

# OPERATING PLATFORM

Keppel harnesses its deep operating capabilities to create alternative real assets and solutions serving the energy transition, sustainable development and digital connectivity.

The Operating Platform is horizontally integrated with the Fund Management and Investment platforms and helps to drive value creation by developing, operating and optimising assets.

Keppel's Operating Platform possesses deep capabilities in engineering, developing and operating assets. It delivers critical solutions and services across Infrastructure, Real Estate and Connectivity to address some of the world's most pressing challenges in the face of climate change and rapid urbanisation and increasing digitalisation. These offerings span power, renewables, clean energy, decarbonisation and sustainability solutions, green buildings as well as digital infrastructure.

Horizontally integrated with the Fund Management and Investment platforms, the Operating Platform contributes its expertise to create, operate and optimise real assets across the investment cycle. Working in concert, the platforms drive superior asset performance and investment outcomes for Keppel's private funds and listed real estate and business trusts, while advancing the

Company's asset-light strategy and recurring income growth.

The Infrastructure Division has a strong international track record for developing and managing critical infrastructure such as power generation, waste-to-energy, district cooling and water treatment plants, as well as providing related services for a spectrum of energy and environmental needs. Keppel, through the Infrastructure Division, is the first company in Singapore to successfully import renewable energy. It is also developing the Keppel Sakra Cogen Plant, the country's first-to-market hydrogen-ready power plant. To help companies decarbonise their operations, the Infrastructure Division also offers Energy-as-a-Service, a subscription service that bundles solutions such as district cooling, solar energy, electric vehicle charging and smart energy management.

The Real Estate Division, with its extensive experience in Asian real estate, provides innovative urban space solutions spanning sustainable urban renewal, senior living, urban living, retail and large-scale integrated developments. The Real Estate Division leverages its operating capabilities to help build quality asset pipelines as well as contribute towards asset enhancement initiatives leveraging its sustainable urban renewal solutions to create value for Keppel's private funds and listed REITs.

The Connectivity segment, which comprises the Data Centres and Networks Division and M1, possesses deep expertise in designing, developing and operating high-quality data centres and subsea cable systems, as well as providing 5G network

and solutions to consumers and enterprises. As a leader in data centres, the Data Centres and Networks Division is developing higher-capacity and more sustainable digital infrastructure to support rapid digitalisation. In doing so, the Division helps to build quality asset pipelines as well as operate specialised assets for Keppel's private funds and listed data centre REIT.

M1 is Singapore's first digital network operator, providing a suite of communications services, including mobile, fixed line and fibre offerings, to over two million customers. As a cloud native digital platform, M1 harnesses its strong synergies with the operating divisions to offer smarter bundled solutions and enterprise services that help customers in their digital transformation.

## INFRASTRUCTURE

5.9 GW

Energy portfolio comprising 4 GW of renewables and 1.9 GW of gas projects

## REAL ESTATE

\$39.3b

In real estate assets under management<sup>1</sup>

## CONNECTIVITY

32 Data Centres

Assets across Asia Pacific and Europe

<sup>1</sup> Includes carrying values of identified assets on the balance sheet, as well as gross asset values of certain identified underlying assets held in joint ventures, that can be potentially converted into fee-bearing FUM. Notes receivables (vendor notes issued by Asset Co) amounting to c.\$4.3 billion is included.

# INFRASTRUCTURE

We provide compelling end-to-end solutions spanning power, renewables, clean energy and decarbonisation, which are essential for sustainable development.

## PROGRESS IN 2023

- First to import renewable energy under LTMS-PIP, with ~270 GWh imported by end-2023.
- Grew proportion of long-term power contracts (3 years and above) from about 36% of total contracted generation capacity as at end-June 2023 to about 60% as at end-December 2023.
- Made good progress on the construction of the Keppel Sakra Cogen Plant, Singapore's first-to-market hydrogen-ready power plant.
- Signed MOUs with international partners including GenZero, Masdar, and AM Green to explore various low-carbon energy solutions such as hydrogen, ammonia, and bioenergy.
- Gained strong traction in EaaS solutions, securing \$1.6 billion worth of contracts in 2023.

