ENERGY & ENVIRONMENT

WE PROVIDE ENERGY AND ENVIRONMENTAL SOLUTIONS THAT ARE ESSENTIAL FOR SUSTAINABLE DEVELOPMENT.

EARNINGS HIGHLIGHTS ($ million)

	2021	2020	2019
Revenue	**5,574**	3,943	4,969
EBITDA	**(376)**	(671)	268
Operating Profit/(Loss)	**(522)**	(822)	116
Loss before Tax	**(469)**	(1,251)	(121)
Net Loss	**(414)**	(1,181)	(101)

PROGRESS IN 2021

- Signed MOUs for proposed combination of Keppel O&M and Sembcorp Marine, and resolution of legacy rigs, while concurrently driving organic transformation.
- Keppel O&M secured new order wins of $3.5 billion and delivered nine major projects.
- Keppel Infrastructure pursued opportunities in renewables, clean energy and decarbonisation solutions, including exploring renewable power import into Singapore, developing EV charging infrastructure, and studying feasibility of a green ammonia supply chain in APAC.
- Secured contract to provide Singapore's first sustainable Energy-as-a-Service solution.
- Announced acquisition of majority joint venture stake in leading solar energy platform, Cleantech Renewable Assets, with KAIF and its co-investor.

FOCUS FOR 2022/2023

- Work towards completing proposed combination of Keppel O&M and Sembcorp Marine and resolution of legacy rigs.
- Accelerate expansion in the renewables space and integrate renewables into existing generation portfolio.
- Expand environment business with a focus on value-enhancing projects with multiple income streams.
- Expand presence and grow capabilities in clean energy and decarbonisation solutions.
- Pursue and develop innovative solutions in collaboration with other Keppel business segments and drive value chain integration.

The Energy & Environment segment provides solutions and services spanning offshore & marine (O&M), power and renewables, new energy and environment. The segment includes Keppel Offshore & Marine (Keppel O&M), Keppel Infrastructure and Keppel Renewable Energy.

Countries representing about 70% of the world economy have committed to net zero emissions by 2050 following COP 26. The energy sector, which contributes about 76% of the world's greenhouse gas emissions, needs urgent decarbonisation on a global scale. The development and funding of energy transition projects and infrastructure are key in the race towards net zero.

Keppel, with expertise in sustainable energy and environmental solutions, as well as asset management capabilities, is well-placed to provide compelling end-to-end solutions that can fast forward the energy transition and sustainable development.

In 2021, Keppel focused on transforming its business and growing new capabilities in the energy and environment space to strengthen its position as an enabler of the low-carbon economy.

BUSINESS TRANSFORMATION

At the start of 2021, Keppel announced a comprehensive transformation of Keppel O&M to enhance its competitiveness and relevance amidst the global energy transition, as well as its exit from the oil rig building business, after completing the existing rigs under construction. This was followed in June by the signing of Memorandums of Understanding (MOUs) for the proposed combination of Keppel O&M and Sembcorp Marine, including the resolution of Keppel O&M's legacy rigs, as part of Keppel's efforts to be more disciplined and refocus its portfolio.

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The proposed combination of Keppel O&M and Sembcorp Marine seeks to create a stronger combined entity that would be better positioned to capitalise on growing opportunities in the O&M, renewables and clean energy sectors. The proposed combination runs in parallel and is inter-conditional with another proposed transaction to sell Keppel O&M's legacy completed and uncompleted rigs and associated receivables to a separate Asset Co, which would be majority owned by external investors to be procured by Kyanite Investment Holdings, a wholly-owned subsidiary of Temasek. Discussions on the proposed transactions are progressing steadily and Keppel is working towards signing definitive agreements by the end of 1Q 2022.

If the proposed transactions are successfully completed, Keppel will become much more streamlined, asset light and focused on renewables, new energy, decarbonisation and environmental solutions.

OFFSHORE & MARINE

While the O&M sector remained challenging in 2021, Keppel O&M performed resiliently. During the year, Keppel O&M secured $3.5 billion of new orders, including a US$2.3 billion contract for a Floating Production, Storage and Offloading vessel (FPSO) from Petrobras. As at end-2021, Keppel O&M's net orderbook stood at $5.1 billion, of which 39% comprised renewables and gas solutions. The quality of Keppel O&M's net orderbook improved, with over 90% of the contracts providing for milestone payments, thereby reducing working capital requirements and risks to the Group.

