Building a Sustainable World Together

Together, we can co-create solutions tailored to the unique demands of your cities, and build a more sustainable future

singapore
Passion Made Possible

The Singapore sustainable development story

Singapore, like many other countries, is striving to build a liveable and sustainable city which supports a high quality of life and competitive economy. We want to do this while ensuring the long-term availability of resources with minimal impact on the natural environment. Sustainable infrastructure is the hardware that supports these goals, and enhances the maintainability and future-proofing of a city.

Today, we are a city in a garden. But the work does not stop here. We continue our journey of sustainable development to build a more liveable city – not just for today's people but tomorrow's generations.

This is our story.

In the 1960s, Singapore – then a newly independent country – had to confront a range of urban issues such as:

- **Limited resources**
- **Pollution**
- **Land constraints**

Photo courtesy of National Archives of Singapore

These are developmental challenges that some countries might be facing today. In addition, cities around the world are also seeking solutions to be sustainable and liveable as density increases.

Singapore turned these challenges into strengths over the past decades through an urban systems approach guided by the concepts of integrated master planning and dynamic urban governance. We have developed a modern city characterised by lush greenery and clear waters. Some of the areas we are focusing on include:

- **Comprehensive water solutions to build water resilience**
- **Renewable energy to enhance energy security**
- **Urban development in an environmentally friendly manner**

The Singapore sustainable development story has been made possible by Singapore companies which developed deep capabilities in sustainable infrastructure to address Singapore's evolving needs over the years.

These are capabilities that you can harness to create your own sustainable development stories. Together, we can co-create solutions tailored to the unique demands of your cities, and build a more sustainable future.

Scan here to learn more about Singapore's urban transformation journey towards a liveable and sustainable city


Water
SG
SINGAPORE
Passion Made Possible

Although Singapore is an island nation, we have limited natural water resources. As such, securing a clean and stable water supply to ensure long-term water sustainability is of paramount importance. Singapore companies have in turn developed extensive capabilities to address water challenges, thereby ensuring Singapore and the cities they work with can build water resilience. Here are some of the solutions our companies offer.

Supplying clean and safe drinking water

- Municipal water supply treatment systems
- Decentralised drinking water solutions
- Mobile water solutions

Enhancing water resilience

- Desalination and water reuse
- Water reclamation

Ensuring sustainable economic development

- Industrial wastewater treatment
- Engineering, procurement and construction (EPC)

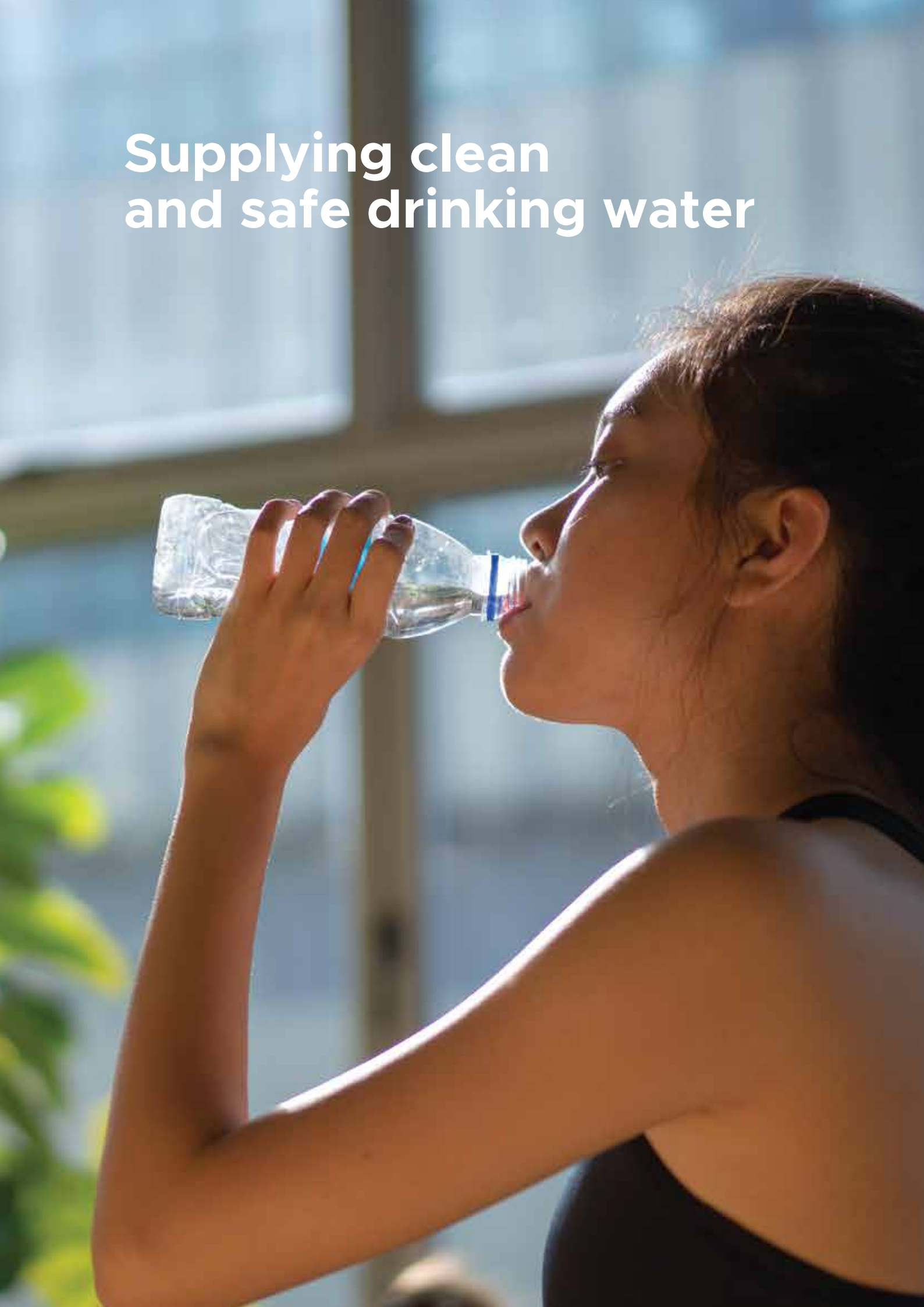
Creating a liveable environment

- Rainwater harvesting for buildings
- Storm water management

Developing future-ready water solutions

- Digital water solutions

Supplying clean and safe drinking water



Ensuring a clean and safe supply of drinking water for citizens is a priority for all cities. Often, this involves treating polluted water that comes from conventional sources such as rivers. This not only ensures safe drinking water, but also eradicates a potential avenue for diseases to spread.

The Singapore River clean-up effort in the 1970s and 1980s exemplifies the transformative effects of tackling pollution. Over the years, Singapore agencies and companies have also developed water treatment capabilities to supply citizens with safe drinking water.

Today, these capabilities and technologies are deployed to tackle water pollution and bring safe drinking water to global communities.

Municipal water supply treatment systems

Ecosoftt (ECO Solutions for Tomorrow Today) provides end-to-end solutions that span the entire water cycle, which include sourcing, recycling, using and discharging. In India, Ecosoftt has deployed its water treatment technologies to clean up the waterway of the Narmada River in Omkareshwar. The project was recognised for its sustainability and impact, and saw Ecosoftt accorded the Zayed Sustainability Award 2019 – an accolade which recognises achievements that drive impactful, innovative, and inspiring sustainability solutions.

Decentralised drinking water solutions

Darco Water is a one-stop customised water and wastewater solutions provider. It is working with InfraCo Asia Development to undertake municipal water treatment projects in Vietnam on a design, build, own and operate (DBOO) model. These plants will take feedwater from rivers and treat it to meet potable standards. The first of these projects in Ben Tre (15,000 m^3/day capacity) broke ground in July 2019.

Mobile water solutions

Wateroam has served over 85,000 people across 38 countries to date. (Photo courtesy of WateROAM)

Wateroam is a water innovation enterprise that develops point-of-use ultrafiltration solutions. It aims to provide speedy access to clean drinking water in rural or disaster-hit locations with no electricity. Its flagship solution – the ROAMfilter Plus – weighs less than 3kg and can be set up in a mere matter of minutes to produce over 200 litres of potable water per hour.

Liquinex specialises in water purification and disinfection systems. One of its latest products is a compact and light-weight system the size of a suitcase that can generate 500 litres of drinking water per hour. The system runs on car batteries or energy from solar panels, making it suitable for humanitarian aid and relief applications. Its products have been deployed in countries such as Indonesia, India, Laos, Malaysia and Myanmar.

Enhancing water resilience

Photo courtesy of Sembcorp Utilities

Singapore has created a "Four National Taps" strategy to ensure a secure, diversified and sustainable supply of water. Local catchment and imported water sources are complemented by innovative solutions such as NEWater and desalination. As countries in the world become water-stressed, more are turning to non-conventional solutions to ensure sufficient water for municipal and industrial uses.

Desalination and water reuse

Keppel Infrastructure is a project developer specialising in environmental infrastructure solutions and services. The company is working on the Keppel Marina East Desalination Plant located in Singapore's Central Business District. Slated to open by 2020, it will be Singapore's first dual-mode desalination plant. It will treat both seawater and rainwater to produce 30 million gallons per day (mgd) of drinking water.

HSL Constructor is a Singapore construction company that focuses on high quality and impactful social and economic infrastructure projects. The Tuas Desalination Plant, one of its flagship projects, is among the most compact and space-efficient desalination plants in the world. It can produce up to 30 million gallons of drinking water a day, or about enough water for 200,000 households. The plant is owned and operated by PUB, Singapore's National Water Agency, under the auspices of which it was named the Desalination Plant of the Year at the 2019 Global Water Awards.

Water reclamation

Sembcorp Utilities is a global provider of specialised total water and wastewater treatment solutions. Its projects have a total gross capacity of over 8.7 million m^3/day. Their plant in Changzhi, China, utilises a zero liquid discharge model – it treats industrial wastewater, reclaims water from treated effluent and then integrates the reclaimed water with the water supply for process use. With a total capacity of over 1.3 million m^3/day, it is one of the largest plants in China to have a zero liquid discharge system. The project was also selected by the governments of Singapore and China as a showcase of bilateral cooperation in water management.

