



2021

**SUSTAINABILITY AT
PSA SINGAPORE**

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○ ABOUT THIS REPORT

Sustainability is a Cornerstone of our Business Strategy

This is PSA Corporation Limited (PSA SG)'s 5th update on our sustainability journey using the GRI Standards as a guidance. Today, 80% of N100 companies worldwide report on sustainability, with the Global Reporting Initiative (GRI) being the most adopted global standard for sustainability reporting.

The N100 refers to a worldwide sample of 5,200 companies. It comprises the top 100 companies by revenue in each of the 52 countries and jurisdictions researched in a KPMG report. When it comes to the largest corporations, it increases to 90%.

In Singapore, the Singapore Exchange (SGX) requires listed companies to provide sustainability reporting. Although sustainability reporting is not mandatory for PSA SG, we have opted to do so for good corporate governance and to signal our steadfast commitment to sustainability.

In this 5th iteration, we continue to scale and extend our coverage to more material aspects. This report is based on our financial year from 1 January to 31 December 2021. The report continues to cover the 3 areas of Environment, Social and Governance (ESG) in PSA SG sustainability framework.

The data in this report has undergone rigorous internal review. We will review the incorporation of external assurance in the future.

For feedback, you can reach us at
sg.psa.contact@globalpsa.com

REGIONAL CEO SOUTHEAST ASIA'S MESSAGE



Dear Stakeholders,

This is PSA Singapore's fifth update on our sustainability journey.

2021 will be remembered as the year when the world continues to battle Covid-19 for the second year as we transit to the endemic phase. With higher vaccination rates, countries are relaxing measures as we progressively return to normalcy and learn to live with Covid-19. In addition, the widespread supply chain disruptions and geopolitical tensions add to a challenging business environment.

Against this backdrop, PSA SG continues to focus on saving lives, sustaining livelihoods and securing our future. As an

essential business, PSA SG is responsible to ensure the port remains operational, supply chains remain open and our staff stay safe and healthy, both physically and mentally.

The global pandemic tested our resolve. But with the strong support from our staff, Unions, customers and industry stakeholders, we managed to ride the waves with resilience, agility and tenacity.

Sustainability is at the Heart of PSA's Business Ethos

Climate change continues to be the defining

REGIONAL CEO SOUTHEAST ASIA'S MESSAGE

issue of our time. The Intergovernmental Panel on Climate Change (IPCC) report on "Code Red for Humanity" released in August 2021 is a sobering wake-up call. At the COP26 summit, countries agreed to meet in 2022 to pledge further cuts in emissions. This is to keep temperature rises within 1.5°C to prevent a "climate catastrophe".

The COP26 is a wake-up call for everyone to instil a sense of urgency on the dire state of our planet. We need urgent action now, not just for us, but for future generations.

This is also why PSA SG steadfastly commits to embedding sustainability into our corporate culture and across every corner of our business.

Decarbonisation Vision & Strategy

PSA, a leading global port operator with footprints along important nodes on the supply chain, must take the lead and responsibility for our carbon footprint. As a leading global port group operating the world's largest transshipment hub,

it is vital for PSA to collaborate with our partners and stakeholders in the industry to address and mitigate carbon issues.

The decarbonisation of port operations is the focus of PSA SG's Environment, Social and Corporate Governance (ESG) framework. We aim to reduce 50% of absolute GHG emissions by 2030 (from 2019 levels) and to achieve net zero by 2050. Our targets are aligned with Singapore's climate ambitions.

We have actively reduced our dependence on fossil fuels. Our three-track decarbonisation strategy - low-carbon fuels, renewables and electrification - dovetails with our overall business expansion and sustainability strategies.

With the LNG refuelling kiosk and LNG prime movers (PMs) in place, we move forward with plans to adopt green hydrogen as the potential fuel of choice. We have also maximised solar panels installation in the port. Concurrently, we are onboarding green electricity imports, implementing a Smart Grid Management System and Battery Energy Storage System and are on-track to progressively electrify our container handling equipment.

REGIONAL CEO SOUTHEAST ASIA'S MESSAGE

In addition, we are also developing new capabilities in automation and the use of artificial intelligence of things (AIoT) to deliver intelligent insights, predictive analytics and augment our existing capabilities in engineering and operations.

Some of these ambitious decarbonisation plans are already introduced in our Tuas Port, which started operations at its first two berths at the end of 2021. When completed in the 2040s, Tuas Port will be the world's single largest fully automated terminal, powered by smart technology and green energy.

Everybody Makes a Difference

PSA SG's vision is for our people to be green-minded, green-skilled and green-motivated. We have made significant efforts to achieve this. Besides the annual PSA SG Go Green Month, a Towards Enduring Partnerships (TEP!) sustainability video, featuring management, the Unions and staff, was produced to encourage everyone to do their part to reduce carbon footprint.

As part of the PSA Corporation Employees' Agreement 2021 signed with Singapore Port Workers Union (SPWU) on 1 November 2021, an initiative was introduced to bring all employees on the sustainability journey to protect and do good for the environment. A suite of activities will be rolled out via the Greenfish Sustainability Mobile App to be launched in phases in 2022 for our employees.

Recognition for Our Efforts

PSA SG is honoured to receive the President's Award for the Environment in 2021, the nation's highest environmental accolade. We were recognised for our significant efforts in reducing carbon emissions, improving energy management and contribution to the maritime industry's decarbonisation efforts as well as our engagement with our staff and community.

Three of our food gardens - PATIO@PPTB3, Botanicals Sky@MB and Botanicals Earth@MB - have also received the Community in Bloom awards in 2021.

REGIONAL CEO SOUTHEAST ASIA'S MESSAGE

A big thank you for the dedication and hard work of our staff, and strong support from our Unions, customers and stakeholders.

The Road Ahead

There will be challenges in the global business environment, coupled with an unprecedented urgency to combat climate change and a stronger call to live, work and play sustainably. Beyond our flagship operations in Singapore, we leverage our position as a global supply chain orchestrator to influence industry stakeholders to be more sustainable.

Alongside our Unions and business units, we will do our best to ensure a sustainable

environment. As a business, we will continue to drive collaborative innovation, digitalisation and sustainability to bring us closer to our emissions reduction targets.

Being a responsible steward, PSA SG seeks to make a difference towards sustainability for future generations. Together, we can contribute to the decarbonisation of the maritime industry and strengthen Singapore's value proposition as a leading global hub port.



Ong Kim Pong
Regional CEO, Southeast Asia
PSA International Pte Ltd

ABOUT PSA SINGAPORE



PSA Singapore (PSA SG) operates the world's largest container transshipment hub, handling 37.2 million TEUs of containers in 2021. With connections to 600 ports globally, shippers have access to daily sailings to every major port in the world, operating 24/7 all year round. Beyond port operations, PSA also offers cargo solutions to customers operating in advanced manufacturing, cold chain, e-commerce, and energy & chemicals. This value adding service is enabled by CALISTA™, a digital platform that facilitates trade and helps shippers to better manage their physical movement of goods, trade financing and compliance.