## FOCUS FOR 2024/2025

- Grow the integrated power business and explore strategic opportunities to provide longer-term energy solutions.
- Continue to maintain a robust and balanced portfolio of long-term power contracts with stable recurring income.
- Fortify Keppel's leadership in the Singapore power sector through low carbon electricity import.
- Further develop pipeline of strategic infrastructure assets for private funds and listed infrastructure trust.
- Continue to execute projects well and safely, including the Keppel Sakra Cogen power plant.
- Continue to expand market share for proprietary EaaS and WTE solutions.



Infrastructure is expected to be one of the fastest-growing asset classes, supported by global trends such as the energy transition and the push for decarbonisation. At the United Nations Climate Change Conference (COP 28) in 2023, there were calls to triple renewable energy capacity globally, transition away from fossil fuels, and accelerate zero- and low-emission technologies. With extensive global engineering, development and operating experience, Keppel's Infrastructure segment is at the forefront of providing sustainability solutions and services in areas such as renewables, clean energy and decarbonisation.

**The global energy transition and climate action are driving demand for Keppel's renewables, clean energy, decarbonisation and environmental solutions.**

As part of a horizontally integrated value chain, Keppel's Infrastructure Division works with the Fund Management and Investment platforms to build quality asset pipelines for Keppel's private funds and listed infrastructure trust. Focused on an asset-light model with recurring income, the Infrastructure Division provides Energy-as-a-Service (EaaS) solutions on subscription, enabling firms to decarbonise their assets and operations with minimal upfront

investments. The Division also confers significant strategic advantages to the Real Estate and Connectivity segments by working with them to future-proof their assets and solutions with low-carbon energy.

#### **INTEGRATED POWER BUSINESS**

The Singapore Wholesale Electricity Market (SWEM) was volatile in 1H 2023 amidst geopolitical tensions, increased electricity demand and inflationary pressures, which resulted in high electricity prices. However, following measures put in place by the Energy Market Authority (EMA) to stabilise the energy market and enhance Singapore's energy security and resilience, electricity prices have stabilised since 2H 2023. Despite the volatile market conditions, Keppel's integrated power business performed strongly, bolstered by growth in contracts and improved operational efficiency.

Keppel's market position in the SWEM expanded, with its commercial and industrial retail market share increasing to 15% (excluding SP Services) as at December 2023. In addition, Keppel signed a multi-year Power Purchase Agreement with GlobalFoundries (GF) in January 2024 to provide 150 to 180 MW of electricity annually to power GF's Singapore site commencing May 2024. Come 2026, GF will also be a significant offtaker from the upcoming hydrogen-ready Keppel Sakra Cogen Plant, contracting about 25% of the plant's total generation capacity

## Operating & Market Review

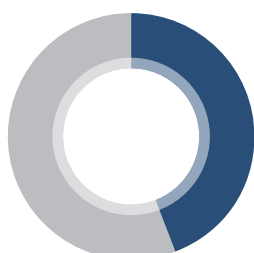
### Operating Platform – Infrastructure

#### ENERGY PORTFOLIO (GW)



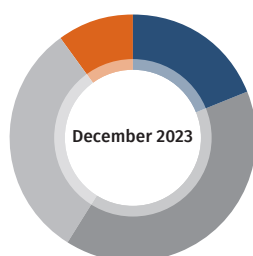
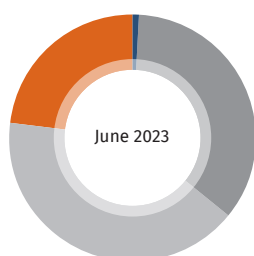
● Gas	1.9
● Renewables – Hydro	0.1
● Renewables – Wind	1.0
● Renewables – Solar	2.9
<b>Total</b>	<b>5.9</b>

#### LONG-TERM SUPPLY & SERVICE CONTRACTS (\$ billion) as at 31 December 2023



● Operations & Maintenance	1.9
● EaaS	2.4
<b>Total</b>	<b>4.3</b>

#### POWER CONTRACTS<sup>1</sup> (%)



	June 2023	December 2023
● >10 years	1.0	19.0
● 3-10 years	35.0	40.0
● 1-3 years	41.0	31.0
● <1 year	23.0	10.0
<b>Total</b>	<b>100.0</b>	<b>100.0</b>

<sup>1</sup> Based on Keppel’s existing generation capacity.

for over 15 years. By the end of 2023, about 60% of Keppel’s contracted generation capacity was locked in for three years and above, a sharp increase from just 36% six months prior in June 2023.