In 2021, Keppel O&M remained focused on execution and delivered nine major projects to its customers. In addition, Keppel O&M also repaired and retrofitted about 120 vessels, which included higher value jobs such as

Through its proprietary platform AssetCare, Keppel O&M is leveraging technology and data to remotely monitor deployed assets to provide real-time support and improve work efficiency.

scrubber and Ballast Water Treatment System retrofits, and drydocking works for LNG carriers.

As part of its active cost management efforts, Keppel O&M achieved a reduction of about $140 million in overheads year-on-year (yoy) for FY 2021, higher than the projected $90 million announced in 2020. Since 2015, Keppel O&M has managed to shave cumulatively $517 million from its overhead costs, positioning the company to achieve profitability with a lower top line.

With rising oil prices, the offshore drilling rig market has shown signs of improvement. Utilisation and day rates for modern jackups, which make up the bulk of Keppel O&M's legacy rigs, both improved during the year. Pareto Securities estimates these to rise even further over the next few years. With improving market conditions, Keppel is hopeful that Keppel O&M's legacy rigs, which would be injected into a separate Asset Co to be majority owned by external investors procured by Kyanite Investment Holdings, can be substantially monetised over the next three to five years.

Meanwhile, Keppel O&M continues to strengthen its position in the offshore renewables sector. In 2021, the company successfully completed its first two offshore wind substations for customer Ørsted, which will be deployed in the Greater Changhua 1 & 2a offshore wind farms in Taiwan. Keppel O&M is currently undertaking integrating and commissioning works for the two offshore substations on-site, and the projects are expected to be delivered in 2022. Reflecting the strong partnership, Keppel O&M signed a global framework agreement with Ørsted in 2021 to potentially undertake future offshore substation projects. In addition, Keppel O&M secured contracts for two offshore wind topsides and a wind turbine installation vessel upgrading project during the year.

In 2021, Keppel O&M was awarded the Singapore Maritime Institute-Maritime and Port Authority of Singapore Joint Call for Proposal in harbour craft electrification and is leading a coalition to develop a comprehensive electric vessel supply chain in Singapore. Keppel O&M is developing the Floating Living Lab (FLL), a first-of-its-kind floating launchpad for the development and test bedding of sustainable marine solutions in Singapore, which will be used to testbed the electric vessel charging infrastructure. In addition, the FLL will facilitate the use of renewable energy such as solar energy in the charging infrastructure.

As part of its transformation, Keppel O&M is harnessing technology including 5G, remote monitoring and surveillance, IoT and data analytics, to enhance its solutions. Keppel O&M's proprietary industry IoT system, AssetCare, which enables remote monitoring and real-time support for vessel operations, has been deployed on several assets, including FueLNG Bellina, Singapore's first LNG bunkering vessel, which was delivered by Keppel O&M in 2021. FueLNG Bellina is also the world's first bunkering vessel to be awarded a smart notation.

SHARPENING FOCUS ON THE ENERGY TRANSITION

The net zero commitments made by governments and companies around the world are driving strong demand for renewables, clean energy, as well as decarbonisation and environmental solutions. These are areas where the Group, especially Keppel Infrastructure, has strong capabilities and a proven track record, and where it can help its customers make the transition to net zero.

Many of Keppel's new business pursuits and R&D efforts in the past year were in these areas, including exploring the import of renewable energy into Singapore, developing electric vehicle (EV) charging infrastructure, securing Singapore's first Energy-as-a-Service (EaaS) contract, and studying the feasibility of developing an Asia-Pacific green ammonia supply chain.

Keppel is partnering Perennial to roll out Singapore's first sustainability Energy-as-a-Service Concept at Perennial Business City, and is looking to provide more Energy-as-a-Service offerings in Singapore and the region.

Keppel is also actively exploring decarbonisation and circular economy solutions, including carbon capture, utilisation and storage, smart distributed energy resources, as well as various environmental sustainability technologies.

Keppel is also providing other decarbonisation solutions for the energy and environmental sectors to help its customers and governments drive down their carbon emissions. In addition to its proven waste-to-energy (WTE) and district cooling solutions, Keppel is also actively exploring decarbonisation and circular economy solutions, including CCUS, smart distributed energy resources, as well as various environmental sustainability technologies.

Looking ahead, Keppel will continue to seize inorganic opportunities to acquire assets, operating platforms and technologies that would allow the Group to scale up quickly in its identified growth areas. Importantly, with its established asset management platform, Keppel can also bring in varied sources of capital from private and public investors to fund the projects and solutions from cradle to maturity.

