologies, and there are opportunities for Keppel O&M to collaborate with

these companies and offer such solutions to customers.

**How can governments and the shipping industry – not just in Singapore, but globally – best work together to manage the energy transition in the maritime sector?**

For widespread adoption of LNG as a marine fuel, parts of the value chain need to connect – from upstream to downstream, as well as across different markets around the world. Singapore as the world's largest bunkering hub has introduced many initiatives to drive LNG bunkering and we are very appreciative of their support. Globally, the Maritime Port Authority of Singapore (MPA) is also working with ports around the world and in 2016 developed the world's first set of harmonised LNG bunkering standards with a network of ports including Antwerp, Rotterdam, Singapore and Zeebrugge.

Keppel O&M is working with the industry on many levels and we are seeing promising progress. We are currently building Singapore's first LNG bunkering vessel for FueLNG

and this is Keppel O&M's fourth project supported by the MPA's LNG Bunkering Pilot Programme (LBPP). Keppel O&M is also a member of international industry coalitions such as the Society for Gas as a Marine Fuel (SGMF) and SEALNG, through which we are able to collaborate with like-minded companies across the value chain to break down commercial barriers, establish best practices and accelerate the adoption of LNG as a marine fuel.

**What impact will the current Coronavirus pandemic will have on shipping's energy transition progress?**

The coronavirus pandemic will have profound effects on the industry. While the demand shock may slow the growth of LNG adoption in the short term, the longer-term outlook for LNG remains positive as the push for cleaner fuels continues. A silver lining we foresee is the accelerated push for digitalisation and automation to increase visibility of asset performance and enable safer operation of maritime assets with lesser manpower.



# Engaging Keppelites around the world

The sixth annual Keppel Group-wide townhall, the Global Keppelites Forum (GKF), was held on 6 February 2020 at the Suntec Singapore Convention & Exhibition Centre. The forum was attended by about 400 Keppelites in person and simultaneously broadcasted live to about 2,100 Keppelites at 60 satellite locations globally.

Mr Loh Chin Hua, CEO of Keppel Corporation and Chairman of Keppel Offshore & Marine (Keppel O&M), provided an overview of Keppel's progress and plans for the future.

He shared that the Group had delivered resilient performance despite a challenging and volatile external environment. He said, "There are challenges and risks, but also opportunities. Keppel must continue to remain agile and nimble, stay relevant and retain a growth mindset in order to seize these opportunities. Moving ahead, our focus is on executing our strategy."

## **PROGRESS TOWARDS VISION 2020**

Mr Loh provided an update of the Group's progress towards Vision 2020, which was launched in 2014. He said, "Collaboration is now more prevalent and increasingly a part of the Keppel DNA. There are many projects today involving collaboration."

The Group has made strides in safety, with zero fatalities



Mr Loh Chin Hua, CEO of Keppel Corporation and Chairman of Keppel O&M, reiterated the Group's commitment to provide solutions for sustainable urbanisation

in 2019, the first time this was achieved in over 25 years. Mr Loh also emphasised Keppel's commitment to sustainability, which is now a core part of the company's strategy. He shared, "We must make sustainability our business, and create solutions for a sustainable world, that are good for the planet and people, and create new profit pools in the process."

## **VISION 2030**

Looking ahead beyond 2020, Mr Loh said, "As we complete Vision 2020, we must set our eyes on the future. We are now finalising Vision 2030, with interim targets for 2025. We should grow as one integrated business, with a clear growth trajectory and a repeatable model, as well as have a more rationalised portfolio focusing on our key strengths of engineering,

project development, operating and managing specialised assets, as well as capital and asset management. We will also continue to tap third party funds to grow our businesses."

## **TRUSTED AND RELIABLE COMPANY**

Mr Loh also shared the outcome of a Keppel brand review, announced at GKF 2019, and implemented during the course of 2019. He said, "There is a consensus among internal and external stakeholders that Keppel is a trusted and reliable company. While this is a hard-earned reputation that we must maintain, we must also strengthen our focus on sustainability, as well as be an agile and innovative company. This will be an integral part of our strategy and how we run our businesses."

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Continued from page 17.

## VALUABLE INSIGHTS

During the fireside chat segment, Mr Loh spoke about reconciling

the Group's focus on sustainability, with its involvement in the oil and gas sector. He said, "While the

world is moving towards cleaner energy, the reality is that the shift is not going to happen overnight.



Dr Lee Boon Yang (seventh from left, front row), Chairman of Keppel Corporation, Mr Loh Chin Hua (sixth from left, front row), CEO of Keppel Corporation and Chairman of Keppel O&M, Mr Chan Hon Chew (eighth from left, front row), CFO of Keppel Corporation, together with the winners of the OneKeppel Award

## ONEKEPPEL AWARDS

The inaugural OneKeppel Awards were also presented during GKF 2020. The awards aim to recognise impactful collaborative projects, exemplary Keppelites, and the business unit that best embodied the OneKeppel spirit. Here are some of the award winners.