As the first and only licensed company to start importing low-carbon power via the Lao PDR-Thailand-Malaysia-Singapore Power Integration Project (LTMS-PIP) in 2022, Keppel is well-placed to help pioneer the decarbonisation of Singapore’s power sector. In 2023, Keppel was awarded two conditional approvals from EMA to import low-carbon electricity from renewable energy sources in Cambodia and Indonesia respectively. Keppel’s Infrastructure Division will continue working with its partners to finalise the technical, commercial, and regulatory aspects of its electricity import projects, with the goal of providing reliable and competitive low-carbon electricity to customers.

While market conditions may continue to be volatile, Keppel’s integrated power business is largely insulated against fluctuations in energy prices, bolstered by its end-to-end value chain. To sustain growth and performance, Keppel will also continue to actively pursue opportunities to provide longer-term energy solutions which will contribute to multiple recurring income streams.

#### DECARBONISATION & SUSTAINABILITY SOLUTIONS

##### Energy-as-a-Service

Decarbonisation technologies play a crucial role in the energy transition, but they often require heavy capital investments which can be prohibitive for businesses. Keppel’s Infrastructure Division provides EaaS, a cost-effective, subscription-based solution, to help drive widespread adoption of cleaner energy solutions.

The EaaS solution, which integrates Keppel’s capabilities in district cooling, solar energy and electric vehicle (EV) charging, has gained strong traction since its introduction in late 2022. About \$1.6 billion worth of EaaS contracts were secured in 2023, out of a total of \$2.4 billion worth of EaaS contracts secured as at end-December 2023. These include Keppel’s appointment as the District Cooling operator for the upcoming Jurong Lake District in Singapore which has a total design capacity of over 29,000 Refrigeration Tonnes, as well as new contracts from across China, Thailand and Vietnam.

Keppel manages two state-of-the-art operation nerve centres in Singapore and Vietnam, which underpin the efficiency, reliability and scalability of Keppel’s EaaS solutions. At these centres, the Infrastructure Division can remotely monitor and optimise all its energy assets in real-time, leveraging digital technology, artificial intelligence and machine learning.

Meanwhile, Keppel’s EV charging brand, Volt, has expanded its network to over 200 chargers as at end-December 2023, riding on strong growth in the adoption of electric vehicles in Singapore.

More recently in February 2024, Keppel was appointed to design and build a large-scale solar photovoltaic (PV) system at Changi Airport, which Keppel will own and operate for 25 years. The solar PV system can generate enough solar energy to allow Changi Airport Group to reduce its carbon emissions by about 20,000 tonnes each year.

Further afield, Keppel will seek opportunities to offer EaaS alongside its real estate and connectivity solutions to drive asset-light growth.

### Environment

Keppel's proven waste-to-energy (WTE) technology enables effective solid waste management and energy recovery, and also helps cities avoid methane emissions which might arise if the waste was sent directly to landfills. More details on the avoided emissions arising from Keppel's solutions will be disclosed in Keppel's Sustainability Report to be published in May 2024.

In 2023, Keppel made good progress constructing the Hong Kong Integrated Waste Management Facility (IWMF) and Singapore's Tuas Nexus IWMF, which attained about 80% and over 50% completion respectively by year-end. Keppel has successfully delivered the prefabricated modules for the Hong Kong IWMF, the first to adopt the modularisation method of construction within the global WTE industry.

In the UK, Keppel secured the renewal of the five-year Technical Support Agreement for the Runcorn Phase 1 & 2 Energy-from-Waste (EfW) facilities. Designed and built by Keppel, the combined Runcorn EfW is one of the largest and most efficient EfW projects in the UK.

## Keppel's \$4.3 billion infrastructure supply and service contract backlog as at end-2023 provides earnings visibility over the next 10-15 years.

As a leader in environmental solutions, Keppel is working on integrating carbon capture technology with its WTE plants to create a carbon-negative solution for waste management. During the year, Keppel successfully completed feasibility and pre-Front End Engineering Design (FEED) studies for the integration of a large-scale carbon capture facility with the Runcorn EfW. As the original designer and builder of the Runcorn EfW, Keppel is well positioned to advise on the possible synergies between the Runcorn EfW facility and the proposed carbon capture facility.