PSA SG is a fully owned subsidiary of PSA International, a leading port group and trusted partner to cargo stakeholders. With flagship operations in Singapore and Antwerp, PSA's global network encompasses over 50 locations in 26 countries around the world. The Group's portfolio comprises more than 60 deepsea, rail and inland terminals, as well as affiliated businesses in distriparks, warehouses and marine services. Drawing on the deep expertise and experience from a diverse global team, PSA actively collaborates with its customers and partners to deliver world-class port services alongside, develop innovative cargo solutions and co-create an Internet of Logistics. As the partner of choice in the global supply chain, PSA is "The World's Port of Call".

Vision to Create Value

PSA SG has maintained its port's value proposition as a resilient and reliable node along the global supply chain. Beyond facilitating port operations, PSA is also helping shippers and cargo owners to move cargo from an end-to-end supply chain perspective, in a cost effective and sustainable manner. Leveraging on digital technology to facilitate world trade and cargo movements, PSA will strengthen its position as a global trade enabler and supply chain orchestrator, realising its vision to co-create the Internet of Logistics.

Key Figures of PSA Singapore FY 2021



37.2 mil

Total Throughput (TEUs)



Connected to

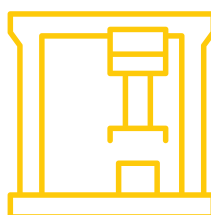
600
ports

Globally



Workforce of

9,400
employees



50 mil

Designed Capacity (TEUs)

Review of Results

PSA Group revenue increased by 11.7% on higher throughput and storage revenue. Profit from operations increased by 13.7%, and overall net profit for the year increased by 18.2% from previous year due to the growth in other income and lower financing cost. PSA's balance sheet remains strong with a gross debt equity ratio of 0.40 times at the close of 2021.

PSA Singapore contributed 37.2 million TEUs, an increase of 1.6% from 2020. PSA terminals outside Singapore delivered a total throughput of 54.3 million TEUs, increasing 8.4% over 2020.

OUR CORE VALUES

We are committed to staying true to our values in all our actions and relationships, as we work alongside our various stakeholders.



Committed to Excellence

continuously improving results and innovating in every aspect of our business



Focused on People

We win as a team by respecting, nurturing and supporting one another



Dedicated to Customers

We help our customers, external and internal, succeed by anticipating and meeting their needs



Integrated Globally

We build our strength globally by embracing diversity and optimising operations locally

KEY DEVELOPMENT & SUSTAINABILITY JOURNEY

1972:

Arrival of first containership in Singapore
Tanjong Pagar Terminal starts operations

1991:

Keppel Terminal starts operations

2000:

Pasir Panjang Terminal (PPT) opens. Use of electric-based yard cranes for the first time

1997:

PSA corporatises and is renamed PSA Corporation Limited

1992:

Brani Terminal opens

2003:

PSA International Pte Ltd becomes the main holding company for PSA Group

2014:

PSA Singapore is the first port in the world to have cumulatively handled 500 million TEUs

2015:

Official opening of PPT4-6. Adoption of 200 new electric automated yard cranes at these terminals

2018:

- PSA SG produces its first sustainability report
- PSA SG receives the Singapore Environmental Achievement Award (Maritime Category) awarded by the Singapore Environment Council
- PSA SG receives the APSN Green Port Award by APEC Port Services Network (APSN)

2019:

- Replacement of diesel RTG cranes with electric RTG cranes starts at PPT1-3 Target to complete by 2027
- Official groundbreaking for Tuas Port
- Opening of first food garden at PATIO@PPT Building 3



2021:

- First 2 berths at Tuas Port Phase 1 begin operations. Tuas Port Maintenance Base – the world's first Super Low Energy Building in a port facility – opens
- Adoption of new electric automated RMG cranes and battery-powered Automated Guided Vehicles at Tuas Port
- Adoption of LNG fuelled prime movers to replace diesel fuelled PMs at PPT 4-6
- PSA Singapore was awarded the President's Award for the Environment – the highest environmental accolade to recognise organisations that have made outstanding contributions towards environment and sustainability



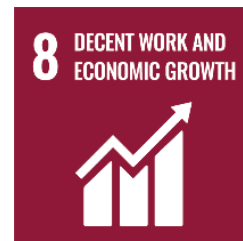
OUR APPROACH TO SUSTAINABILITY



PSA SG is aligned to PSA International's Sustainability Strategy Framework developed in 2020, in which we have identified and assessed significant environmental, social, economic and governance topics that are most material to our business and stakeholders. We are also guided by PSA SG ESG-focused framework.

We support Singapore's climate ambitions, aiming to reduce 50% of absolute GHG emissions by 2030 (from 2019 levels) and to achieve net zero emissions by 2050.

PSA SG has also aligned our sustainability approach with the United Nations Sustainable Development Goals (SDGs). We place a strong focus on six SDGs which we can make a positive difference through our business activities and sustainability efforts.



Our Sustainability Strategy Framework

OUR PRIORITIES

CREATING SUSTAINABLE VALUE

TAKING CLIMATE
ACTION

TRANSFORMING
SUPPLY CHAINS

NURTURING A
FUTURE-READY
WORKFORCE

OUR FOUNDATIONS

STEWARDED RESPONSIBLE BUSINESS

Ensuring
Responsible
Operations

Protecting
Our People

Acting with
Integrity

Supporting
Our
Communities

Keeping Our
Operations
Safe and
Secure



Material Sustainability Topics

This section lists PSA SG's material sustainability topics and in the rest of this report, we review our performance in each of them.

Priority Topics are topics which are of utmost importance to the business and our stakeholders. They are the focus of our sustainability strategy and reporting, which we seek to disclose goals, targets and performance.

CYBERSECURITY AND DATA PRIVACY

Protect our business systems and ensure data privacy through robust cybersecurity measures.

EMISSIONS

Reduce carbon emissions across all our businesses and operations, and to support decarbonisation of the shipping and logistics industry.

ENERGY

Reduce our energy consumption and intensity through energy management and storage, harnessing energy-saving and efficiency technology, as well as maximising the use and generation of renewable energy.

ETHICAL BUSINESS CONDUCT

Uphold high standards of ethics and regulatory compliance beyond the minimum legal requirements. Build a business that is successful, honest and responsible.

INNOVATION AND TECHNOLOGY

Innovate and harness technology to drive digitalisation, automation and to create more efficient and sustainable operations.



Material Sustainability Topics

OCCUPATIONAL HEALTH AND SAFETY

Ensure the highest standards of health, safety and mental wellbeing for all staff.

OPTIMISATION OF SUPPLY CHAINS

Drive sustainability enhancements in local and regional global shipping and logistics supply chains by working with suppliers, partners and customers on route optimisation and alternative transport options to achieve efficiency and safety.