POWER AND RENEWABLES

Keppel's Power and Renewables business performed well in 2021 despite the challenges caused by the rise in global gas prices and supply disruptions, and volatility in the Singapore Wholesale Electricity Market.

During the year, Keppel Electric successfully maintained its position as one of the leading electricity retailers in Singapore. As at November 2021, Keppel Electric was the 3rd largest commercial and industrial retailer with a market share of 17.9%[1]. Keppel Electric also retained its position as the largest Open Electricity Market provider in Singapore, with a market share of 22.1% as at end-April 2021. Keppel Electric remains committed to providing its consumers with customisable retail solutions that best suit their needs.

With economic activity recovering despite the ongoing pandemic, electricity consumption in Singapore has rebounded to pre-COVID-19 levels more quickly than anticipated. Demand for electricity in Singapore is beginning to outpace supply. Coupled with a lack of new generation capacity planting in the immediate horizon, the tight market conditions are likely to persist in the near to medium term.

With the recently announced hike in Singapore's carbon tax, which will progressively increase from the existing $5 per tonne of emissions to reach $50-$80 per tonne of emissions by 2030, consumers will be financially incentivised to decarbonise their electricity consumption. This is expected to drive up demand for green electricity and decarbonisation solutions.

To diversify its generation portfolio and to cater to the emerging domestic demand for renewable energy, Keppel Infrastructure has increased its participation in renewables. In line with efforts to promote greater energy infrastructure connectivity in the region, Keppel Infrastructure signed an exclusive framework agreement with Electricite Du Laos (EDL) as part of the Lao PDR-Thailand-Malaysia-Singapore Power Integration Project, to jointly explore opportunities to import up to 100MW of renewable hydropower into Singapore. Keppel Infrastructure and EDL will also explore collaboration opportunities arising from the demand for renewable energy and the transition towards greener forms of energy. Such projects will not only create new growth engines and advance sustainability for the Group but will also enable Keppel to enhance its green retail offerings.

Keppel Infrastructure is strengthening its renewable energy capabilities by collaborating with like-minded partners in the areas of low-carbon electricity, storage and intermittency management solutions. It seeks to deliver reliable, competitive and non-intermittent low-carbon electricity to end-consumers, potentially in the ASEAN region. Apart from hydropower, Keppel is exploring other forms of renewable energy such as wind, solar and biomass, and will leverage technology and data to enhance its operational performance.

Keppel Infrastructure develops, owns and operates a network of integrated utilities and sustainable energy solutions. During the year, it secured a long-term service corridor contract from a large petrochemical customer at Jurong Island and also successfully completed the design and construction of several facilities on the island without any lost time incident.

[1] Excluding SP Services.

We will continue to invest in R&D, and explore new opportunities in renewables, clean energy, decarbonisation and environmental solutions.

To further advance the Group's pursuit of sustainability as a business, Keppel Infrastructure is collaborating with Singapore LNG Corporation (SLNG) and another industry partner on the front-end engineering design of a natural gas liquids extraction facility project. To be located on Jurong Island, the project aims to remove heavier hydrocarbons from LNG through a sustainable approach that incorporates the use of cold energy from SLNG's operations. The project will not only unlock multiple benefits across the LNG and Chemicals value chains but also contribute towards enhancing Singapore's energy security and strengthening the country's position as an LNG and Chemicals hub.

GROWING RENEWABLES PORTFOLIO

Keppel has set a target to grow its renewables portfolio to 7.0GW by 2030 and will do this both organically and inorganically. This will not only contribute to growing the Group's renewable energy portfolio but will also generate recurring income for the Group.

In 2021, Keppel Corporation announced the acquisition of a majority joint venture stake in Cleantech Renewable Assets (Cleantech), a leading solar energy platform, in partnership with Keppel Asia Infrastructure Fund (KAIF) and a co-investor of KAIF. Cleantech has a total capacity of over 600MW across the various stages of operations, construction, and development, with its assets located across India and six countries in Southeast Asia. In addition, Cleantech is targeting to achieve a cumulative generation capacity of 3.0GW over the next five years.

This latest transaction brings the Group's total announced capacity for renewables to 1.1GW, including Keppel Renewable Energy's ongoing solar farm project in Queensland, Australia, which continues to make steady progress. Construction of the solar farm is on track to commence in 2023. Upon completion in 2024, the Harlin solar farm project is expected to have a capacity of at least 500MW, generating enough energy to power over 142,000 average Australian homes.