Meanwhile, in Singapore, Keppel and the National Environment Agency are in advanced stages of a joint study on the feasibility of implementing carbon capture technology at selected WTE plants in Singapore.

### New Energy

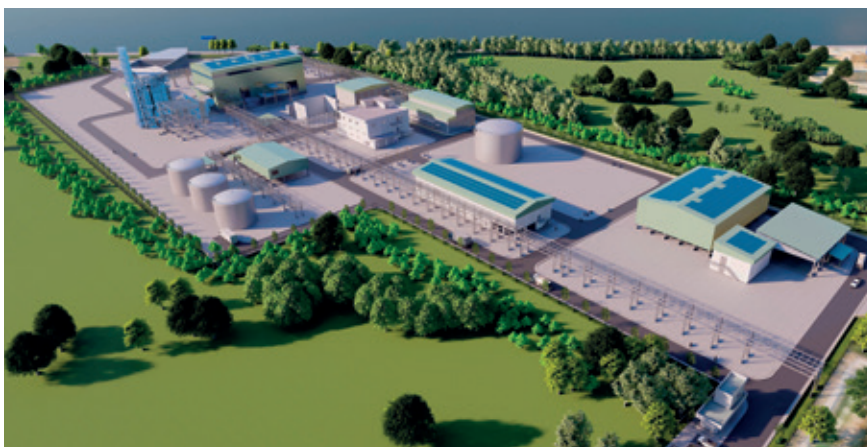
Keppel is intensifying its work with international partners on supply chains for low-carbon hydrogen and hydrogen-derived fuels, such as

green ammonia, as part of Keppel's plans to capitalise on the growth of the hydrogen economy.

In May 2023, Keppel joined the Central Queensland hydrogen project (CQ-H2) to develop one of the largest green hydrogen projects in Australia as part of an international consortium. FEED studies for the CQ-H2 project have kickstarted with support from the Australian Renewable Energy Agency. Leveraging the green hydrogen feedstock from CQ-H2, Keppel is developing a downstream green ammonia project in Gladstone with Incitec Pivot Limited, which can produce up to 850,000 tonnes per annum of green ammonia for Australia as well as international export.

In Singapore, Keppel signed a Memorandum of Understanding (MOU) with ExxonMobil to explore low-carbon hydrogen and ammonia for scalable commercial and industrial applications that can support both Jurong Island's sustainability goals and Singapore's hydrogen strategy. The collaboration would help to realise the vast potential of low carbon ammonia as a fuel as well as feedstock for refinery and petrochemical operations.

Besides low-carbon solutions, Keppel is also actively engaging its partners on various sustainability solutions including bioenergy. In 2023, Keppel signed separate MOUs with GenZero, Masdar and AM Green to explore projects in areas such as biomethane, biomethanol and Sustainable Aviation Fuel. Bioenergy, a form of renewable energy generated from organic materials such as purpose-grown crops and organic waste, is poised to play a pivotal role in the ongoing energy transition and offers numerous advantages to decarbonise hard-to-abate industries such as aviation and the heavy-duty transport sector.



When completed, the hydrogen-ready Keppel Sakra Cogen Plant will be the most cutting-edge and energy efficient power plant in Singapore, which will translate into superior performance, including lower emission intensity and higher operational flexibility.

# REAL ESTATE

We provide sustainable and innovative urban space solutions, focusing on sustainable urban renewal and senior living.

## PROGRESS IN 2023

- Announced monetisation of \$830 million of residential and commercial assets in Singapore and the region.
- Implementing sustainable urban renewal initiatives in eight projects across Asia Pacific, with combined asset value of \$7.5 billion.
- Launched Sindora Living, a senior living operating platform for Asia, and opened Keppel's flagship assisted living community in Nanjing, China.
- Signed Memoranda of Understanding with DBS and UOB to provide REaaS solutions to businesses and assets owners in Asia.

## FOCUS FOR 2024/2025

- Accelerate asset monetisation and unlock capital that can be re-invested for growth and higher returns, leveraging Keppel's asset-light model.
- Work on securing new sustainable urban renewal projects in existing markets in Asia.
- Continue expanding senior living footprint through exploring opportunities in priority markets of China and Singapore, as well as other markets in Asia Pacific, Europe and the US.