PEOPLE DEVELOPMENT

Build a future-ready workforce through attracting talents and talent retention strategies. Prepare for scale up operations in Tuas Port and to provide learning and development opportunities.

SUSTAINABILITY- FOCUSED CULTURE

Build a culture where all our people are green-skilled, green-minded and green-motivated. This will result in a generative culture where being sustainability-focused is integral.

PORT SECURITY

Ensure safety and security of port operations, including the responsible handling of dangerous goods, as well as working with relevant authorities and partners to put in place adequate controls to safeguard against terrorism and illicit trade.

SUSTAINABLE PORT DEVELOPMENT

Ensure that planning, design and development of port infrastructure and operations take into account and address the environmental impacts from land development and reclamation, and the use of sustainable materials wherever possible.



Important Topics are topics of medium to high importance to the business and our stakeholders. These are actively managed by PSA SG and are included in external reporting as relevant, based on the sustainability context and stakeholder interest.

SUSTAINABLE PROCUREMENT

Minimise environmental impact and create positive social impacts through the procurement of goods and services.

ENVIRONMENTAL PROTECTION

Protect our people by protecting the work environment they work in. To ensure that the air quality and boundary noise level are within healthy limits, and to have in place a good haze response management strategy.

WASTE MANAGEMENT AND RECYCLING

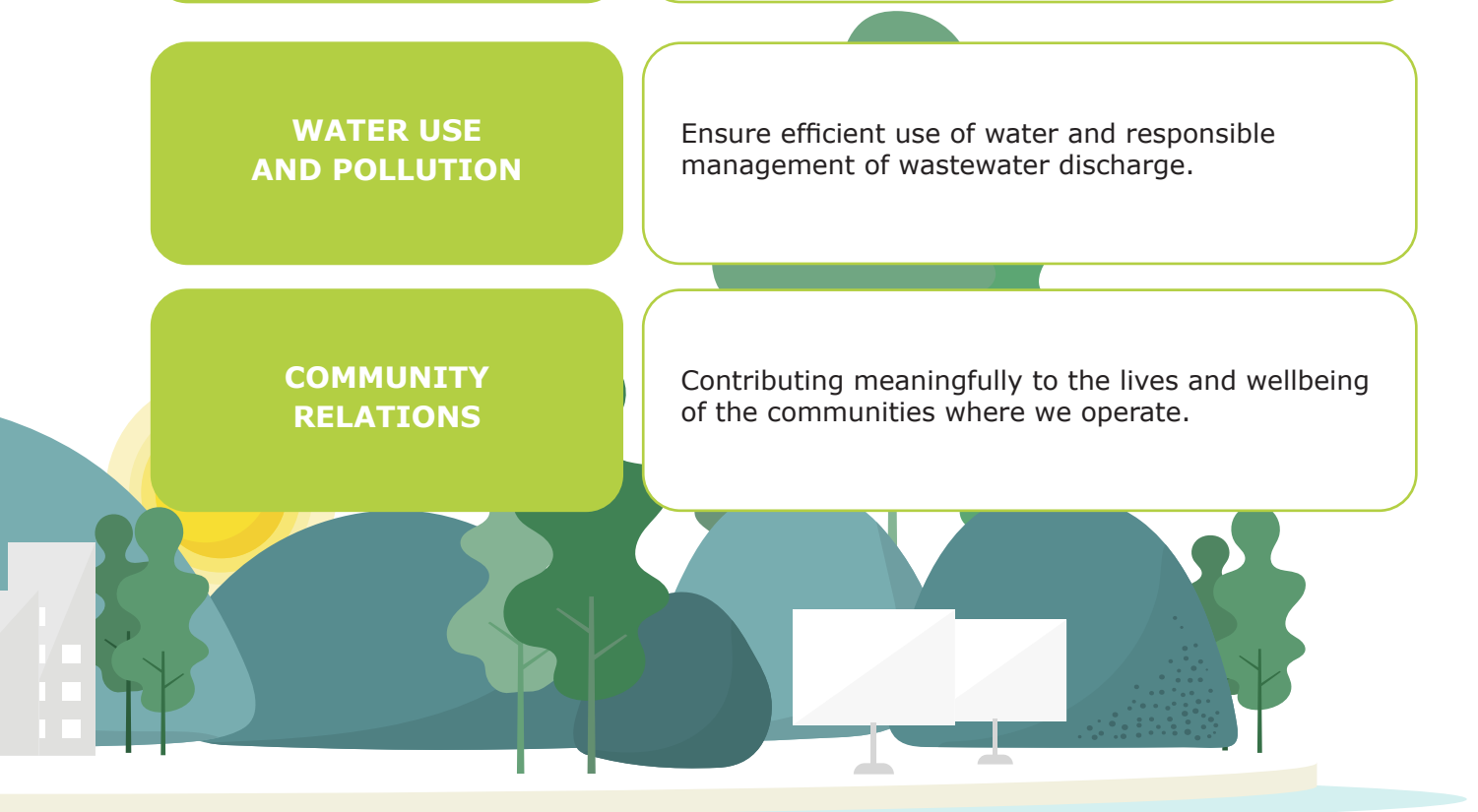
Adopt more circular approaches to optimise resource use, minimise waste generated in our operations, and increase recycling rate.

WATER USE AND POLLUTION

Ensure efficient use of water and responsible management of wastewater discharge.

COMMUNITY RELATIONS

Contributing meaningfully to the lives and wellbeing of the communities where we operate.



DECARBONISING PORT OPERATIONS



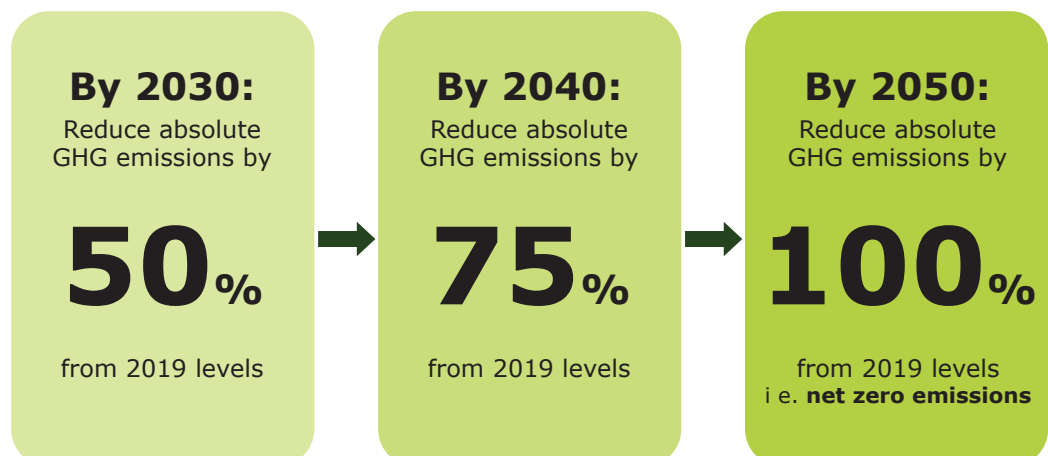
Decoupling Carbon Emissions and Achieving Net Zero

PSA SG reached a new milestone in 2021 as we commenced operations of the first two berths at Tuas Port. Being an automated container terminal, the container handling equipment (CHE) at Tuas Port are electric-powered, a cleaner energy source compared with diesel.