## SPECIAL MENTION

Autonomous tug project by Keppel O&M, M1, Keppel Telecommunications & Transportation (Keppel T&T) and Keppel Technology and Innovation (KTI): This is a pilot project with the Maritime Port Authority of Singapore,

where a 65-metric tonne tug from Keppel SMIT is retrofitted with an autonomous navigation system which will leverage M1's ultra-low latency 4.5G network, making it capable of autonomously navigating Singapore's harbour waters. Keppel Data Centres provided guidance on the data infrastructure required, while KTI helped to develop the overall project concept.

## PROJECT OF THE YEAR

Gimi FLNG conversion project by Keppel O&M and Keppel Capital: In this project, Keppel O&M executes the engineering, procurement and construction contract

including underwriting schedule and performance risks, while Keppel Capital provides end-to-end transaction services including structuring advisory, financing, lending, and asset management. This project serves as a seed asset for the Keppel Asia Infrastructure Fund.

## BUSINESS UNIT OF THE YEAR

Keppel O&M: Exemplifying the OneKeppel spirit, Keppel O&M clinched the award in recognition of its top and middle management's push for collaboration, as well as commitment to initiate projects that involve Keppelites from across the Group.



There is still a need for fossil fuels. We identified some years ago that gas will be an important transition fuel, and we started developing gas solutions at Keppel O&M. It is not by coincidence that I have put Keppel Renewable Energy under Keppel O&M. A lot of the engineering capabilities that we have at Keppel O&M can be put to use in a different way. For other aspects of our business, we endeavour to be the most energy efficient. In terms of our

portfolio, we want to emphasise renewables.”

On managing headcount and being people-focussed, he said, “Looking at the broader question of value enhancement across the Group, this is something that is necessary. The world of work has changed. With the advent of robotics and artificial intelligence, all our jobs will be changed. We have to change along with it. When we are confronted with

a rapidly changing world, our business strategy will have to adapt accordingly. We need to have the right people with the right experience executing on the strategy. It is important that we give people a chance to learn and upgrade their skills. That is being done, and something that we will continue to do.”

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## Inspiring dialogue

Keppel Young Leaders (KYL) kickstarted its 2020 series of activities with a Leaders’ Dialogue session in Keppel Nantong Shipyard, China, on 11 April 2020.

Mr Edmund Lek, President of Keppel Nantong Shipyard, engaged Keppelites in a dialogue, sharing his life experiences and views on leadership.

About 50 Keppelites attended the session in Nantong, while over 10 Keppelites in other parts of China and Singapore joined via video conferencing, allowing cross-border sharing even during the COVID-19 outbreak.



Mr Edmund Lek (centre, standing), President of Keppel Nantong Shipyard, engaged Keppelites in a KYL Leaders’ Dialogue session on 11 April 2020

Li Si Chuan, Production Manager of Keppel Nantong Shipyard, said, “Mr Lek’s stories inspired the younger leaders to stay resilient in the face of our current challenges, so that we can emerge stronger together.”

As part of Keppel’s talent management framework, KYL comprises a group of high-potential Keppelites empowered to champion and take part in high-impact projects and spearhead enriching programmes.

# Frontline heroes

Amidst the coronavirus pandemic, many dedicated Keppel Offshore & Marine (Keppel O&M) employees around the world are hard at work on the frontlines and in essential services, ensuring Keppelites are well taken care of and operations run smoothly. *OffshoreMarine* gathers what some employees have done in response to COVID-19, and their thoughts on the current situation.



“My duties range from conducting health screenings and administering medication to initiating health promotion activities. With the spread of COVID-19, my responsibilities have also evolved to include implementing public health measures across the yards and providing medical advice relating to the virus. During this difficult period, one of my goals is also to maintain the health and morale of fellow nursing officers so that we are physically and mentally fit enough to take care of our colleagues.”

**Irfan Murdipi**

*Assistant Manager & Senior Nursing Officer,  
Keppel O&M*

“Our medical team has been working tirelessly to perform good health management during such unique and complex times. By means of extensive analysis and constant monitoring of COVID-19’s evolution around the world, we are able to – thanks to the work of a multi-disciplinary team – carry out preventive and risk mitigation actions, providing support, guidance, and bringing confidence to our employees. Our team is optimistic, united, and committed in keeping up the good work and we are certain that this shall pass.”