**Keppel’s innovative SUR solutions integrate people, AI-driven technology and processes to bolster the sustainability performance of commercial buildings.**

With decades of real estate development and management experience in Asia, Keppel harnesses its deep operating capabilities to create value for investors, customers and governments through its end-to-end value chain. Keppel’s Real Estate Division works with the Fund Management and Investment platforms to build quality asset pipelines and leverages its Sustainable Urban Renewal (SUR)

and faster-to-market solution compared to demolition and redevelopment. It also allows asset owners to cater to evolving user preferences by upgrading their buildings to be smarter, better connected and more sustainable.

Drawing on its strong operating capabilities in real estate, Keppel has developed an innovative SUR initiative, which integrates people, processes and AI-driven technology to open up new possibilities in the rejuvenation of older commercial buildings. Keppel’s SUR solutions deploy the latest technologies to reduce buildings’ operational and embodied carbon, driving energy and water efficiency and extending the lifespan of aging buildings. SUR also uses spatial programming to implement intelligent workspace solutions and introduces best-in-class amenities and placemaking activities to support changing work preferences. Given their versatility, Keppel’s SUR solutions and methodology can also be applied to the design, development and operation of new buildings.

capabilities to perform asset enhancement initiatives for Keppel’s private funds and listed trusts. As part of Keppel’s asset-light business model, the Real Estate Division also provides Real Estate-as-a-Service (REaaS) solutions such as SUR to help businesses decarbonise their assets and operations.

**SUSTAINABLE URBAN RENEWAL**  
The built environment is responsible for some 40% of the world’s carbon emissions, and its decarbonisation is one of the most cost-effective ways to mitigate climate change. Retrofitting existing assets can be a greener, less costly

Keppel’s SUR solutions are being implemented in eight assets, namely Keppel Bay Tower, Ocean Financial Centre and Keppel South Central in Singapore; The Kube and Park Avenue Central in Shanghai, China; Saigon Centre in Ho Chi Minh City, Vietnam; INNO88 Tower in Seoul, South Korea, and Kohinoor in Pune, India.

## Operating & Market Review

### Operating Platform – Real Estate

The Division is expanding its SUR offerings in Asia Pacific and also actively working with Keppel’s private funds to offer SUR capabilities as part of asset enhancement initiatives that can help to bolster the efficiency, sustainability performance and valuations of their asset portfolios.

During the year, Keppel partnered Singapore banks DBS and UOB to jointly develop and provide businesses across the region with a comprehensive suite of sustainability and digitalisation solutions to support their decarbonisation

journeys. Through these collaborations, Keppel can offer SUR-related solutions including spatial programming and workplace solutions to businesses and asset owners can help improve their building performance and uplift asset values.

Looking ahead, the Division will continue to pursue a strong pipeline of over 20 assets to retrofit and decarbonise, as well as explore opportunities to offer SUR for a wider range of hospitality, healthcare and industrial assets.

### SENIOR LIVING

Many countries are seeing ageing populations amid low fertility rates and longer life expectancies. Coupled with rising affluence and a focus on healthy ageing, the demand for assisted-living communities is growing, particularly in countries such as China and Singapore. Keppel sees opportunities to cater to the large and generally underserved senior populations in these markets, using an asset-light model.

Keppel has built in-house capabilities across the senior living segment,

### Spotlight

## SINO-SINGAPORE TIANJIN ECO-CITY: A MODEL FOR SUSTAINABLE DEVELOPMENT

The Sino-Singapore Tianjin Eco-City (Eco-City), which marked its 15th anniversary in 2023, is a showcase of Keppel’s strong expertise in sustainability-related solutions, as well as its ability to integrate them to advance sustainable development.

Keppel leads the Singapore consortium, which works with its Chinese partner to guide the 50-50 joint venture, Sino-Singapore Tianjin Eco-City Investment and Development Co., Ltd. (SSTEC), in its role as master developer of the Eco-City.

In addition, Keppel also contributes to the Eco-City’s growth by developing green residential and commercial developments, and through joint ventures with its Chinese partners, provides diverse infrastructure solutions such as renewable energy, water treatment and district heating and cooling services.

During the year, SSTEC sold two residential plots and an industrial plot for RMB 1.15 billion, as well as over 1,100 homes in its projects. To attract more green companies to the Eco-City, SSTEC commenced development of the new Green



Keppel drives the growth of the Eco-City by developing green residential and commercial developments, and providing infrastructure solutions such as renewable energy, water treatment and district heating and cooling services.