PSA SG commits to the decarbonisation goals alongside PSA Group, which is to reduce absolute carbon emissions* by 50 per cent by 2030, 75 per cent by 2040, and progressively achieve net zero emissions by 2050.

*against the base year of 2019

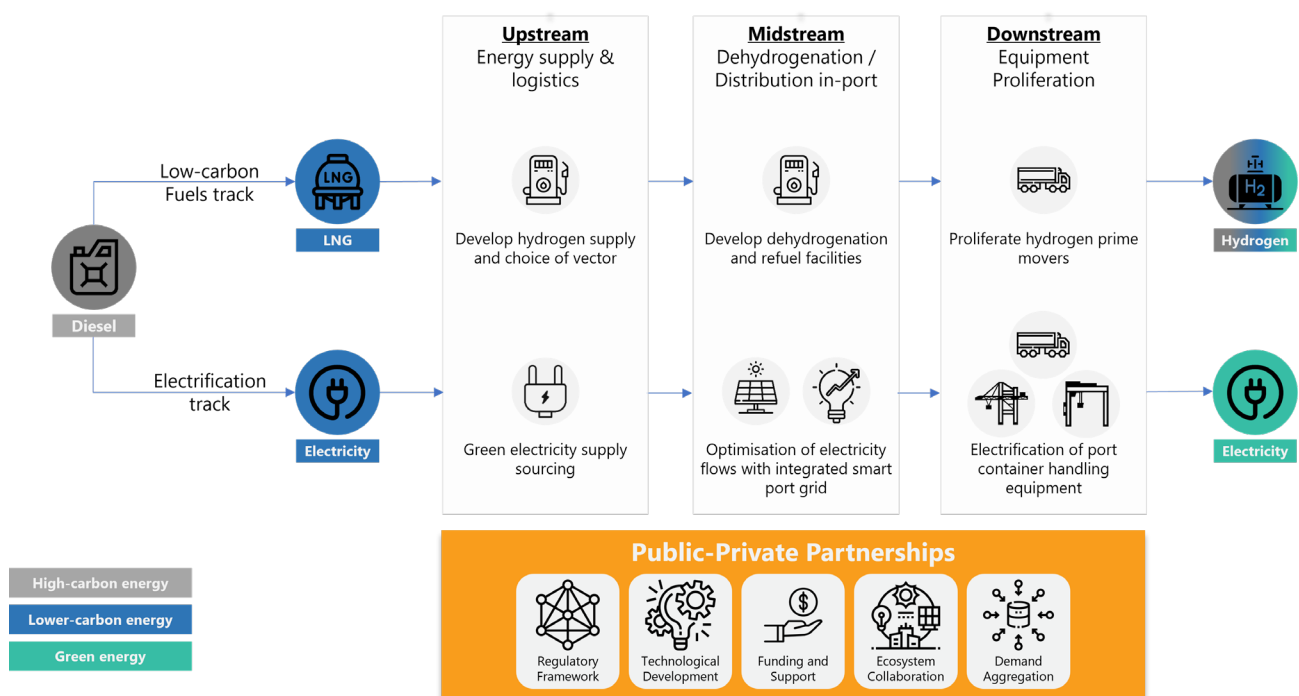


Key Pathways to Achieve our Decarbonisation Goals

Diesel was our primary energy source in port operations at PSA SG. As part of our decarbonisation efforts, we have embarked on two concurrent tracks for our energy transformation.

The first track is based on the adoption of cleaner alternative fuels. In the longer run, we are working towards adopting hydrogen as an energy source to power port operations. The second track focuses on the adoption of electric-powered CHE. When we switch from diesel to electricity, we reduce carbon emissions as electricity is a cleaner energy source.

To fully realise its potential, we are required to source and tap on green electricity. Today, we use brown electricity to operate our electric-powered CHE, which is generated using fossil fuels such as natural gas. To further reduce carbon emissions, electricity generated by renewable energy sources such as wind and solar is necessary.



Both tracks pose significant challenges and require us to collectively form various public-private partnerships to overcome them. We collaborate with partners from a broad diversity of stakeholders - to develop the right ecosystems to support the decarbonisation projects. Some of these partners include government agencies, industry players, institutes of higher learning (IHLs) and research institutes.

Overcoming Upstream, Midstream and Downstream Challenges

Achieving success in our decarbonisation projects would require timely progression in each upstream, midstream and downstream segment.

At the upstream, the focus is on securing the respective energy sources to power future low-carbon operations, namely the hydrogen molecules for the low-carbon fuels track and green electricity generated using renewable energy for the electrification track.

At the midstream, the focus transits to converting energy into the correct form and distribution to power our port equipment. This refers to converting hydrogen from its carrier form through dehydrogenation. For electricity, this entails the development of the proper charging infrastructure for our electric port equipment and optimising electricity use through the development of a smart grid.

At the downstream, the focus shifts to the proliferation and operationalisation of port equipment for both tracks, including developing proper operating and safety procedures.

Green Projects Updates

Low-carbon fuel track:

160 LNG prime movers at PPT were deployed from 2Q 2021, supporting us with lower-carbon horizontal transport operations. An additional 50 units will be added, bringing the total fleet to 210 LNG prime movers by 2023. Compared to diesel-powered prime movers, the LNG ones will produce about 20% less carbon emissions for the same performance.

With traction in our proof-of-concept trial on hydrogen refuel kiosk and prime mover, we are on target to start operational trials by early 2024. This successful implementation of the trials will pave the way to deploy hydrogen prime movers at scale.



Green Projects Updates

Electrification track:

In 2021, we converted an additional 6 units of electric-automated rubber tyre gantry cranes (ea-RTG), bringing the total to 27 units deployed at PPT. This is in line with the target set by PSA Group to have 90% of our RTGs to run on electricity or hybrid by 2030.

New solar photovoltaic systems installed at PSA Horizons and Tuas Port have added 3.4 megawatt-peak (MWp) of solar photovoltaic capacity, bringing our total to 7.4 MWp. This is equivalent to about 9.5 gigawatt-hours of carbon-free electricity harnessed each year and will help to reduce about 3,750 tonnes of carbon emissions annually.