Sembcorp's plant in Changzhi, China, utilises a zero liquid discharge model. (Photo courtesy of Sembcorp Utilities)

Ensuring sustainable economic development

Water is essential to the smooth running of many industrial processes. As Singapore grew its economic activities over the years, our companies have correspondingly developed state-of-the-art industrial water solutions to treat wastewater discharge and maximise reuse. These technologies can help you to achieve sustainable economic growth while minimising the impact on the environment.

Industrial wastewater treatment

Century Water is a water treatment company specialising in industrial applications across sectors ranging from electronics to petrochemicals. The engineering and technology firm has developed advanced wastewater treatment technologies such as fluidised bed crystallisation and pervaporation to treat challenging wastewater streams in the semiconductor and pharmaceutical sectors. To date, it has successfully delivered on-site treatment projects for semiconductor companies such as Micron (in Singapore, Malaysia and China) and pharmaceutical firms including Pfizer and Novartis.

Century Water specialises in wastewater treatment purification systems and technologies.
(Photo courtesy of Century Water)

Novexx is a wastewater treatment specialist for the petrochemical and process industry. Its Advanced Oxidation Technology is a chemical-free process designed to treat dissolved organic contaminants, and is able to handle high chemical oxygen demand parameters (> 10,000 mg/L). This technology has been applied to major oil and pharmaceutical companies such as Oiltanking, Vopak, Universal Terminal, Petrochina and GSK.

Net Water Asia specialises in wastewater treatment for the agriculture and food industries. Its Micro and Nano Bubble Advanced Oxidation process ensures efficient chemical oxidation via hydroxyl radicals. It has worked with palm oil mills in Malaysia, as well as industrial dairy and meat processing plants in Poland.

Engineering, Procurement and Construction (EPC)

Boustead Salcon is a leading global water and wastewater engineering specialist. To date, the company has delivered over 800 water and wastewater treatment installations across 61 countries for the power, oil & gas and petrochemical industries. In Singapore, its key projects include a 15,840 m^3/day demineralisation plant and 11,320 m^3/day condensate polishing plant for the Sembcorp Multi-Utilities Facility@Banyan, a 17,280 m^3/day demineralisation plant and 18,000 m^3/day condensate polishing plant for the Tembusu Multi-Utilities Complex, and water and wastewater treatment facilities for GMR Energy, SMAG and YTL PowerSeraya.

Creating a liveable environment

With the increasing uncertainties of climate change, solutions to optimise water catchment and protect our environment from rising sea levels are growing in demand. This is how Singapore firms have developed and deployed solutions to enhance the resilience of our city-state.

Rainwater harvesting for buildings

Fast Flow is a rainwater drainage solution provider. The company designs draining systems which include sophonic, pressurised and hybrid solutions spanning 20 million m^2 of roof area across Asia-Pacific. Its track record includes Marina Bay Sands' Sky Park in Singapore, the Beijing National Stadium or Bird's Nest in Beijing, China, and the Hilton Hotel Empire in Queensland, Australia.

Storm water management

Netatech provides design and master planning, hydraulic modelling, and environmental engineering services for decentralised storm water management and treatment projects in both natural and urban environments. In Singapore, Netatech has delivered numerous public, commercial, and industrial projects under PUB's Active, Beautiful, Clean (ABC) Waters programme. Some of Netatech's projects in Singapore include HDB Waterway Ridges, Rochor Canal, Jurong Port, PUB WaterHub, and JTC Chemical Hub.

Surbana Jurong, a master planner for sustainable industrial development and urban living, is one of Asia's largest infrastructure consultancies. It uses flood hydrology and hydraulic modelling to advise city developers on how to plan for and manage emergency events, as well as monitor actual flooding situations. Surbana Jurong has worked with officials in Singapore, Myanmar, Australia and China to better plan for flood resiliency.

Koh Brothers is a construction company with a strong track record in specialist engineering solutions. One of its most iconic projects is the Marina Barrage, a dam located in Singapore's Central Business District. The project was conferred the Superior Achievement Award by the American Academy of Environmental Engineers.

The Marina Barrage is a dam built across the 350m-wide Marina Channel, and part of a comprehensive flood control scheme to alleviate flooding in downtown Singapore.

Developing future-ready water solutions

Photo courtesy of Subnero

Singapore companies have embraced the advent of digital technologies to develop relevant urban solutions. These include early detection of potential contaminants hazardous to public health, as well as data analytics solutions to optimise the use of water. These solutions can be readily deployed in cities.

Digital water solutions

ZWEEC is a leading water technology company focused on creating innovative solutions. Its Intelligent Bio-Monitoring System – AquaTEC – serves as a crucial first-line assessment of drinking water, thereby allowing for timely interventions to safeguard water security. AquaTEC provides early warning systems for the detection of irregularities in drinking water. Each system performs 24/7 real-time remote monitoring and can detect anomalies within 15 minutes. AquaTEC is used in markets such as Singapore, China, Taiwan, Australia and the Middle East.

Environsens' Intelligent Integrated Bio-Sensor (I2BioS) is a real-time water toxicity system that provides early warning for illegal and accidental discharge of heavy metals into public sewage. I2BioS is an effective and cost-competitive alternative to existing manual sampling methods, which can be time-consuming and expensive. I2BioS is currently being utilised for the used water network by PUB.

Environsens' i2BioS continuously monitors water quality and automatically collects samples when toxicity levels rise above safe levels. (Photo courtesy of Environsens)

Subnero provides robotics solutions for water quality sensing and monitoring. Its Subnero Water Assessment Network (SWAN) can carry in-situ water quality probes and operate with minimal manual support (see image on left page). SWAN can autonomously execute missions and perform profiling of water column at points of interest, and allow users to access the data in real-time. Subnero has deployed SWAN in various reservoirs in Singapore. Besides SWAN, Subnero also provides underwater wireless & networking products and solutions for various applications such as marine & offshore, subsea, research and defence.

ZWEEC's AquaTEC is a fully automated system with progressive alerts. (Photo courtesy of ZWEEC)

Singapore Water Solutions Companies

Water Treatment Solutions

Ceraflo
www.ceraflo.com

Darco Water
www.darcowater.com

Ecosoftt
www.ecosoftt.org

Liquinex
www.liquinex.com

Memiontec
www.memiontec.com

Smitech
www.smi-engrg.com.sg

Wateroam
www.wateroam.com

Desalination and Water Reclamation

AnnAik
www.annaik.com.sg

HSL Constructor
www.hsl.com.sg

Keppel Infrastructure
www.kepcorp.com

Memiontec
www.memiontec.com

Sembcorp Utilities
www.sembcorp.com

Tritech
www.tritech.com.sg

Industrial Water Solutions

AnnAik
www.annaik.com.sg

Boustead Salcon
www.bousteadsalcon.com

Century Water
www.century-water.com

Ceraflo
www.ceraflo.com

EcoWorth Tech
www.ecoworth-tech.com

Medad
www.medad-tech.com

Liquinex
www.liquinex.com

Net Water Asia
www.netwatertechnologies.com

Novexx
www.novexx.com.sg

NSL Oilchem
www.nsloilchem.com.sg

Pioneer Environmental Technology
www.pioneerenv.com.sg

Trident Water Systems
www.tridentwater.com.sg

Storm Water Collection and Management

Fast Flow
www.fastflowgroup.com

Koh Brothers
www.kohbrothers.com

Netatech
www.netatech.com.sg

Digital Water Solutions

Environsens
www.environsens.com

Pan Asian Holdings
www.panasian.com.sg

Subnero
www.subnero.com

Tritech
www.tritech.com.sg

ZWEEC
www.zweec.com

Energy

SINGAPORE
Passion Made Possible

As a country with limited natural resources, Singapore has always needed to be prudent about energy management. This has prompted our companies to explore innovative ways to optimise energy use, pursue energy efficiency and develop clean energy infrastructure. These solutions are relevant in a world that is transitioning towards a cleaner and smarter energy future. Here is how Singapore companies can work with you to address your concerns of energy security, economic competitiveness and environmental sustainability.

Building a resilient power grid

- Power generation
- Gas distribution
- Rural electrification and microgrids

Bolstering renewable energy capacity

- Solar projects
- Photovoltaic (PV) panel technology
- Offshore wind

Creating a liberalised and flexible energy market

- Electricity retail
- Electricity trading
- Demand response

Improving efficiency in energy usage

- District cooling
- Heating, ventilation and air-conditioning (HVAC)
- Energy services

Creating future-ready energy solutions

- Internet of Things (IoT), smart monitoring and control
- Energy storage
- Electric mobility

Building a resilient power grid

A reliable power generation and distribution supply is essential for societal and industrial development. This in turn requires resilient infrastructure and systems. Over the years, Singapore has built up comprehensive energy infrastructure that includes power generation plants, transmission systems, gas distribution networks and a national electricity grid that is among the world's most reliable.

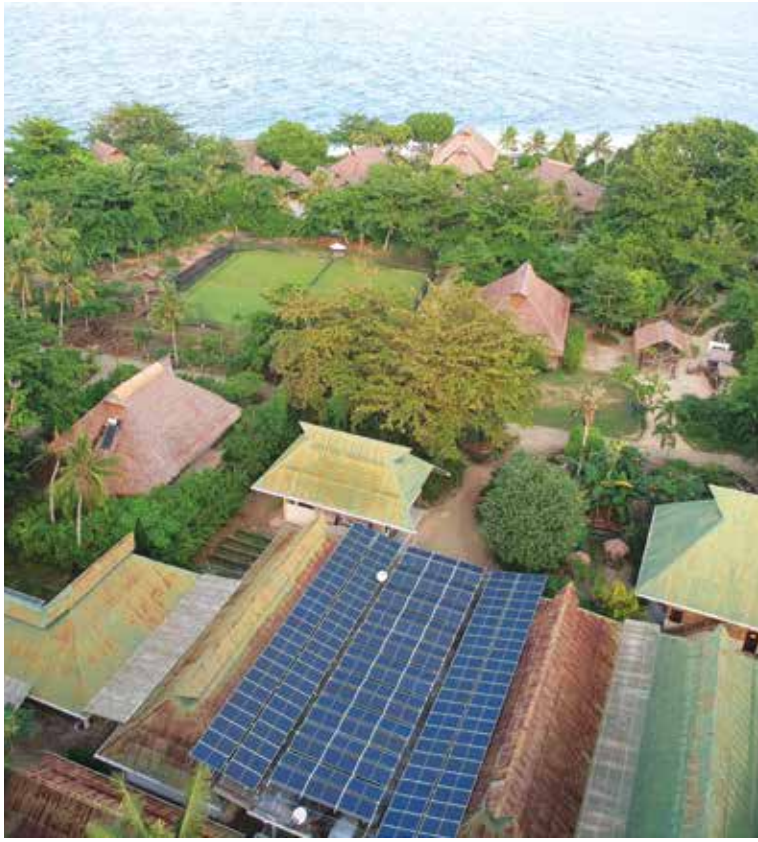
Power generation

Sembcorp Industries is a leading utilities company that has a global energy portfolio of more than 12,000MW. Its strong capabilities across the entire gas value chain – including importation, retail, regasification and gas-fired power generation – make it an ideal turnkey energy solution provider. It is versatile in meeting diverse customer needs, with its track record ranging from a 1,215MW gas-fired co-generation power plant in Singapore to 32 smaller, fast-ramping, gas-fired power generation assets across England and Wales.