Innovation Park in the central district of the Eco-City. SSTEC has also signed a collaboration agreement with the Singapore University of Technology and Design to set up a research and innovation centre in the Eco-City, and further enhance the Eco-City as a “living lab” for the innovation and development of green and low-carbon technologies.

At the 15th Sino-Singapore Tianjin Eco-City Joint Steering Council Meeting in December 2023, which

was co-chaired by Deputy Prime Minister and Minister for Finance of Singapore, Lawrence Wong, and Vice Premier of the State Council of the People’s Republic of China, Ding Xuexiang, Singapore and China unveiled a new project collaboration framework that will strengthen the Eco-City’s role as a pathfinder for climate-friendly cities, and broaden bilateral cooperation across the areas of green growth, low-carbon living, ecological resilience, innovation, talent development and governance.



including development and operational expertise, drawing from experience through its investment in Watermark Retirement Communities in the US. Keppel continues to build up a strong ecosystem of clinical, research, recruitment and technology partners to offer differentiated senior living services.

Meanwhile, Keppel opened its flagship project – a 400-bed premier assisted living community in Nanjing, China – under its senior living platform, Sindora Living. Sindora Living redefines senior living by focusing on empowering programmes for seniors of all conditions, with a strong emphasis on personalised life plans, holistic care, and smart management systems with a human heart. The Sindora Living platform and its Nanjing community will serve as a launchpad for Keppel to offer related asset management and operating services in China and other parts of Asia.

### REAL ESTATE INVESTMENT

Despite challenging market conditions in 2023, Keppel continued to monetise its real estate portfolio in Asia, announcing \$830 million in asset monetisations. We also sold 3,100 homes across Singapore, China, Vietnam, Indonesia and India.

As part of its asset-light strategy, Keppel is selectively investing in development projects, leveraging its operating capabilities and networks, to connect investors of its private funds with real estate opportunities in Asia. This would in turn enable Keppel to grow its Funds Under Management.

In Singapore, the Division made progress in the development of the iconic Keppel South Central, a next-generation smart and super low energy building located in Tanjong Pagar. When completed in early 2025, the new building will add to Keppel’s asset pipeline of approximately 650,000 square feet of technology-forward spaces – comprising Grade A offices, flexible workspaces, retail and event spaces as well as a diverse range of indoor and outdoor amenities.

As part of Keppel’s refreshed China playbook and pivot away from



Keppel is implementing SUR initiatives across eight projects in Asia Pacific, including the INNO88 Tower in South Korea.

developing and selling homes, Keppel will focus on sustainability-related solutions in sectors benefiting from tailwinds and government support, and where Keppel has strong differentiation and value add. These include Keppel’s focus areas across the energy transition, sustainable urban renewal, senior living and data centres. Keppel is also bringing together partners and investors in China to invest in good projects in the country, as part of the Company’s “China-for-China” asset management strategy.

In Vietnam, strong government emphasis on infrastructure development, an expanding middle-class population and young workforce continue to drive demand for Keppel’s real estate solutions. During the year, the Real Estate Division jointly invested in two residential projects with the Keppel Vietnam Fund and Khang Dien Group in Ho Chi Minh City, where the partners will jointly develop over 200 landed homes and 600 high-rise apartments.

In India, the demand for office space is expected to remain strong due to the return-to-office policy by top IT companies and increasing number of global capability centres. The robust office market, along with a trend of occupiers wanting to shift to quality and sustainable buildings, bodes well for Keppel’s active search to expand its office portfolio across key micro markets in Mumbai, Pune, Bangalore,

Hyderabad, Chennai and the Delhi National Capital Region.

Building on its strong track record in the master development of smart, sustainable urban townships, the Real Estate Division secured consultancy contracts to provide master planning, smart city solutions and estate management advisory services for projects in Jinan and Suzhou in China, as well as Sri Lanka.

Meanwhile, Keppel continued to engage various Singapore government agencies on the feasibility and benefits of nearshore developments as coastal protection solutions, and completed various related technical tests. The Division has also obtained relevant IP certifications for nearshore solutions in Singapore, enabling Keppel to further engage corporates, institutes of higher learning and business partners on potential collaboration.