Total Energy Consumption in 2021

In 2021, our cargo handling operations resulted in the consumption of higher amounts of fuel and electricity. Diesel consumption increased by 8.8%, while electricity consumption increased by 19.1%.

Energy Consumption of PSA SG

Energy Consumption	2019	2020	2021	Change
Diesel (,000 litre)	97,830*	97,576*	106,128	8.8%
LNG (tonne)	0*	0*	2,745	-
Electricity (MWh)	421,706*	495,516*	590,118	19.1%

Note:

*Energy consumption figures for 2019 & 2020 have been restated due to reporting methodologies' refinement. Energy consumption figures from outsourced services and leased assets have been excluded, considering PSA's use of the equity share approach for carbon emissions accounting.

The main drivers for the higher energy consumption were increased container handling volume of 1.6% in 2021 compared to 2020 and higher container dwell time for containers in our ports due to Covid-19. This includes reefer containers, resulting in higher electricity consumption to power reefer points.

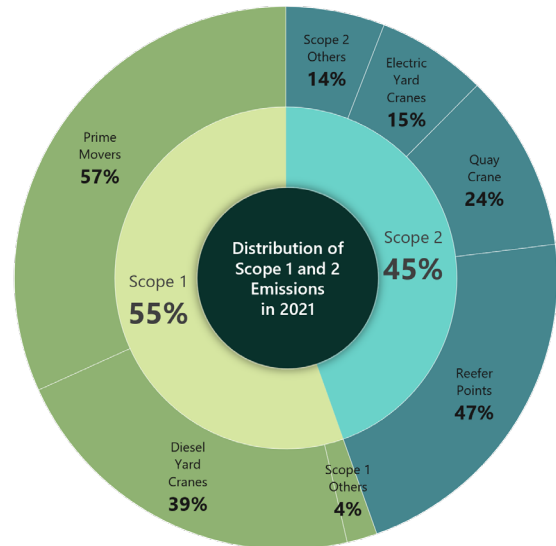
With the deployment of 160 LNG prime movers at PPT from 2Q 2021, we have also begun registering the use of LNG fuels, with 2,745 tonnes of LNG consumed for the year.

Total Carbon Emissions Footprint in 2021

Due to the higher energy consumption to power our cargo handling operations, our carbon emissions (by equity share) have increased by 16.0% in 2021 compared to 2020.

Scope 1 emissions accounted for 55% of PSA SG's total Scope 1 and 2 emissions, with Scope 2 emissions making up the remaining 45%.

Most of our Scope 1 emissions are attributed to carbon emissions footprint from the operation of our cargo handling equipment, namely prime movers (comprising of diesel and LNG variants) and diesel yard cranes. Overall, these two equipment categories were the biggest carbon emitters, collectively accounting for more than 50% of total Scope 1 and 2 emissions.



Our Scope 2 emissions are attributed to electricity consumption to power our reeper points and the operating of quay and electric yard cranes. Electric yard cranes include the various types of electricity-powered yard cranes deployed at PSA SG. These include electric / electric-automated rubber tyre gantry cranes, automated / manual rail-mounted gantry cranes, and bridge cranes.

Total Emissions of PSA SG

Carbon Emissions (`000 tCO ₂ e)	2019	2020	2021	Change
Direct Scope 1	187*	182*	205	12.6%
Indirect Scope 2	120*	137*	165	20.6%
Total Scope 1 and 2	307*	319*	370	16.0%

Note:

*Scope 1 and 2 emissions in the above table are computed based on an equity share consolidation approach. Gases included in the calculation are CO₂, CH₄ and N₂O. Emission factors for fuel were sourced from GHG Protocol Emission Factors for Cross Sector Tools (March 2017) and the UK Department for Environment, Food and Rural Affairs (DEFRA).

Scope 2 emissions were computed using the respective market-based emission factors.

*Carbon emissions for 2019 & 2020 have been restated due to reporting methodologies' refinement. Carbon emissions from outsourced services and leased assets have been moved from PSA's Scope 1 & 2 emissions to Scope 3 emissions, considering PSA's use of the equity share approach for carbon emissions accounting.

TÜV SÜD PSB Pte Ltd externally verifies 2021 GHG emission figures as conforming to the requirements of ISO 14064-1:2018. Reference statement registration no GHG-ISO 14064-0020.

ENVIRONMENTAL PROTECTION



Protecting our people through protecting the work environment they are in by ensuring that the air quality and boundary noise level are within healthy limits with good haze response management in place.

Ambient Air Quality Monitoring (AAQM)

The AAQM is conducted annually at various locations in PSA SG's terminals to ensure we comply with the National Environment Agency's (NEA) guidelines and requirements, under the Environmental Protection and Management Regulations. AAQM covers monitoring of the level of air pollutants; namely, nitrogen dioxide (NO₂), carbon monoxide (CO) and particulate matter (both PM₁₀ and PM_{2.5}, with diameters of less than 10 and 2.5 micrometres, respectively) throughout a 24-hour sampling regime.



From 25 October to 6 November 2021, NEA's licensed operator Astar Laboratory Pte Ltd installed the meters at 16 sampling locations in PSA terminals – 4 points in Brani Terminal, 4 points in Keppel Terminal and 8 points within PPT 1-6.

The values measured are within and comply with the respective limits of NEA Singapore Ambient Air Quality Targets. The average values of the 16 monitoring sampling locations are as follows:

Type of Air Pollutant	Value Recorded	Within Healthy Limit
Nitrogen Dioxide (NO ₂)	<0.1 to 0.3µg/m ³	200 µg/m ³ (1hr)
Carbon Monoxide (CO)	<1 to 3mg/m ³	10 mg/m ³ (8hr)
PM 10	6 to 23µg/m ³	50 µg/m ³ (24hr)
PM 2.5	3 to 17µg/m ³	37.5 µg/m ³ (24hr)

Boundary Noise Assessment

The objective of boundary noise monitoring is to assess the noise levels emitted at PPT, in compliance with NEA's Environmental Pollution and Management Act 2008.

In November 2021, PSA SG engaged NEA's licensed operator Astar Laboratory Pte Ltd to measure the noise levels at 210 sampling locations.

The sound pressure levels were measured over a one-minute sampling period every 20 meters along the selected route, from the corner of Free Trade Zone (FTZ) fencing between PSA Maintenance Base and the former Pasir Panjang Distripark to the corner of FTZ fencing adjacent to West Coast Ferry Road and the Republic of Singapore Yacht Club, covering a total distance of 4.2km.

The results of all the 210 sampling locations are within the permissible limits of NEA Singapore Boundary Noise Regulations (up to 75 db) during the day.

An additional 24-hr monitoring was set up at PPT Gate 3 (near PSA Alongside) where the recorded 24-hr reading are within permissible limits.

Haze Response Management

Singapore experiences smoke haze from time to time. The haze arises due to forest fires in the regional countries, when burning is carried out to clear land for agricultural uses. It can be exacerbated by dry seasons, changes in wind direction, and low precipitation. Prevailing winds sometimes carry smoke haze over Singapore's skies, particularly during the Southwest monsoon season.