Gas distribution

Gashub provides comprehensive piping, trading and distribution, on-site power generation and utility services to deliver clean and efficient energy solutions from liquefied natural gas (LNG). To date, Gashub has serviced over 3,000 commercial and industrial facilities with LNG-based solutions. Examples include supplying on-site electricity, hot water and steam for food processing factories in Singapore, as well as on-site power and cooling for a data centre in Malaysia.

Rural electrification and microgrids



Microgrids accord off-grid communities a reliable source of power while helping them reduce their reliance on diesel. (Photo courtesy of Canopy Power)

Canopy Power designs, builds and co-finances turnkey renewable energy microgrid solutions to deliver electricity to off-grid business and communities across Asia-Pacific. By integrating solar PV and other renewable energy sources with energy storage, Canopy Power's microgrids provide cheaper, cleaner and more reliable on-site power. This has allowed customers to reduce diesel consumption by up to 90%.

Bolstering renewable energy capacity

Renewable energy is essential for cities to meet global energy needs sustainably. As technology costs decrease and the need to mitigate climate change increases, more cities are incorporating renewables into their energy mix as they seek to diversify their energy sources. Over the years, Singapore firms have developed capabilities in areas such as solar project development, solar products and advanced PV panel technologies to increase our overall renewables capacity.

Solar projects

Energetix is a solar PV system design, engineering, procurement and construction (EPC) and installation specialist. To date, it has deployed over 100MWp of installations across Asia-Pacific. One of its key projects includes a partnership with Sembcorp to install a 2.77MWp solar PV system in Supply Chain City in Singapore utilising crystalline silicon panels and string inverter technologies.

Third Wave Power provides smart solar power solutions to off-grid consumers across Asia-Pacific and the United States of America. Its products include home lighting, charging and street lighting solutions, as well as cloud connected IoT solutions. Third Wave Power has won numerous awards for its innovative solutions, such as the 2018 ASEAN India Grand Challenge.

Photovoltaic (PV) panel technology

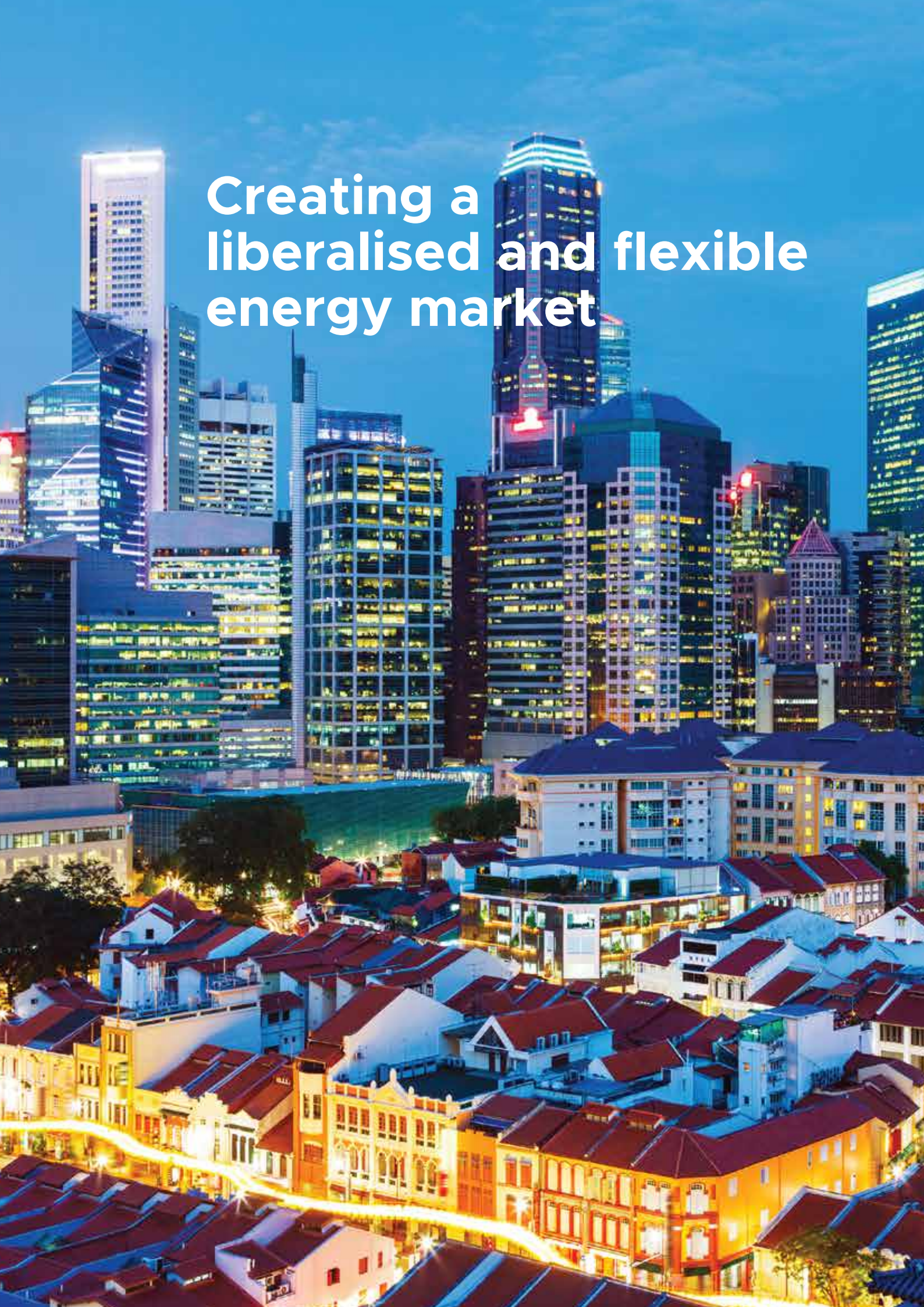
PvFoundry provides full turnkey solar PV design, advanced solar module technology licensing and manufacturing services. The company is actively building its project portfolio with clients from Singapore, Hong Kong and Sri Lanka. One of its recent projects includes the design of a 128kWp roof-mounted system with fixed racking for an educational institute in Negeri Sembilan, Malaysia.

Offshore wind

Keppel Offshore and Marine is a global player in building marine infrastructure. The company is applying its capabilities in offshore design, engineering and construction to develop solutions across the offshore wind value chain such as wind turbine foundations and substation platforms. It also provides installation and supports vessels services. Its wholly-owned subsidiary, Keppel FELS, has secured a contract from Ørsted, a Danish renewable energy company, for the detailed engineering, procurement, construction, testing and commissioning of two 600MW offshore wind farm substations.

There is rising demand for offshore wind as a renewable source of energy.

Creating a liberalised and flexible energy market



Singapore was the first country in Asia to liberalise its electricity market in 2003, allowing companies to buy and sell electricity on the open market. Today, Singapore consumers have the flexibility to purchase electricity from any authorised retailer of their choice. As cities around the world look towards liberalising their own electricity markets, we hope our experience in operating and administering an efficient and competitive market can help to spark change.

Electricity retailing

Energy Market Company (EMC) is an established and trusted name in the energy sector. Set up in 2003 to operate the wholesale market of the National Electricity Market of Singapore – Asia's first liberalised electricity market – EMC is recognised as both the pioneer and leader in competitive electricity markets across Asia. EMC currently provides training and consultancy services to those looking to liberalise electricity markets. These include power procurement, dispatch and exchange entities, as well as regulators, in the Middle East and China.