**Dr. Gustavo Nogueira**

*Occupational Doctor,  
BrasFELS*



“The health and safety of my co-workers has and will always be my top priority. Since the implementation of COVID-19 awareness at our shipyard, my responsibilities have grown to include other safety aspects such as workplace disinfection, the review of shipyard visitors’ recent health and travel history, as well as contact tracing. To facilitate temperature screenings in the morning, we have also assembled a team of employees from the Health, Safety, Environment and Security (HSES) and production departments to take the temperatures of every person before they step foot into our facilities.”

**Arnold Rodriguez**

*HSES Supervisor,  
Keppel AmFELS*







“Daily temperature checks, social distancing, public space disinfection and mask wearing have become the new norm in Nantong yard operations in the year of the rat. Leveraging on our experiences gained during the initial stages of COVID-19, we have heightened entry requirements and screening efforts through means such as China’s nationwide QR health code to ensure all employees’ well-being. The tenacity displayed by workers has shown how we can do business safely during this pandemic.”

**Zhang Zhi Cheng**  
*HSE Manager*  
*Keppel Nantong*

“My team and I continue working hard to help keep businesses moving during the COVID-19 crisis. Besides daily temperature checks, I ensure that there are masks and hand sanitizers for everyone at our warehouse. Taking care of my team is my top priority as we work to fulfil customers’ orders around the world.”

**Oscar Flores**  
*Warehouse Supervisor,*  
*Keppel LeTourneau*



## Providing alternative accommodation

In support of Singapore’s national efforts to combat COVID-19, Keppel O&M and its associate company, Floatel SE, have worked with Maritime and Port Authority of Singapore and PSA Singapore to deploy floating accommodation to temporarily house healthy foreign workers.

Built by Keppel O&M in 2016, the vessel has about 300 rooms and used to be deployed off the coast of Western Australia. The vessel has been docked in a restricted area at Tanjong Pagar Terminal since April 2020.



The floating accommodation is docked in a restricted area at Tanjong Pagar Terminal

# Enhancing worker safety and welfare during Covid-19

In Keppel Offshore & Marine's (Keppel O&M) ongoing response to the COVID-19 pandemic, its Pandemic Task Force (PTF) team has continued to both enhance safe management practices across its workplaces and promote the well-being of all employees. Besides control measures such as temperature screening, safe entry and safe distancing measures in alignment with guidance by the local authorities, employees are also reminded to

practise good hygiene through weekly broadcasts on the latest government advisories.

In addition, the yards have also been divided into separate zones to further increase segregation and reduce the risk of transmissions so that in the event of any infection, as small a group as possible will be affected. The zones where workers work in are a bubble, where the segregation links workers according to projects,

dormitories and company-provided transportation. Supervisors can easily monitor and ensure no cross-contamination onsite through a digital app that identifies a worker's designated zone. Beyond the segregation of workers, shift work arrangements were also put in place to reduce the density of workers at the yard. In the Keppel Housing dormitories, walk-through sanitiser mist tunnels were also added to its comprehensive safety measures to increase disinfection and improve hygiene.



A walk-through sanitiser mist tunnel was introduced in Keppel Housing dormitories to increase disinfection and improve hygiene



Volunteers packed care packages for workers living in dormitories and decanted sites

Keppel O&M values both the physical and mental wellness of its workers providing assurance, medical services, meals and necessities to them. To meet their daily needs and uplift spirits, volunteers prepare, pack and distribute household necessities, snacks and mobile phone top-up cards, as well as help with the daily delivery of meals to workers living in dormitories and decanted sites. To ensure that the emotional well-being of workers is taken care of, counsellors are available at the dormitories for counselling sessions. Temporary Living Quarters (TLQs) were also set up in the yards to house recovered workers so that they can be decanted from the dormitories that they are staying in and return to work safely with peace of mind.

Keppel O&M continues to actively support its workforce as they gradually return to the workplace safely.



# Stronger together



Keppel Volunteers, including Dr Lee Boon Yang, Chairman of Keppel Corporation (second from left) helped to distribute free hand sanitisers to Singaporeans at Funan Mall, as part of Temasek Foundation's #BYOBclean event

As the world continues to fight the COVID-19 pandemic, the Keppel Group is committed to supporting its stakeholders and the wider community in this challenging time.

On 19 March 2020, Keppel Corporation announced a comprehensive package worth more than \$4.2 million to help the Singapore community weather COVID-19. The package is being funded by voluntary contributions from the Keppel Group's directors, senior management and staff, with dollar-for-dollar matching contributions from Keppel Corporation.

Dr Lee Boon Yang, Chairman of Keppel Corporation, said, "As one of the largest homegrown companies in Singapore, Keppel will do what we can to strengthen national resilience in the fight against COVID-19. Through this package, we will provide support to the communities most affected by the pandemic, including healthcare workers and patients, lower income families, as well as Small and Medium Sized Enterprises (SMEs).