Singapore did not experience severe transboundary haze in 2021, in part due to the weather conditions. In the early months, the rainfall is higher than average caused by the La Niña effect. In the second half of the year, there was no elevated risk of forest fires and accompanying haze due to drought.

While the solution to the haze problem lies in collaborative efforts among nations to reduce burning of forests, PSA SG takes steps to ensure our staff is well equipped to deal with haze when it occurs. These include the provision of advisories, early haze warnings, measurement and dissemination of air quality information, and guidelines for dealing with haze-related issues.



Haze Response Plan and Guidelines

To prepare and protect our staff for haze situations, PSA SG has a comprehensive haze response plan and guidelines:

Understand transboundary haze and haze risks management

Ensure enough PPE (N95 masks) for our staff and stakeholders

Different levels of haze alerts and escalation of haze response according to well defined severity situations

Clear guidelines for response during different severity levels

Defined roles and responsibilities of Haze Committees, Taskforces and Coordinators in the event of response plan activation

Understand environmental health issues relating to haze and how to mitigate them

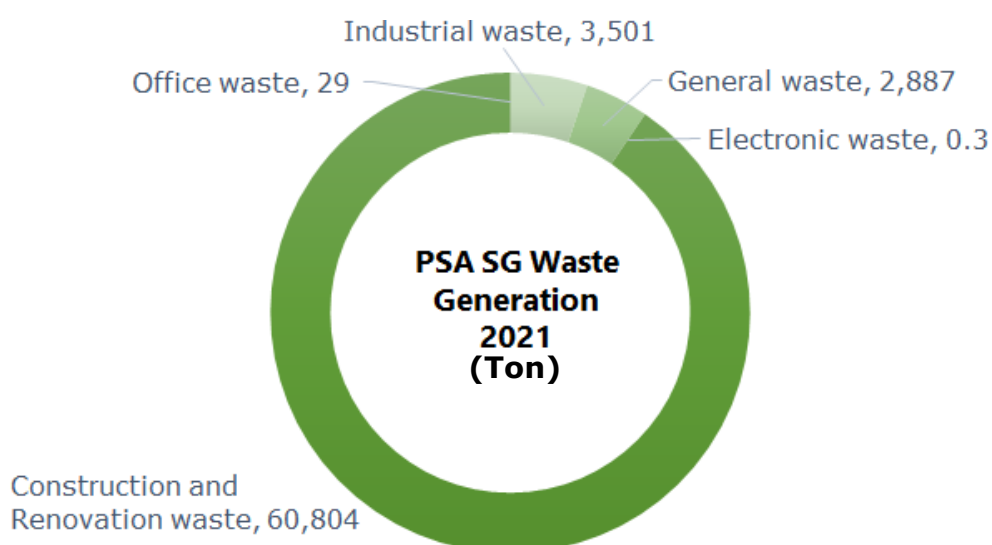


Waste Management And Recycling

PSA SG's guiding principle for waste management and recycling is to Reduce, Reuse and Recycle Right. The majority of PSA SG's materials consumption and waste generation arise from running, repair and maintenance (RRM) activities for our fleet of CHE. We have two main streams of waste - general waste (includes food waste) and industrial waste.

67,220.7 tons of waste was generated in 2021 and the breakdown is as follows:

Waste Type	Weight (Ton)	%
Industrial	3,500.7	5.2
General	2,887.2	4.3
Electronic	0.3	0
Construction and Renovation	60,804	90.5
Office	28.5	0
TOTAL	67,220.7	100



A total of 67,220.7 tons of waste were generated and 64,326.4 tons or 95.7% were recycled, with the remaining 2,894.4 tons or 4.3% landfilled.

Waste Type	Landfilled (Ton)	Recycled (Ton)
Industrial	0	3,500.7
General	2,887.1	0
Electronic	0	0.3
Construction and Renovation	0	60,804
Office – Paper	7.2	12.8
Office – Can & Plastic	0	8.5
TOTAL	2,894.3	64,326.4



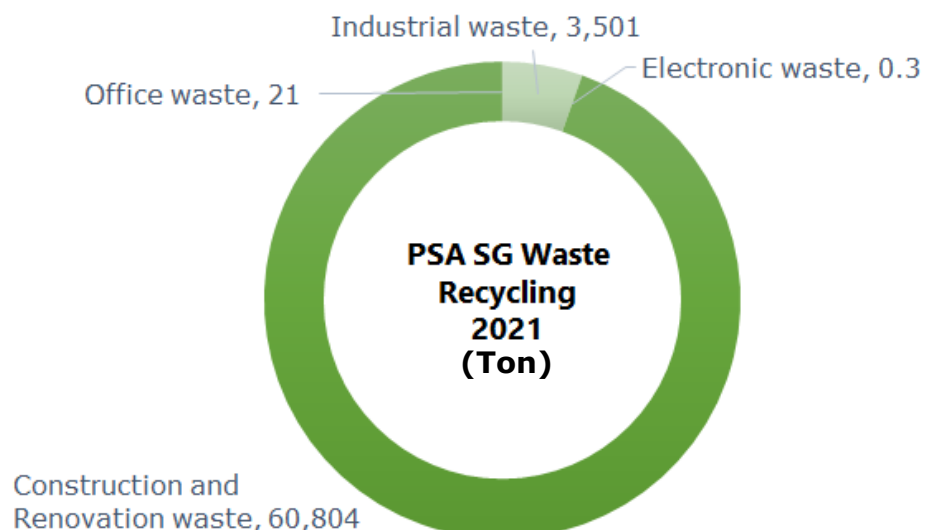
In 2021:

PSA SG's recycling rate is

95.7%

Includes industrial waste, e-waste, construction and renovation waste and office waste

Recycling rate in 2020 was 61.9%. The increase in recycling rate is mainly contributed by construction and renovation waste.



NEA appointed ALBA Group plc & Co. KG (ALBA) to operate a Producer Responsibility Scheme (PRS) in Singapore. As the PRS operator, ALBA collects consumer e-waste for treatment and recycling. With this arrangement, Starhub collected the 3 RENEW (stands for Recycling the Nation's Electronic Waste) bins in PSA SG's premises (Tanjong Pagar Complex Lobby, Brani Terminal Building Lobby and PPT Building 3) in March 2021.

In July 2021, we received an ALBA e-waste bin with compliments from NEA. It is placed at level 3 of PPT Building 3.

Reducing Packaging Waste for Environmental Sustainability

Given that the majority of PSA SG's materials consumption and waste generation arise from RRM activities for our fleet of CHE, PSA SG's engineering team proactively deep dives into possibilities of reducing packaging waste arising from RRM activities. Below are highlights of packaging waste reduction projects completed in 2021.