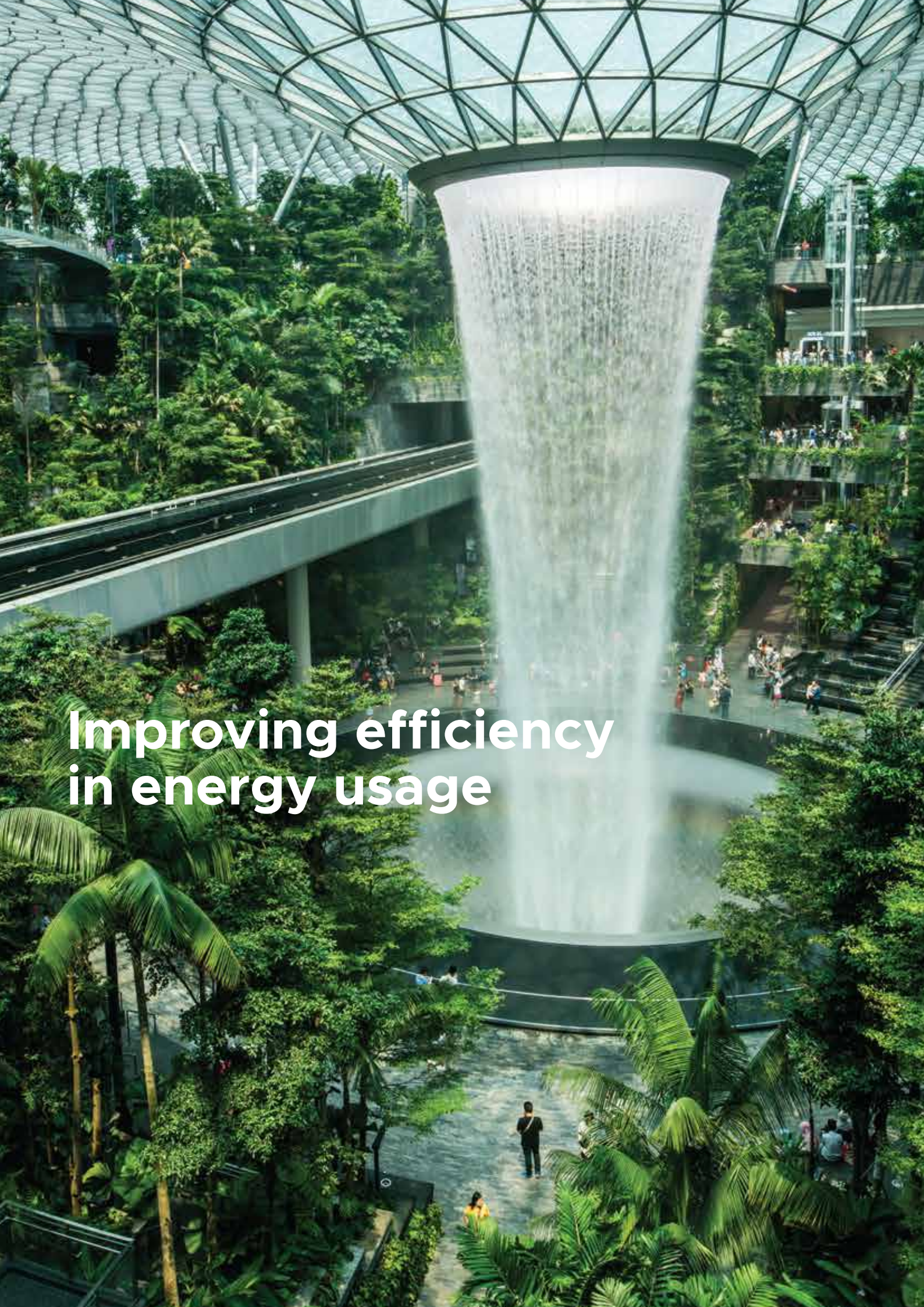
Electricity trading

Electrify has developed an innovative energy trading platform designed to enable peer-to-peer trades across the power grid. This empowers prosumers and consumers to directly transact energy trades with each other on a city grid-wide scale. To date, over 60GWh of electricity has been transacted via its marketplace. Electrify is active in Southeast Asia and gaining traction in developed markets such as Australia and Spain.

Demand response

Diamond Energy is the pioneer of demand side management in the National Electricity Market of Singapore. It has an initial registered capacity of 7.2MW – enough to meet the energy demand of approximately 18,100 three-room public housing units in Singapore. Beyond Singapore, Diamond Energy has implemented pilot demand response programmes in countries such as Vietnam and the United Arab Emirates. The company has also won several awards, the most recent being the 2017 Southeast Asia Demand Response Growth Excellence Leadership Award by Frost & Sullivan.

An open electricity market allows consumers to not just select their energy provider, but also energy source – from solar, to gas, to conventional fossil fuels.



Improving efficiency in energy usage

Energy-efficient industrial and building technologies can enable firms to enjoy more utility savings. On a district level, Singapore has unlocked economies of scale by operating the world's largest district cooling network. Solutions such as these can support energy-efficient industrial and commercial developments in your city.

District cooling services

Singapore District Cooling (SDC) operates the world's largest fully underground district cooling network. Its innovative urban utility service is recognised as one of Singapore's Top 50 Engineering Feats, and allows customers to enjoy energy savings of over 40%. SDC achieves this by aggregating energy and cooling needs, as well as optimising asset efficiency, to deliver cooling throughout the Marina Bay area in Singapore. SDC also provides combined cooling and heating service for Raffles City Chongqing in China.

Heating, ventilation and air-conditioning (HVAC) services

Kaer has over 70 years of experience in designing, building and operating air-conditioning & mechanical ventilation systems in Asia. In Singapore, Kaer pioneered the air-conditioning-as-a-service model, which allows building owners to decide the conditions they want in their space and simply pay as they use. Kaer has been able to deliver highly efficient air-conditioning systems by leveraging its proprietary artificial intelligence (AI) platform to optimise energy use. Kaer currently serves over 10 million square feet of space across Singapore, Malaysia and India.

Energy services

G-Energy Global is an energy service company offering integrated energy audit, EPC and management services. It also provides green building design consultancy services for clients looking to make their buildings more energy-efficient and sustainable. G-Energy has provided services for iconic projects in Singapore such as Jewel Changi Airport, Universal Studios Singapore and Resorts World Sentosa. It also redesigned the Chiller Plant System in Goodwood Park Hotel, enabling the hotel to achieve energy savings of 1.44GWh per year.
G-Energy has also undertaken industrial and commercial projects across Brunei, Cambodia, China, Indonesia, Malaysia, the Philippines and Vietnam.

Kaer's analytics systems have helped its customers increase their energy efficiency by up to 20%. (Photo courtesy of Kaer)

Creating future-ready energy solutions

Singapore companies have developed transformative digital technologies that improve how consumers and businesses alike use energy. These technologies include intelligent control and monitoring, storage and e-mobility solutions to enhance efficiency and support the transition towards distributed generation and renewables. These solutions are relevant to cities looking to develop their own future-ready smart city solutions.

Internet of Things (IoT), smart monitoring and control

Ampotech offers an energy monitoring and analysis IoT solution for site owners. The system comes with enhanced edge computing and security to meet the diverse needs of customers across various industries. In Singapore, it has achieved utility savings of 6% across the 15 sites it monitors. To date, it has deployed its solution in Australia, India and Indonesia.

AVA Asia provides 360° analytics for solar plant yield optimisation by combining SCADA, drone imagery and AI algorithms for fault detection and maintenance recommendations. It currently services over 300MW of solar PV systems across Southeast Asia.

AVA Asia's professionally trained pilots collect high-quality aerial data that is subsequently analysed for actionable insights.

Energy storage

Genplus designs, customises and manufactures energy storage systems for renewable energy, backup power, mission-critical assets and grid frequency regulation. Its extensive product offerings include advanced lithium-ion and lead-carbon energy storage systems, portable power generation sets and smart battery management systems. Genplus has delivered several notable projects across Southeast Asia, including a mission-critical high redundancy hybrid energy storage system for telecommunication towers in the Philippines.

Electric mobility

Xnergy Autonomous Power Technologies develops wireless, bi-directional and fast-charging solutions for electric vehicles and mobile robots. Its solutions are differentiated by their durability, speed and competitive prices. Xnergy is working with German semiconductor firm Infineon Technologies to co-develop solutions for its corporate headquarters in Asia-Pacific. It has also deployed its wireless Autonomous Guided Vehicle charging solution on the production floor of Singapore engineering company HOPE Technik.