During the year, Keppel was recognised for its strong sustainability efforts in the real estate space. In the 2023 GRESB Assessment, Keppel’s Real Estate Division was ranked second place in the Diversified – Office/ Residential/Non-listed/Core category for its strong Environmental, Social and Governance (ESG) performance. It also retained its Green Star rating, which recognises entities with commendable scores across the benchmark’s ESG components.

# CONNECTIVITY

We connect people, businesses and countries in the digital economy.

## PROGRESS IN 2023

- Achieved ready-for-service status for first phase of Building 1 of Keppel Data Centre Campus at Genting Lane.
- Achieved full utilisation at first two phases of Huailai Data Centre in Greater Beijing.
- Continued to make progress on the Floating Data Centre Module (FDCM) and DataPark+, with final investment decision for the FDCM expected in 1H 2024, and actively engaged government agencies on DataPark+.
- Completed close to 50% of overall cable laying operations for Bifrost Cable System.
- M1 achieved nationwide 5G standalone network coverage ahead of schedule in 1Q 2023.
- M1 completed consumer migration to its new cloud native digital platform.
- M1 launched its “solution-in-a-box” offering with a suite of plug-and-play 5G solutions for companies to boost 5G adoption and deployment.

## FOCUS FOR 2024/2025

- Accelerate data centre portfolio expansion overseas in Asia Pacific and Europe.
- Continue to develop innovative data centre solutions, such as DataPark+ and the FDCM.
- Target for Bifrost Cable System to go into commercial service by end-2024.
- Pursue subsea cable opportunities in Asia and other emerging markets with Joint Build Partners.
- Grow the enterprise business with more 5G-enabled solutions for enterprises and industries.
- Develop innovative solutions and drive 5G-enabled advancements across industries through collaboration between M1 and Keppel’s operating divisions.



Strong growth in social media and video streaming, the adoption of cloud computing, and emergence of Generative Artificial Intelligence (GenAI), are driving up computing power, bandwidth, and latency requirements worldwide. These in turn underpin the demand for advanced digital infrastructure, such as data centres and fibre networks, as well as 5G connectivity.

## Keppel delivers high-quality data centres, subsea fibre cables and 5G connectivity and applications, harnessing the power of its end-to-end value chain.

Keppel's Connectivity segment comprises the Data Centres and Networks Division and M1. The former possesses deep expertise in designing, developing and operating high-quality data centres and subsea cable systems, while M1 provides 5G network and solutions for consumers and enterprises.

As part of a horizontally integrated value chain, the Data Centres and Networks Division works with the Fund Management and Investment platforms to build quality asset pipelines for Keppel's private funds and listed data centre REIT. The Data Centres and Networks Division also benefits from strategic

access to low-carbon energy provided by Keppel's Infrastructure Division, which helps to power and future-proof its assets and solutions.

### DATA CENTRES

Amid climate and energy security concerns, data centre operators are expected to provide higher capacity and rack densities for their clients, while improving carbon emissions and the power usage efficiency of their assets.

In Singapore, Keppel DC Singapore 7, the first complex situated within the Keppel Data Centre Campus at Genting Lane, has been in service since 1Q 2023. Meanwhile, the second complex, Keppel DC Singapore 8, achieved structural completion in March 2024, with the first phase of the complex expected to be ready for service in 3Q 2024. For Keppel Data Centre Fund II's data centres in China, the first two phases of Huailai Data Centre in Greater Beijing have achieved full utilisation, while the Shanghai Data Centre was ready for service in early-2024.

Keppel is accelerating the pursuit of data centre projects in new markets across the Asia Pacific, which is one of the fastest-growing regions for digital infrastructure. Home to digitally-connected populations, the Asia Pacific benefits from a high penetration rate of mobile devices and social networking applications, as well as the expansion of 5G networks.

## Operating & Market Review

### Operating Platform – Connectivity



The proposed DataPark+ is a 1 GW nearshore sustainable data centre campus that is envisioned to be powered by hydrogen and solar energy, and can save nearly 21 billion litres of water annually through the use of seawater for cooling.

In addition to portfolio expansion, Keppel is also exploring ways to future-proof data centre infrastructure by deploying AI and machine learning for predictive failure analyses, as well as incorporating sustainable design and energy-efficiency solutions. To this end, the Data Centres and Networks Division is working with the Infrastructure Division as well as international partners to harness green energy sources that can help to improve the power utilisation and reduce the carbon emissions of Keppel's data centres.