Project 1 : Solid tyres delivery to PSA SG

Before

Solid tyres are used by prime mover trailers and they used to be delivered on wooden pallets and wrapped with non-reusable plastic wrap.



After

By stacking the solid tyres neatly on delivery trucks, we eliminate the use of wooden pallets and plastic wrap.

As a result, annual packaging waste of 1,400 wooden pallets and 14,000 square metres of plastic wrap (equivalent to the size of two soccer fields) are avoided.



Project 2 : Reusable plastic cover for equipment engines**Before**

An engine, after undergoing maintenance or repair, is kept dust-free before installation with single-use plastic film wrapping.

After

Reusable plastic covers were customised to keep these engines dust-free before installation.

An annual packaging waste of 10,000 square metres of plastic wrap are avoided.

Project 3 : Reduce metal packaging waste**Before**

Aerosol spray cans of lubricants are used to lubricate bearings and screws.

After

Purchase industrial-size tins of lubricants and decanting the lubricants into smaller reusable spray bottles.

An annual packaging waste of 10,000 aerosol spray cans (equivalent to over 326 square metres of metal) are avoided.

Reaching Out to Staff

An e-waste recycling drive, jointly organised with the Unions, was held during Climate Action Week (CAW) 2021 in August.

In-house publication, DO YOU KNOW series – Season 2 featured 8 articles focusing on the waste generated in PSA SG and how they are being reduced, reused and recycled.

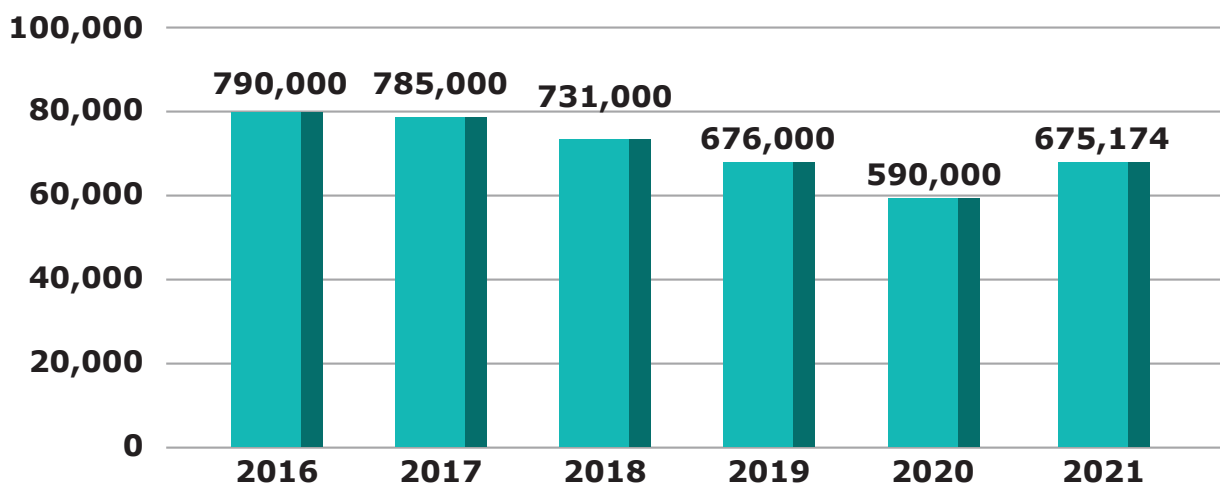
Water Use And Pollution

Water is a valuable resource. Managing and conserving water use is paramount. PSA SG is committed to using and discharging water in a sustainable manner. Proper sewage and oil receptacles are designed and installed according to industrial best practices and standards to ensure proper handling of waste water.

Singapore has successfully closed the “water loop” and manages the whole water cycle - from rainwater collection, purification and supply of drinking water, to the treatment of used water and its reclamation to NEWater. NEWater is Singapore’s own brand of high-grade recycled water.

Singapore’s water story encourages PSA SG to manage and conserve our water use and to close the loop wherever we can. Though PSA SG’s water consumption increased in year 2021 due to increased business activities, we are keeping up with our water conservation efforts.

PSA SG’s annual volume of water use (in cubic metres)



PSA SG’s longstanding water conservation efforts are:

All PSA buildings and port facilities are equipped with efficient plumbing and sanitation to reduce water usage

Close monitoring of water usage and consumption habits, with early detection and rectification of leakages

Annual review and submission of water usage statistics to PUB, Singapore’s National Water Agency

Through our stepped up efforts in water conservation, we saved close to 48,000 cubic metres of potable water annually, which is enough to fill up more than 19 olympic-sized swimming pools.

Rainwater collection tanks are located at various engineering workshops to make use of harvested rainwater for workshop and equipment washing. NEWater is also used for the cooling towers of air-conditioners at Tuas Port. We are exploring to also use NEWater for the cooling towers of air-conditioners in PPT and PSA Horizons.

Smart Water Flow Monitoring System

To facilitate real time checks on water use and leak detection in our network of pipes, PSA SG is working to implement a smart water flow monitoring system in PPT by 2023.

Through the installation of smart water meters to measure water flow for real-time monitoring, we are able to detect and arrest a leaked pipe in the shortest possible time. This will reduce water wastage and maximise the life-span of our water pipe network, by identifying and strengthening the pipe section with higher pressure.

Water Circularity at PSA Horizons

PSA Horizons, our new corporate headquarters in Singapore, is designed with sustainability and water circularity in mind.

The rainwater harvesting system in the building is equipped with large tanks to collect rainwater for automatic subsoil drip irrigation to water landscape plants. An Air Handling Unit (AHU) condensate recovery system is also installed to recover the water in discharged condensate for reuse in the cooling towers. Rain sensors are also installed and upon detection of rain, the scheduled irrigation of landscape plants will be automatically stopped and resumed only after the rain has stopped. There is also a water leakage detection system for prompt detection and rectification of leaks to minimise water loss.



SUSTAINABLE PORT DEVELOPMENT

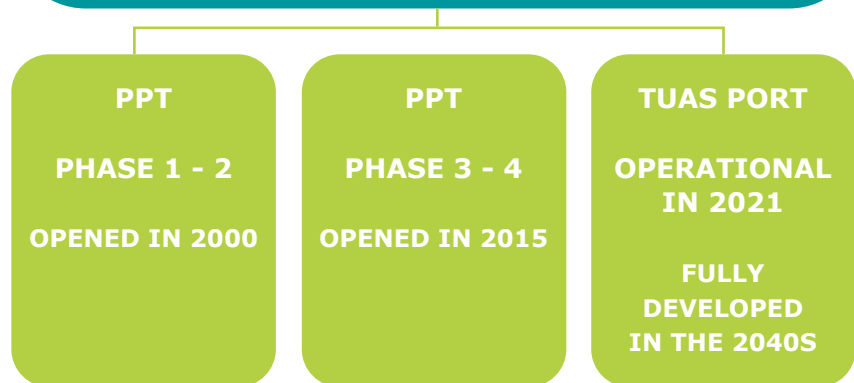


PSA Singapore is committed to strengthening the resilience of our infrastructure and operations against climate change risks and support the nation's climate change ambitions

Management of climate-related risks and opportunities is embedded across PSA SG's business strategy and operations. Below are the highlights of our efforts in sustainable port development. The use of low carbon energy and automation which also count towards our efforts in climate change and adaptation is covered in Decarbonising Our Port and Innovation and Technology respectively.