Singapore Energy Companies

Power Generation and Distribution

Canopy Power
www.canopypower.com

Cyclect
www.cyclect.com.sg

Eastern Green Power
www.easterngreenpower.com

Enercon Asia
www.enercon-eng.com/enercon-singapore

Gashub
www.gashub.com.sg

SP Group
www.spgroup.com.sg

Sembcorp Industries
www.sembcorp.com

Renewables

Alpha Biofuels
www.alphabiofuels.sg

AVA Asia
www.avaasia.co

Bluefield Renewable Energy
www.bluefieldrenewable.com

Cleantech Solar
www.cleantechsolar.com

ecoWise
www.ecowise.com.sg

Eigen Energy
www.eigen.sg

Energetix
www.energetix.sg

Gashub
www.gashub.com.sg

Hann-Ocean Group
www.hann-ocean.com

Keppel Offshore
www.keppelom.com

Mako Energy
www.mako.energy

Mat Hydro
www.mathydro.com

Oceanpixel
www.oceanpixel.org

PvFoundry
www.pvfoundry.com

Rezeca Renewables
www.rezeca.com

Sembcorp Marine
www.sembmarine.com

Sobono Energy
www.sobono.com.sg

Sunseap
www.sunseap.com

The Blue Circle
www.thebluecircle.sg

Third Wave Power
www.thirdwavepower.com

Zaffra Solar
www.zaffrasolar.com

Electricity Retailing and Trading

Diamond Energy
www.diamond-electric.com.sg

Electrify
www.electrify.sg

Energy Market Company (EMC)
www.emcsg.com

Industrial and Building Efficiency

Actsys
www.actsys.com

Ampotech
www.ampotech.com

Anacle
www.anacle.com

Air T&D
www.airtd.com.sg

Barghest Building Performance
www.bbp.sg

BeeBryte
www.beebryte.com

Climate Resources Exchange
www.climateresources.net

Comfort Management
www.energyconservation.sg

En-trak
www.en-trak.com

Evercomm
www.evercomm.com.sg

G-Energy Global
www.genergy.com.sg

Green Koncepts
www.greenkoncepts.com

HVS Engineering
www.hvsglobal.com

Kaer
www.kaer.com

Keppel DHCS
www.keppeldhcs.com.sg

Primustech
www.primustech.com.sg

Qi Square
www.qisquare.sg

Red Dot Analytics
www.rda.ai

RESYNC Technologies
www.resynctech.com

S3 Innovate
www.s3innovate.com

SenSING
www.sensing.online

Shelton Group
www.sheltongrp.com

Singapore District Cooling (part of SP Group)
www.spgroup.com.sg

IoT, Storage and E-mobility

Ampotech
www.ampotech.com

AVA Asia
www.avaasia.co

Duralite Power
www.duralitepower.com

Durapower
www.durapowerbattery.com

e-Synergy
www.e-synergy.green

Energeia Group
www.energiagroup.com

Genplus
www.genplus.sg

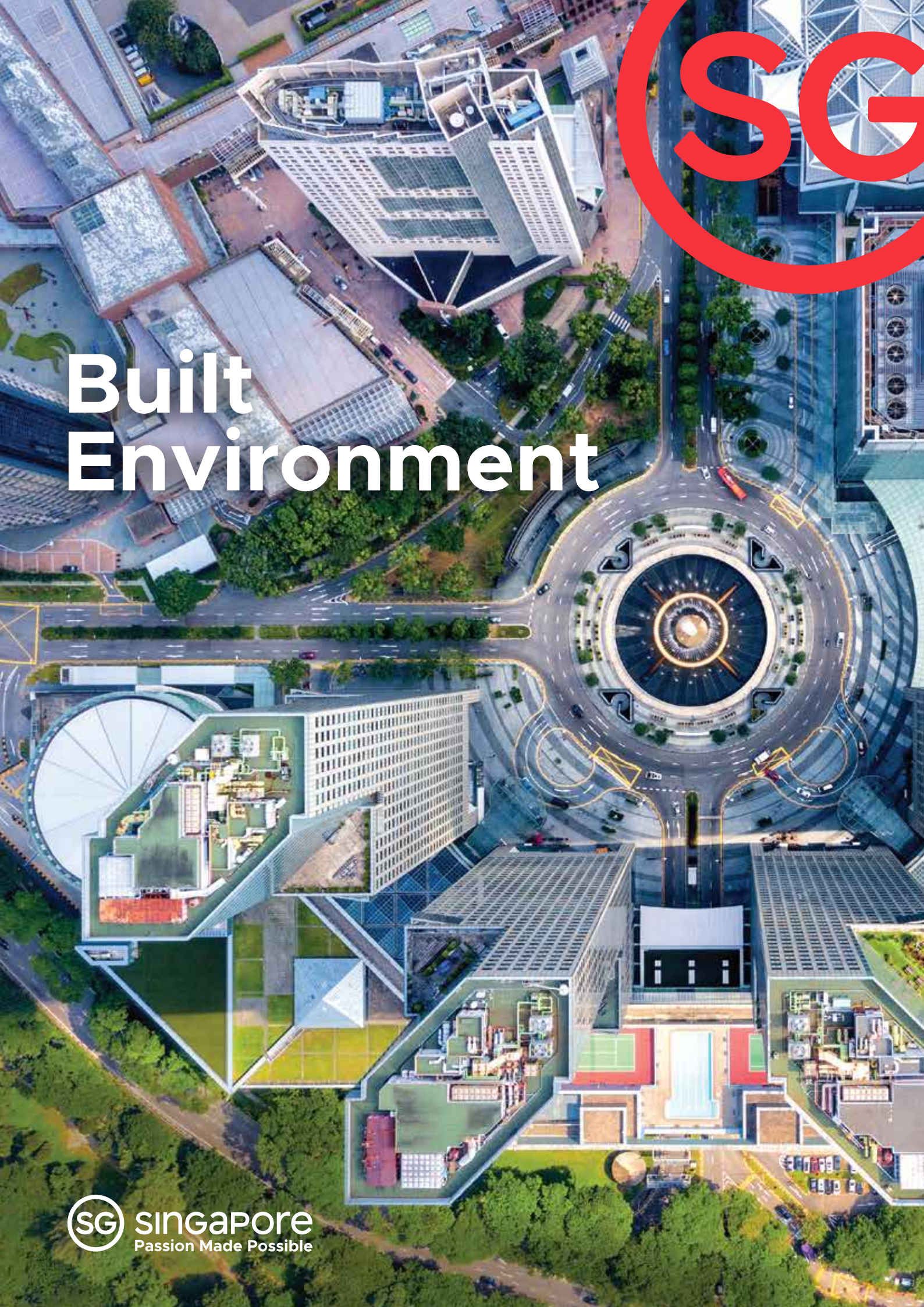
gridComm
www.gridcomm-plc.com

Illuminating Asia
www.illuminatingasia.com

Orient Technology
www.orient-technology.com.sg

Spectronik
www.spectronik.com

Xnergy Autonomous Power Technologies
www.xnergytech.com


Built
Environment
SG
SINGAPORE
Passion Made Possible

Singapore's population has more than tripled in just over 50 years from 1.7 million in the 1960s to 5.7 million today. With only 720 km^2 of land area, Singapore may be among the densest cities in the world but remains a vibrant city where one can work, play and live in. This is largely due to the capabilities Singapore has developed to optimise scarce land resources in a progressive and sustainable manner. Such capabilities that Singapore companies have built up can contribute to sustainable urban development not just in Singapore but across the world.

Planning and designing for sustainable development

- Master planning
- Architectural and design services

Building and rejuvenating essential infrastructure

- Public housing
- Road and rail
- Infrastructure renewal and rejuvenation

Enhancing construction capabilities through technology

- Advanced construction methods
- Digital construction solutions
- Sustainable building materials

Developing infrastructure to support economic growth

- Township and industrial park development
- Integrated mixed development
- Hospitality infrastructure

Future-proofing cities through smart solutions

- Smart city solutions
- Property technologies
- Resilience technologies for aging infrastructure

Planning and designing for sustainable development

Singapore's experience in sustainable urban development – as we transformed from a city with low liveability in the 1960s to a high-density metropolis today – can prove useful to cities with increasing populations and limited resources today. Our land constraints have necessitated Singapore companies to develop strong capabilities in urban planning and architectural design to optimise land use. These capabilities are relevant for cities seeking long-term development plans.

Master planning

Surbana Jurong is a global urban, infrastructure and management services consulting firm with projects across over 40 countries. It is instrumental in developing Singapore's urban, industrial and infrastructure landscape, having designed over one million homes and planned the sustainable development of industrial clusters such as Jurong Island. It works closely alongside its member companies such as AETOS, B+H, KTP, Robert Bird Group, SAA, Sino-Sun and SMEC to provide comprehensive sustainable solutions for cities around the world.

Architectural and design services

WOHA is a design firm widely recognised for its integration of environmental and social principles at every stage of the design process. Its portfolio of projects in Singapore includes Kampung Admiralty, Punggol Digital District, Oasia Hotel Downtown and School of The Arts.

DP Architects is a local architecture firm which has played an active role in shaping Singapore's landscape. It was the architect behind iconic projects such as Esplanade – Theatres on the Bay, SEA Aquarium, and Singapore Flyer.

RSP Architects Planners & Engineers provides a wide range of services for town and master planning, urban design, architecture, engineering and interior design. Its latest project, Jewel Changi Airport, is home to the world's tallest indoor waterfall.

WOHA's architectural philosophy involves the fusion of contemporary ideas, local culture and sound environmental principles. (Photo courtesy of WOHA)

Building and rejuvenating essential infrastructure

From the 1960s to 1980s, Singapore faced issues such as overcrowding in the city, housing shortages and a lack of public infrastructure. To address these, the government developed Singapore's first Concept Plan in 1971 to serve as a framework for land use, infrastructure development and transport links. The plan involved the development of high-density satellite towns which would house various amenities such as schools, shops, markets and other community spaces within their respective areas. This, coupled with the pressing need to quickly develop one million safe, comfortable and modern public housing units, catalysed the growth of local civil engineering and construction companies, and subsequently the development of a robust built environment ecosystem.
Today, Singapore companies draw on their experience to build new infrastructure and rejuvenate ageing ones, ensuring cities around the world continue to remain sustainable and well-prepared for the future.

Public housing

Tiong Seng, a company listed on the Singapore Stock Exchange, has developed capabilities in modular construction using advanced precast solutions. These solutions can be deployed for both affordable and premium housing. In 2018, it completed the installation of seven five-storey residential blocks in Yangon, Myanmar using modular construction in just 24 days – 40% less time than conventional methods. Some of Tiong Seng's notable projects in Singapore include Resorts World Sentosa, Punggol Waterway Terraces I & II, as well as luxury hotel Capella Singapore.

Chip Eng Seng is one of Singapore's most established property and construction companies. It specialises in residential projects such as the iconic 50-storey Pinnacle@Duxton, which features the world's longest sky gardens. Chip Eng Seng's recent property development projects also include High Park Residences in Singapore and Williamson Estate in Melbourne, Australia.

Road and rail

Samwoh is a civil construction company with a track record of innovative and sustainable solutions. It has delivered numerous connecting infrastructure projects in Singapore such as airport runways, F1 race tracks and various road networks, including an eco-link across a major expressway in Singapore to ensure local wildlife can cross safely.
Its overseas clients include foreign road infrastructure authorities and the international airports of Kuala Lumpur, Hong Kong, Brussels, Amsterdam and Kraków.

Utracon is a structural engineering and post-tensioning specialist with experience in both building and civil engineering sectors. They are well-versed in various bridge construction methodologies and have working experience across Asia and Africa. Some of Utracon's projects include Marina Bayfront Bridge and Marina Bay Financial Centre in Singapore, Permata Hijau Flyover in Indonesia and Jinja Bridge in Uganda.

Infrastructure renewal and rejuvenation

Keong Hong is a building construction company that offers solutions for retrofitting and redevelopment works in high-density areas. Some of its projects in Singapore include the Raffles Hospital Extension, alteration and extension works for the Singapore Institute of Management, and fitting out works at Fuji Xerox Towers in Singapore.

Enhancing construction capabilities through technology

As is the case with many countries, the construction industry in Singapore faces challenges such as a lack of manpower, tight project deadlines, and increasing demand for more environmentally sustainable solutions. In response, Singapore's construction companies have leveraged technology to develop innovative solutions that can be deployed both domestically and globally.

Advanced construction methods

NuForm System Asia is an established manufacturer and provider of system formwork solutions for buildings and infrastructure projects. NuForm's priority is to arm their clients with a competitive edge through providing them with safe, innovative and productive system formwork solutions in the construction of quality buildings and infrastructure works. Nuform's formwork has been adopted in various projects such as CapitaSpring, a 280-metre skyscraper in Singapore's Central Business District.

Kimly Construction, a main contractor in building projects, has been shaping Singapore's landscape through quality construction projects since 1965. One of its recent projects involved using Mass Engineered Timber (MET) to build Eunoia Junior College. This allowed for a safer, smoother and higher quality installation overall. Some of Kimly Construction's other projects in Singapore include Changi Medical Centre, Yishun Hospital, and NUS Alumni House.

Digital construction solutions

Hubble is a Singapore startup that develops digital modules for the construction industry. Its solutions help clients to monitor construction processes and analyse data in real-time, thereby enabling them to optimise operations according to varying conditions. Some of Hubble's solutions include tools for effective manpower tracking and deployment, as well as programmes for preventive defects management. Hubble counts Koh Kock Leong Enterprise, Woh Hup, and Chuan Lim Construction among its clients.