Keppel Renewable Energy is also pursuing opportunities in the solar, onshore wind, offshore wind and run-of-river hydro space in Asia Pacific, with a focus on the markets of Australia, India, the Philippines, the Republic of Korea, Malaysia and Vietnam.

NEW ENERGY

Keppel Infrastructure continued to expand its district cooling services with three new service contracts, further contributing to energy-efficient cooling in Singapore. The addition of the latest contracts brings the total cooling supplied by Keppel's plants in Singapore to over 70,000 refrigeration tonnes. Meanwhile, construction of Bulim Phase 1 of the Jurong Innovation District in Singapore and the district cooling systems (DCS) plant in Bangkok continued to progress. Both projects are on track to be completed in 2023. Keppel Infrastructure also deepened its partnership with BCPG Public Company Limited via an MOU to jointly develop more energy efficiency-related solutions such as cooling, EV charging, microgrids, and solar installations in key gateway cities in Thailand.

With climate change being one of the greatest threats today, Keppel is investing in new technologies and energy-efficient solutions. Keppel Infrastructure and the National University of Singapore jointly designed and developed a Thermal Energy Storage (TES) solution that uses a new Phase-Change Material to improve the energy efficiency of DCS. The TES system has an energy carrying capacity of up to three times more than a conventional chilled water storage system, and can yield more than 10% in cost savings annually. The TES trial was completed in 2021 and will be rolled out for commercial application in 2022.

As part of its plans to grow in the EV sector, Keppel Infrastructure entered into a joint venture with Starcharge to deploy EV charging infrastructure in Singapore and the region. It also launched Volt, its EV charging brand and solutions provider.

Keppel Infrastructure is also partnering Perennial to roll out Singapore's first sustainable EaaS concept at Perennial Business City. The concept includes installing and operating highly efficient chiller systems and photovoltaic solar panels, providing long-term zero-carbon electricity, as well as developing smart EV charging stations. The project is expected to reduce Perennial Business City's total energy consumption by more than 40%, making it the first sustainable super-low energy business park in the Jurong Lake District.

To meet the rapidly growing global demand for carbon-free energy, Keppel Infrastructure signed an MOU with Temasek and

The Hong Kong IWMF was 40.6% completed as at end-2021.

Incitec Pivot to study the feasibility of producing green ammonia in Australia for export. Green ammonia is a potential source of clean fuel that can support the demand for sustainable energy and contribute to deep decarbonisation in power and hard-to-abate sectors.

Looking ahead, Keppel Infrastructure will continue to invest in R&D, and explore new opportunities in renewables, clean energy, decarbonisation and environmental solutions, as it expands its track record for zero-emission solutions and low-carbon energy services.

ENVIRONMENT

Governments around the world recognise the need for more sustainable water and waste management solutions to cope with rapid urbanisation, with many countries announcing planned infrastructure investments over the next few years. In 2021, Keppel Infrastructure continued to focus on the execution of its projects in Singapore and overseas with an emphasis on safety and quality.

In February 2021, Singapore's fourth desalination plant, the Keppel Marina East Desalination Plant, was officially opened by Prime Minister Lee Hsien Loong, strengthening Keppel's presence as a provider of water solutions.

Meanwhile engineering design and procurement activities continued at Singapore's first Integrated Waste Management Facility (IWMF), in anticipation of the commencement of major site works in 2022. Upon completion in 2024, the IWMF WTE facility and the Materials Recovery Facility will be amongst the largest of such facilities in Singapore. Over in Hong Kong, the prefabrication of process modules and reclamation works progressed steadily at the Hong Kong IWMF despite the supply chain disruptions arising from COVID-19. As at end-2021, the Singapore and Hong Kong IWMF projects were 22.7% and 40.6% completed respectively.

In mainland China, Keppel Infrastructure successfully commissioned two WTE plants in Beijing and Xi'an. As one of the leading and most reliable WTE technology solutions provider in China, Keppel is well positioned to seize opportunities in China, as part of the Chinese government's plans to grow the country's urban municipal waste incineration capacity to 800,000 tonnes per day by the end of 2025.

Building on its track record and expertise, Keppel is well-placed to capitalise on the increasing demand for sustainable water and waste management solutions, especially in the Asia-Pacific and Middle East regions. The Group is also exploring investments in decarbonisation and circular economy solutions, including CCUS, smart distributed energy resources, and various environmental sustainability technologies.