"Keppel has stood together with the community to overcome many challenges over the past five decades. I am confident that

with unity and determination, we can effectively weather this difficult environment, and emerge stronger together."

The CEO and CFO of Keppel Corporation, as well as CEOs of key Keppel business units, have volunteered to give up one month of their salaries in April 2020 to support this effort, while Directors of Keppel business units contributed an equivalent amount of their annual fees. Other members of the Group's senior management have forgone half a month of their salaries, while other Keppel employees in Singapore contributed any amount of their choice. Any additional amount contributed by Keppel's employees will be channelled to The Courage Fund.

Keppel also recognises the challenging environment faced by many SMEs as a result of COVID-19. Keppel works with a network of about 3,000 SMEs in Singapore and will help to improve cashflow for SMEs by improving payment terms. Since March 2020, and for a period of six months, the Group has committed to pay all SME suppliers within one week upon the approval of invoices by Keppel, regardless of the credit terms provided by the suppliers.

The Keppel Group's \$4.2 million package to fight COVID-19 includes the following elements:

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- About \$3.5 million is going towards supporting lower income households in Singapore, through rebates given by Keppel Electric, M1 and City Gas to residents living in 1 and 2-room HDB flats. Since 1 May 2020, the rebates are being rolled out, and are expected to benefit more than 40,000 households.
- \$300,000 has been donated to The Courage Fund to fund

relief schemes for communities in Singapore affected by COVID-19.

- \$400,000 has been set aside to support Keppel's frontline contract staff, such as cleaners and security personnel, in appreciation for their contributions and hard work during this difficult period to keep workplaces safe and healthy, and also to provide personal protective

equipment, hygiene items and other essentials to vulnerable communities in Singapore.

Earlier, in February 2020, Keppel Corporation, through its philanthropic arm Keppel Care Foundation, also announced a S\$300,000 donation to The Courage Fund to support communities in Singapore affected by COVID-19.

## Combating climate change

Reflecting its commitment to environmental stewardship, Keppel Offshore & Marine (Keppel O&M) kickstarted a tree planting initiative on 27 February 2020. The day's efforts were led by Mr Loh Chin Hua, CEO of Keppel Corporation and Chairman of Keppel O&M, Mr Chris Ong, CEO of Keppel O&M, and Mr Kevin Chng, CFO of Keppel O&M.

Since then, 4,300 trees and shrubs have been planted across five Keppel O&M yards in Singapore, offsetting the equivalent of 430 tonnes of CO<sub>2</sub> (t-CO<sub>2</sub>e) yearly.

Together with other efforts to reduce carbon emissions, such as the installation of 21,000 solar panels with a peak capacity of 8.8 MW at its yards, 5,530 t-CO<sub>2</sub>e will be offset annually – an amount



[From L to R] Mr Chris Ong, CEO of Keppel O&M, Mr Kevin Chng, CFO of Keppel O&M, Mr Loh Chin Hua, CEO of Keppel Corporation and Chairman of Keppel O&M, and Mr Mathias Gutgesell, Deputy EPC Director of Ørsted cementing their commitment towards reducing carbon emissions via tree planting

that can power around 2,300 four-room HDB flats every year.

Beyond reducing carbon emission and improving resource efficiency, Keppel O&M is leveraging its

engineering capabilities to combat climate change, with renewables and LNG-related solutions making up over 60% of new orders secured in 2019.



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# Sixth rig delivered to Borr Drilling



Hild is the sixth jackup that Keppel has delivered to Borr Drilling, out of the 11 that have been ordered

Keppel Offshore & Marine (Keppel O&M) announced in April 2020 it has delivered the state-of-the-art jackup rig, Hild, to Borr Drilling Limited (Borr Drilling) safely, on time and within budget.

Built to Keppel's proprietary KFELS Super B Class design, Hild is the sixth jackup that Keppel has delivered to Borr Drilling, out of the 11 that have been ordered. It is capable of operating in 400 feet water depth and drilling to 35,000 feet. Equipped with a maximum combined cantilever load of 2,700 kips and high capacity hook loads of two million pounds, the KFELS Super B Class has tremendous horse power during drilling operations.

Following this delivery, Borr Drilling will have nine KFELS B Class and two KFELS A Class rigs in their fleet.

Developed by Keppel O&M's technology arm, Offshore Technology Development, the KFELS B Class designs have a market share of about a quarter of all jackup rigs delivered since 2000. The innovative and cost-effective rig incorporates industry-leading safety and environmentally friendly features which provide maximum uptime with reduced emissions and discharges. It has performed excellently in major offshore exploration and development programmes in various locations worldwide.

Keppel O&M had previously delivered the Saga, Skald, Thor, Hermod and Heimdal jackup rigs to Borr Drilling.