Sustainable building materials

Samwoh operates across the entire construction value chain. It has its own production facilities, and is equipped with both logistics and engineering expertise that allows it to deliver the full suite of construction services. These include supplying building materials, recycling construction waste, designing and constructing transport infrastructure, as well as pipeline jacking and performing deep excavations. It invests significantly in research to develop new construction materials and technologies, and plays an active role in greening Singapore's construction industry. Samwoh's clients include Singapore government agencies such as the Urban Redevelopment Authority, Land Transport Authority, PUB and JTC Corporation, as well as many private main contractors.

Pan-United Corporation is Singapore's largest concrete producer, and the local industry leader in sustainable concrete innovation. It has developed many proven specialised solutions for large-scale infrastructure development, such as structural green concrete made from recycled raw materials, structural lightweight concrete and underwater concrete. Some of Pan-United's projects in Singapore include Tanjong Pagar Centre, Jewel Changi Airport and Changi Airport Terminal 3. It also has a strong overseas track record, having provided materials for Landmark 81 and Saigon Centre in Ho Chi Minh City, Vietnam, the Mass Rapid Transit system in Kuala Lumpur, Malaysia, and MMHE Dry Dock in Johor, Malaysia.

Developing infrastructure to support economic growth

Over the years, Singapore has developed many industry clusters and commercial developments to attract investments and create good jobs. One such zone is one-North (see image on left page), a business park dedicated to research, innovation and test-bedding. The 200-hectare development is home to both multinational firms and start-ups in key growth sectors such as biomedical sciences and info-communications technology and media. The park also houses firms with complementary capabilities such as scientific research and engineering. This creates a fertile ecosystem conducive for cross-collaboration. Singapore firms have drawn on their experience to export their capabilities in designing, developing and operating such industrial parks to cities around the world.

Township and industrial park development

Keppel Corporation is a multi-business company providing solutions for sustainable urbanisation to meet the world's needs for energy, clean environments, quality real estate and connectivity. It has a strong track in masterplanning and developing large-scale integrated developments. Keppel was appointed leader to the Singapore consortium for the development of the China-Singapore Suzhou Industrial Park and the Sino-Singapore Tianjin Eco-City in China. Keppel Urban Solutions is collaborating with Keppel Land to develop the 64-hectare Saigon Sports City in Ho Chi Minh City, Vietnam.

CapitaLand has a portfolio of diverse real estate classes across 200 cities in over 20 countries. Its assets include business parks, industrial and logistics, integrated development, urban development, commercial and retail, as well as lodging and residential. It is one of the largest developers of business parks and industrial spaces in Asia-Pacific, with properties spanning across Singapore, China, India, Malaysia and Vietnam. CapitaLand also participates in large-scale township projects, such as the China-Singapore Guangzhou Knowledge City – a vibrant and sustainable city attractive to both knowledge-based companies and professionals.

Sembcorp Development has over 25 years of experience in industrial park development – both in Singapore and around the world. Some of its notable projects include the Vietnam-Singapore Industrial Park, Singapore-Sichuan Hi-Tech Innovation Park, Wuxi-Singapore Industrial Park and Sino-Singapore Nanjing Eco Hi-Tech Island in China and Kendal Industrial Park in Indonesia.

Integrated mixed developments

CapitaLand has established a strong track record in the commercial and retail real estate sector. Raffles City is its signature brand of integrated developments, and the first Raffles City opened in Singapore in 1986. Today, there are eight other Raffles City developments across major cities in China such as Beijing, Shanghai, Chengdu, Hangzhou, Ningbo, Shenzhen and Chongqing. Raffles City Chongqing is Singapore's largest single development in China.

Mapletree manages a portfolio of real estate development, investment, capital and property. It is present across 12 countries in Asia-Pacific, the United States, and Europe. Some of its projects include Mapletree Business Park in Singapore, Mapletree Ningbo Mixed Use Development in China, as well as Pacific Place in Vietnam.

Hospitality infrastructure

The Ascott Limited is among the world's leading international lodging owner-operators. Ascott's portfolio spans more than 170 cities across over 30 countries in Asia-Pacific, Central Asia, Europe, the Middle East, Africa and the United States. Ascott has more than 100,000 units across 700 properties, of which approximately 64,000 units are in operation and 45,000 units are under development. Some of Ascott's serviced residence and hotel brands include Citadines, Somerset, Quest, The Crest Collection, lyf, Préférence, Vertu, Harris, Fox, Yello and POP!.

Far East Hospitality is an international hospitality owner-operator with a diverse portfolio of nine unique yet complementary brands – Oasia, Quincy, Rendezvous, Village, Far East Collection, Adina Hotels, Vibe Hotels, Travelodge Hotels, Vibe Hotels and TFE Hotels Collection. Far East Hospitality's combined portfolio consists of over 95 hotels and services residences in seven countries – Australia, Denmark, Germany, Hungary, Malaysia, New Zealand and Singapore.

Future-proofing cities through smart solutions

Singapore has built itself into one of the most liveable cities by adopting a forward-looking approach. To further future-proof the city, Singapore built environment and infrastructure companies are investing significantly in solutions that enable cities to be well-planned, managed, connected, accessible, sustainable and safe.

Smart city solutions

Eutech Cybernetic provides digital solutions for smart cities. Its proprietary cloud solution – iviva – provides a BIM-enabled Integrated Digital Delivery platform. The platform delivers a digital twin of the physical asset that better allows for smart operations and maintenance, thereby reducing operational costs by up to 30%.
Some of Eutech Cybernetic's references include International Towers in Sydney, Dubai Festival City in the United Arab Emirates, and Malta Airport.

Surbana Jurong offers integrated smart city solutions that focus on the security, sustainability, efficiency, and community aspects of a city. Surbana Jurong leverages its strong planning capabilities to sharpen the perspectives of city planners and developers through smart solutions, thereby empowering cities to be future-ready. It also co-developed cloud-based “Smart City in a Box” solutions with Microsoft. Smart city projects undertaken by Surbana Juong include Guangming Smart City in Shenzhen, China, and Maharashtra Orange Smart City in India.

Property technologies

Smarten Spaces is a property technology firm transforming places of work and leisure. It uses artificial intelligence (AI) and Internet of Things (IoT) technologies to create smart and sustainable solutions for real estate developers and enterprises. These allow the company to offer next-generation spaces that improve productivity, reduce operational costs and ultimately enhance convenience for end users. Smarten Spaces' clients include CapitaLand, Oberoi Realty and Siemens.

Resilience technologies for ageing infrastructure

Wavescan offers non-destructive testing scanners that detect internal defects – sub-surface and structural – of ageing infrastructure through microwave and mm-wave technology. The company also incorporates AI in its data analysis for predictive maintenance. Besides projects in Singapore, Wavescan has also secured piloting partnerships with France's VINCI Group for projects in the Netherlands and Germany.

Franzwood is a consultancy firm that provides a full suite of diagnostic services for infrastructure. It can identify abnormalities within a structure and recommend conservation and restoration techniques accordingly. Some of its projects in Singapore include The Fullerton Heritage and St Joseph's Church. It has also provided services for the Old Burma Railway Headquarters in Myanmar.

Future of construction

Teambuild, a progressive multi-disciplinary group experienced in developing residential, institutional and industrial projects, has been investing extensively into 3D prefabrication and exploring new technologies at its automated precast plant in Singapore. One of its recent projects, The Brownstone Condominium,
was the first large-scale private residential development in Asia to utilise 3D prefabrication.

Soilbuild is an integrated property group in the construction and development sector. The company is automating the assembly of 2D precast panels into 3D, thereby replacing the need for expensive 3D moulds while maintaining efficiency. Their projects include Solaris and Bedok Food City in Singapore, and Parasol Shopping Centre in Myanmar.

Sembcorp Design & Construction is a design and build construction firm with a wide array of capabilities. Some of its projects in Singapore include work on the Thomson-East Coast Line, office buildings, accommodation for the National University of Singapore, as well as Changi Water Reclamation Plant C22A. The company has developed the capability to 3D-print structures using recycled products such as fly ash – all within a day. This makes its products more sustainable, and also saves time and manpower.

Singapore Built Environment Companies

Urban Planners, Designers and Architects

DP Architects
www.dpa.com.sg

Meinhardt
www.meinhardt.com.sg

Morrow Architects & Planners
www.morrow.sg

RSP Architects Planners & Engineers
www.rsp.com.sg

SCDA
www.scdaarchitects.com

Surbana Jurong
www.surbanajurong.com

WOHA
www.woha.net

Infrastructure Development and Rejuvenation

Boustead
www.boustead.sg

Chip Eng Seng
www.chipengseng.com.sg

Keong Hong
www.keonghong.com

Koh Brothers
www.kohbrothers.com

Lee Kim Tah
www.leekimtah.com

Lum Chang
www.lumchang.com.sg

Prime Structures
www.primestructures.com.sg

Samwoh
www.samwoh.com.sg

Seiko Architectural Wall Systems
www.seikowall.com

Sembcorp Design & Construction
www.sembcorpdc.com

Soilbuild
www.soilbuild.com

T T J Holdings
www.ttj.com.sg

Teambuild
www.teambuild.com.sg

Tiong Seng
www.tiongseng.com.sg

Utracon
www.utracon.com

Yongnam
www.yongnam.com.sg

Construction Technologies

Big Tiny
www.bigtiny.com.sg

Elid Technology
www.elid.net

Erect Group
www.erectgroup.com

Expand Group
www.expandgroup.com.sg

Hubble
www.hubble.sg

Kimly Construction
www.kimly.com.sg

Novade
www.novade.net

Nuform System Asia
www.nuform.com.sg

Pan-United Corporation
www.panunited.com.sg

Samwoh
www.samwoh.com.sg

Struts Building Technology
www.struts.com.sg

Woh Hup
www.wohhup.com

Infrastructure to Support Economic Growth

Amara Hotels & Resorts
www.amarahotels.com

Ariva Hospitality
www.stayariva.com

Ascendas-Singbridge
www.ascendas-singbridge.com

Banyan Tree
www.banyantree.com

CapitaLand
www.capitaland.com.sg

Far East Hospitality
www.stayfareast.com

Furama Hotels
www.furama.com

Keppel Corporation
www.kepcorp.com

Mapletree
www.mapletree.com.sg

Millennium & Copthorne Hotels
www.millenniumhotels.com

Pan Pacific
www.panpacific.com

Santa United
www.santa.com.sg

Sembcorp Development
www.sembcorp.com

The Ascott Limited
www.the-ascott.com

Future-proof Smart Infrastructure Solutions

CBM
www.cbm.com.sg

Centurion Corporation
www.centurioncorp.com.sg

Eutech Cybernetic
www.ecyber.com

G Element
www.gelement.com

Franzwood
www.franzwood.com

LHN Group
www.lhngroup.com

OrangeTee
www.orangetee.com

Sembcorp Design & Construction
www.sembcorpdc.com

Smarten Spaces
www.smartenspaces.com

Surbana Jurong
www.surbanajurong.com

Teambuild
www.teambuild.com.sg

Wavescan
www.wavescan.sg


SG
Environmental Services
SG SINGAPORE
Passion Made Possible

Environmental services serve as the backbone for societal development. As a newly independent country in the 1960s, Singapore grappled with issues such as pollution and unsanitary living conditions, prompting a concerted effort from the public and private sectors to clean the city up. Today, Singapore is a clean and green garden in a city, while Singapore companies are recognised for their expertise in the environmental solutions sector. Here are some of the solutions our companies offer.