Keppel also continues to explore disruptive innovations, such as the energy-efficient Floating Data Centre Module, which is expected to reach final investment decision in 1H 2024. The Data Centres and Networks Division has also been actively engaging government agencies and authorities to advance the development of DataPark+, a 1 GW nearshore net zero data centre campus concept.

DataPark+ is envisioned to be a self-sustaining, carbon neutral campus that will operate on clean energy derived from a private smart grid powered by sustainable hydrogen and solar energy. DataPark+ is engineered to tap seawater for

its cooling needs. This is estimated to reduce the use of treated water for cooling by about 21 billion litres annually, enough to fill 1,200 Olympic size swimming pools.

Featuring a modular design, DataPark+ can be developed in phases in tandem with demand, and the availability of clean and low carbon energy. By aggregating cooling and power requirements, DataPark+ is designed to greatly enhance the efficiency of data centre operations.

#### SUBSEA CABLE SYSTEMS

In 2023, the Bifrost Cable System, the largest capacity high-speed transmission cable and subsea connectivity hub across the Pacific Ocean, achieved financial close, with Keppel securing private investors to take a 60% stake in Keppel's share of the fibre pairs.

The construction of Bifrost is progressing well, with key milestones achieved, including the necessary permits and licenses for marine installation. Cable laying operations were close to 50% completed as at end-December 2023, with cable laying activities in the international waters of the Pacific Ocean fully completed. Construction of the landing facilities in Singapore, Indonesia, Mexico, and

the US have commenced. When completed, these landing facilities will integrate the subsea cable with data centre infrastructure, to create an ecosystem of throughput connectivity.

When Bifrost achieves commercial service status, currently expected in end-2024, it will connect Singapore directly to the west coast of North America, bolstering connectivity by providing a route through Indonesia, the Philippines and Guam.

The Data Centres and Networks Division is also working with Keppel's Fund Management and Investment platforms to explore opportunities to invest in and develop more subsea cables in Asia and other emerging markets.

#### **DIGITAL CONNECTIVITY**

As part of its multi-year digital transformation, M1 accelerated the rollout of highly personalised services and completed the migration of all its mass consumer customers to its new cloud native digital platform. The new platform supports streamlined digital services, enables an efficient digital experience for customers through automation, enhances sustainability through future-proofing of the business, and optimises resources with cloud native applications.

M1 is looking to harness AI and GenAI to further enhance its productivity and service quality in customer experience and engagement. For instance, it is exploring the integration of ChatGPT with its chatbot, as well as the deployment of Salesforce AI which can help improve information accuracy and service speed of call agents.

M1 completed its nationwide 5G standalone network rollout ahead of schedule in 1Q 2023, and has since achieved nationwide outdoor 5G coverage for all consumers. M1 has implemented over 50 5G solutions in partnerships with various enterprises across the maritime, energy, utilities,

smart estate vehicle and tourism sectors. In 2023, M1 launched its 5G-powered "solutions-in-a-box" offering, the first of its kind in Southeast Asia. The suite of SMART solutions include applications for worker safety to detect risk and forecast accidents, real-time security surveillance and management solutions at sea, autonomous robotics for the inspection of critical assets, and workforce productivity solutions. The solution's plug-and-play approach provides hassle-free integration and deployment of 5G-powered solutions for companies.

### **M1 drives growth by providing best-in-class 5G solutions to consumers and enterprises through its cloud-native connectivity platform.**

In 2023, M1's growing enterprise business saw an increase in revenue of 27% year on year, driven by robust demand for its information and communications technology services, digital connectivity, hybrid multi-cloud offerings, as well as infrastructure and application modernisation services to help enterprise customers with their digital transformation.

In the realm of AI and data management, enterprise customers seek swift, on-demand, and flexible provisioning of graphics processing units (GPUs). M1 is collaborating closely with its key enterprise clients to provide GPU-as-a-Service solutions, enabling enterprises to harness GPU resources to address diverse, multiple workloads with ease, while enjoying substantial cost savings.

M1 continues to harness its strong synergies with Keppel's operating divisions, including bundling enterprise services for colocation data centre clients, as well as enabling smarter product features for several of Keppel's customer-facing services.