Tackling pollution and waste

- Waste collection
- Materials recovery and waste treatment

Overcoming land constraints for waste disposal

- Offshore landfills
- Multi-storey recycling facilities

Creating a clean and pleasant living environment

- Pneumatic waste collection systems
- Landscaping and greenery services

Supporting the circular economy

- Waste-to-energy
- Value recovery from organic waste
- Plastics and wood recycling

Building future-ready environmental solutions

- Smart solutions
- Cleaning robotics

Tackling pollution and waste

Photo courtesy of NSL OilChem

Reliable waste collection, recovery and disposal services are essential to a city's liveability. These service providers are often the unsung heroes that enable a city to run smoothly. Singapore companies have developed strong track records for providing comprehensive waste collection services that ensure the safe, timely, and responsible collection and disposal of waste.

Public waste collection

800 Super is one of the four licensed public waste collectors appointed by the National Environment Agency in Singapore. It currently serves one third of the municipal waste collection sectors in Singapore, which comprises about 245,000 households. To complement its waste collection services, 800 Super also operates an integrated facility, which helps to enhance Singapore's recycling rate.

General waste collection

V8 Environmental provides general waste management services for the construction, industrial and commercial sectors. The company also focuses on materials recovery and recycling, and has invested significantly in innovative waste management technologies such as a robotic waste separation system in its materials recovery facility – a first in Singapore.

Wah & Hua is one of the largest general waste collectors in Singapore, and provides waste management and multi-material recycling services in the industrial and commercial space. Wah & Hua has established recycling capabilities and operates its own material recovery facility. The company is also in the midst of building up further capabilities such as a one-stop zero-waste facility that provides automated sorting and waste-to-energy solutions.

Industrial waste collection

NSL OilChem, an integrated industrial waste management company, collects and treats industrial and hazardous waste in compliance with stringent environmental, health and safety regulations. It has also developed downstream treatment capabilities – it operates Singapore's only onshore plant that treats, recycles and disposes of oily waste from the marine and oil & gas sectors. It also opened its Industrial Wastewater Treatment Complex in July 2019 to meet growing demand for treating challenging trade effluents.

NSL OilChem treats industrial and hazardous waste in compliance with stringent regulations. (Photo courtesy of NSL OilChem)

Overcoming land constraints for waste disposal

Photo courtesy of Marina Technology & Construction

Cities often face competing uses for land, and Singapore is no exception. Our small land area of 720 km^2 means our companies have had to engineer novel solutions to meet our waste disposal needs.

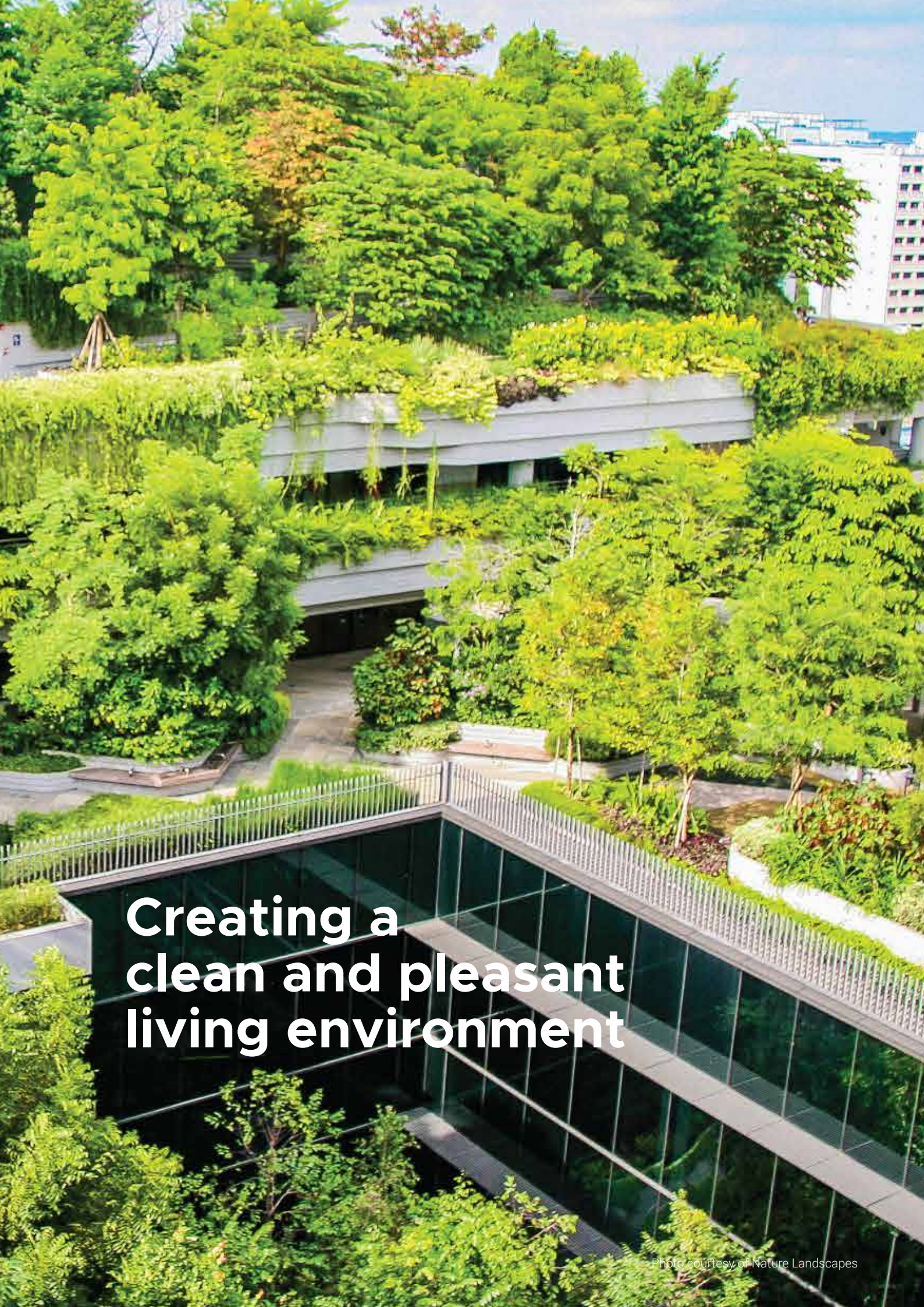
Offshore landfills

Marina Technology & Construction is a Singapore company with expertise in the design and civil engineering of offshore structures. One of its flagship projects is the Semakau Landfill – the world's first man-made offshore landfill – just off the coast of Singapore. The landfill incorporates innovative technical solutions such as the use of a floating platform to mitigate the risks of waste sliding that come with the uneven seabed.

Multi-storey recycling facilities

Boustead Projects possesses core engineering expertise in the design-and-build and development of smart eco-sustainable industrial facilities. One of its latest projects is the Multi-Storey Recycling Facility in Singapore. Estimated to be completed by 2021, the land-efficient facility is projected to receive the Green Mark Platinum rating, the highest eco-sustainability rating under Singapore's Building and Construction Authority's Green Mark programme.

Marina Technology & Construction has experience in developing floating pontoons and other maritime structures. (Photo courtesy of Marina Technology & Construction)



Creating a clean and pleasant living environment

Photo courtesy of Nature Landscapes

The environment has a profound effect on one's mental and physical well-being. Environmental management and greening services are key to maintaining a clean and pleasant living environment, thereby allowing citizens to go about their daily lives in comfort.

Pneumatic waste collection systems

PV Vacuum provides pneumatic waste conveyance system (PWCS) solutions, which use an underground pipe network to transport waste from various disposal points to a centralised bin centre. PV Vacuum was contracted by Singapore's Housing & Development Board to design, supply, install and maintain district-level PWCS for centralised municipal waste collection. The system will feature in newer housing districts such as Sengkang, Tengah and Bidadari. It will also be retrofitted in older existing estates such as Teck Ghee. PV Vacuum's PWCS complies with industry standards such as the SS 642 – the world's first standard on PWCS that guides developers, consultants, designers, engineers, architects and service providers in implementing, operating and maintaining such systems.

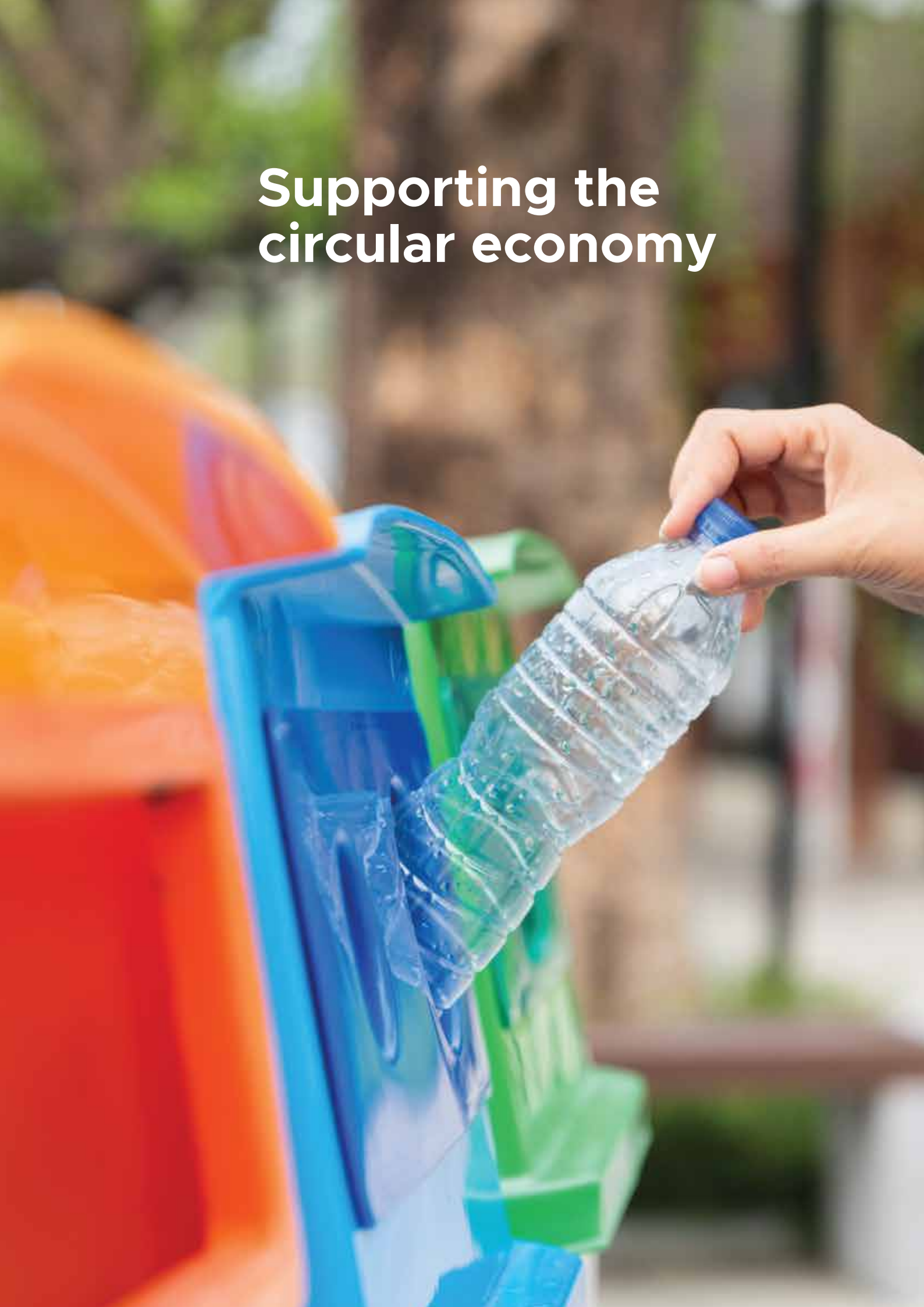
PV Vacuum transports waste safely and efficiently to a centralised bin centre using its PWCS solutions. (Photo courtesy of PV Vacuum)

Landscaping and greenery services

Nature Landscape's greening efforts have made Kampung Admiralty a next-generation community suitable for people of all ages. (Photo courtesy of Nature Landscapes)

Nature Landscapes is an award-winning landscaping company that implements and maintains landscape designs across a wide range of developments. One of its landmark projects is on display at Kampung Admiralty – a one-stop integrated housing complex which won the World Building of the Year in 2018. The project saw Nature Landscapes plant over 600 trees and 80,000 shrubs, as well as implement a water system that allows rainwater to be harvested, cleansed and recycled for irrigation and water display features.

Supporting the circular economy



Singapore strives to be a Zero Waste nation, and is adopting a circular economy approach to close the waste loop. A large part of this involves reusing and recycling materials via effective waste-to-resource solutions, thereby giving used resources a second lease of life.

Waste-to-energy

Keppel Seghers, a subsidiary of Keppel Corporation, provides technologies for the treatment of municipal solid waste. It developed the Doha North Sewage Treatment Works, which was the first integrated waste management facility to be built in the Middle East. Located in Qatar, the plant handles and treats domestic solid waste for the whole country. To date, Keppel Seghers has delivered 100 waste-to-energy projects in close to 20 countries worldwide.

Alpha Grace Enviro-tech (AGE) is a Singapore start-up that uses its proprietary Alpha Magnetic Plasma (AMP) system, a plasma assisted technology, to convert municipal and organic waste into concentrated recyclable ash. The output from AGE's AMP system can be re-used for road and building construction or as organic compost for landscaping and planting. The AMP system can also process hazardous bio-medical waste and recover precious metals from electronic waste. The system is mobile, compact and does not emit any toxic fumes or odour.

LHT harnesses technology and automation to ensure its products are consistent in colour, texture and density. (Photo courtesy of LHT)

Value recovery from organic waste

Biomax is a company that can turn organic waste into fertiliser using its rapid thermophilic digestion technology. Biomax's system digests food waste into high nutrient fertiliser at high temperatures within 24 hours. Besides working with hotels and schools in Singapore, Biomax also runs a 15 tons per day (tpd) treatment plant that serves the Frew Group Abattoir in Australia.

Biomax turns organic waste into fertiliser using its rapid thermophilic digestion technology. (Photo courtesy of Biomax)

Plastics and wood recycling

LHT runs Singapore's first waste wood recycling plant that turns timber industrial waste into compressed engineered wood. This engineered wood can then act as a substitute for natural wood, ensuring the original timber gets a new lease of life. Separately, the company has also developed a series of environmentally-friendly products made from waste wood materials. One example is its recycled wood-plastic composite pallet – developed in collaboration with the Singapore Institute of Manufacturing Technology – which serves as a price-competitive alternative to both existing plastic and wood options.

Building future-ready environmental solutions

Singapore companies have adopted technologies such as robotics and artificial intelligence (AI) to deliver more efficient services at scale. These solutions can be easily deployed to support the development of smart and sustainable cities.

Smart compactors

Sin Lian Seng Engineering Services specialises in manufacturing equipment for waste management. One of its solutions is a waste compactor with an on-demand waste collection function. With its 24/7 weight, safety and fault monitoring system, the compactor allows operators to monitor and react to its usage to manage waste more efficiently. The machine is also designed with a high compacting ratio to reduce the amount of space needed in a bin centre. Both portable and stationary versions are available.

Smart facilities management

Advancer Smart Technology, part of Advancer Global, is an integrated smart facility management solutions provider. The firm harnesses its extensive experience in cleaning, security and property management to integrate various building services within a single platform to improve efficiency and communication. For instance, it has developed a smart toilet system that tracks usage patterns, thereby allowing for cleaning-on-demand operations that increase efficiency by 30%.

Cleaning robotics

Chye Thiam Maintenance is one of Singapore's pioneering firms in the environmental sector, and has been providing a full suite of cleaning and waste management services since 1979. It is known for incorporating innovative technologies in its solutions to deliver additional value to its customers. For instance, Chye Thiam has collaborated with robotics company, Lionsbot, to develop a series of autonomous robots with specialised cleaning functions. These cleaning robots leverage AI to optimise their cleaning schedules and enable Chye Thiam to deliver efficient cleaning services to customers.

Sin Lian Seng Engineering Services' equipment is used in residential, industrial and public areas. (Photo courtesy of Sin Lian Seng)

Singapore Environmental Solutions Companies

Waste Collection

800 Super
www.800super.com.sg

Colex Environmental
www.colex.com.sg

NSL OilChem
www.nsloilchem.com.sg

PV Vacuum
www.pvsin.sg

SembWaste
www.sembcorp.com

TEE Infrastructure
www.teeinfra.com

V8 Environmental
www.v8.com.sg

Wah & Hua
www.wahhua.com

Engineered Solutions for Efficient Waste Management

Boustead Projects
www.bousteadprojects.com

Keppel
www.kepcorp.com

Marina Technology & Construction
www.marinatechnology.com

Quek & Quek Civil Engineering
www.qqcepl.com

Sanli M&E Engineering
www.sanli.com.sg

Landscaping and Greenery Services

Elmich
www.elmich.com

Mao Sheng Quanji Construction
www.maosheng.com.sg

Nature Landscapes
www.naturelandscapes.com

Uniseal
www.uniseal.com.sg

Waste-to-resource Solutions

Alpha Grace Enviro-tech
www.age.com.sg

Biomax
www.biomaxgreen.com

Boustead Projects
www.bousteadprojects.com

Chevon International
www.chevon.com.sg

EcoWise
www.ecowise.com.sg

Enerprof
www.enerprof.com.sg

Keppel Seghers
www.keppelseghers.com

LHT Holdings
www.lht.com.sg

Insectta
www.insectta.com

RWDC Industries
www.rwdc-industries.com

Sen Yue Holdings
www.senyueholdings.com

Sobono Energy
www.sobono.com.sg

UglyGood
www.uglygood.com.sg

Westcom Solutions
www.westcomsolutions.com

Zerowaste Asia
www.zerowasteasia.com

Robotics and Smart Solutions

Advancer Smart Technology
www.advancer.sg

Chye Thiam Maintenance
www.chyethiam.com

Globotix
www.globotix.sg

IFSC
www.ifsc.sg

Lionsbot
www.lionsbot.com

Otto Waste Systems Singapore
www.ottoasiapac.com

Red Dot Robotics
www.reddotrobotics.com

Sin Lian Seng Engineering Services
www.sls-es.com

WIS Holdings
www.wisholdings.com.sg

Enterprise Singapore

About Enterprise Singapore

Enterprise Singapore is the Singapore government agency championing enterprise development. We also support the growth of Singapore as a hub for global trading and startups.

We attract global commodities traders to establish their global or Asian home base in Singapore. Today, Singapore is a leading global trading hub with a complete ecosystem for the energy, agri-commodities and metals & minerals trading clusters. We are also home to many global enterprises, startups and investors that operate in Singapore's robust pro-enterprise environment.

We build trust in Singapore's products and services through quality and standards. Renowned for our dedication to quality and innovation, Singapore companies make ideal business partners.

With our global network in over 35 locations spanning many developed and emerging markets, we connect businesses with relevant Singapore companies for their business expansion.

Visit **www.enterprisesg.gov.sg** for more information.

Supported by

Enterprise Singapore

CENTRE for LiveableCities SINGAPORE

230 Victoria Street #10-00
Bugis Junction Office Tower
Singapore 188024

1 Fusionopolis Walk #01-02
South Tower, Solaris
Singapore 138628

www.enterprisesg.gov.sg

45 Maxwell Road #07-01
The URA Centre
Singapore 069118

www.clc.gov.sg