PPT and Tuas Port are built at least 5m above sea level.

**BUILT AT LEAST
5 METRES ABOVE SEA LEVEL**



Tuas Ecosystem

From planning to realisation, PSA's Tuas Port will be a smart and green port. When fully completed in the 2040s, Tuas Port will be the largest fully automated container terminal in the world, with an annual handling capacity of 65 million twenty-foot equivalent units (TEUs).

By then, Singapore's container activities will all be consolidated at Tuas Port, significantly reducing inter-terminal haulage operations and GHG emissions. Automation and electric-powered port equipment will also enhance productivity, and the potential use of hydrogen as a clean energy source and green electricity will further reduce our carbon footprint.

Tuas Port will be the focal point of a wider supply chain ecosystem, connecting the world through cargo and trade flows. Beyond the physical port, the Tuas Ecosystem will also be interconnected through digital platforms and exchanges. Tuas Port is in good stead to be a resilient green port of the future.

Use of Sustainable Concrete for Tuas Port

Tuas Port is constructed using sustainable and transformational green concrete. The berth and yard construction is built using Portland Blast Furnace Cement (PBFC) with up to 80% Grand Granulated Blast-Furnace Slag (GGBS) and 20% Ordinary Portland Cement (OPC). Having GGBS reduces carbon emissions and embodied carbon in the built environment with more than 70% reduction in carbon emissions compared to ordinary cement. It is estimated that 1.4 million ton CO₂e of carbon will be saved by using PBFC for the Tuas Port development.

Upon the successful test-bed of CarbonCure Technology, it will be incorporated in remaining rigid pavement in Tuas Port development, further reducing carbon emissions. CarbonCure Technology is a method that introduces recycled carbon dioxide into fresh concrete to reduce its carbon footprint without compromising performance. Once injected, the carbon dioxide becomes permanently embedded through a chemical process.

Super Low Energy Building

The energy consumption of buildings typically contributes about 5% of our total annual carbon emissions. The buildings in Tuas Port are designed to be smart and green as well. The Tuas Port Maintenance Base Administrative Building is PSA SG's first Super Low Energy Building (SLEB). It was awarded the Platinum Super Low Energy Building Award by Singapore's Building and Construction Authority.

The SLEB is expected to use 58% less energy annually as compared to other similar-sized buildings. With the rooftop solar panels, this is our first net-zero energy building in PSA SG.

Majority of the energy used in buildings goes towards cooling. Green buildings aim to reduce the amount and intensity of heat entering the building, coupled with more efficient ways of cooling. Built on this principle, there are 3 main innovative technologies used in the Administrative Building which maximise the harvest of solar energy:

PASSIVE DISPLACEMENT COOLING

The concept of Passive Displacement Cooling leverages on a naturally occurring phenomenon that warm air rises and cold air sinks, eliminating the need for fans to create indoor air circulation.

Fresh air is injected through specially developed nozzles, increasing the cooling capacity by 50%, which results in significantly less energy consumption.

BUILDING-APPLIED PHOTOVOLTAIC SYSTEM ALSO KNOWN AS BAPV

The building's exterior façade is fitted with solar panels.

These vertical solar panels supplement the horizontal rooftop solar panels to maximise the amount of renewable energy generation on-site.

MODEL PREDICTIVE CONTROL

Model predictive control is an intelligent process control used to ensure the cooling system uses the lowest possible energy to provide optimal thermal comfort for occupants.

Through sensors, data such as temperature, humidity, light intensity, and carbon dioxide level are collected where a thermal comfort index is derived to optimise the system.



In addition, the frames for the double-glazed windows are also made from a material that is a poor conductor of heat, creating a thermal break that further reduces the amount of heat entering the building.

Together with smart lighting and Indoor Air Quality System, these innovative technologies work together to further maximise energy efficiency and thermal comfort.

SUSTAINABILITY- FOCUSED OUTREACH



Raising PSA Singapore's sustainability profile

We aspire to cultivate a generative culture where people are green-minded, green-skilled and green-motivated.

While the form and format of our outreach activities and events vary throughout the year in accordance with the Covid-19 measures, we continue to make great progress in all our existing programmes with the PSA SG Go Green Programme winning the Community in Bloom (CIB) Awards organised by National Parks Board (NParks) and even introduced a new programme – Go Green Corporate Social Responsibility (CSR) Programme.

Go Green CSR

This is a partnership between New Technologies & Sustainability Division and Corporate Branding & Commercial Division to empower our CSR partners, their beneficiaries and the wider community to be more sustainable. As a good corporate citizen, we want to do what we can to empower and impact the communities to collectively build a stronger nation for our children and future generations. By doing so, we will in turn encourage volunteerism and build a sustainability-focused culture within PSA SG.

In 2021, we partnered with Zero Waste SG, a charity and non-governmental organisation leading the drive towards zero waste in Singapore through education and advocacy, to promote and inculcate a go green culture among our staff and beneficiaries. PSA SG staff, as well as beneficiaries from St Luke's ElderCare (SLEC), HCA Hospice and The Haven (The Salvation Army Singapore) were provided opportunities to learn and rethink the concept of zero waste by learning how to create new value from unwanted items instead of just discarding them. The intention – especially in light of the on-going climate crisis – is to spread the message of a zero waste lifestyle. We were especially heartened to witness The Haven's children and youths' enthusiasm in conversations about protecting the environment. It shows that our future generations can be responsible stewards of our planet if we impart the right mindset to them!



Training on zero waste and climate change for PSA SG volunteers and our CSR partners.



The seniors at St Luke's ElderCare (Telok Blangah Centre) learn how to recycle unwanted items rather than trashing them. With our volunteers' guidance, the seniors tried their hands to repurpose old items.



A series of virtual workshops for the children and youths at The Haven are held during the school holidays to inculcate zero waste habits in them. They were taught how to upcycle from used items.

Everybody Makes a Difference Movement

This movement aims to create awareness and personal ownership that each of us can make a difference in reducing our personal carbon footprint and collectively, we can also make a difference in reducing our carbon footprint.

A Greenfish Sustainability Mobile App is being developed with Phase 1 to be launched in 2022. Open to all colleagues in PSA SG, the key functions in Phase 1 include a personal carbon footprint calculator. This app will further encourage users to adopt sustainable practices and integrate them into professional and personal actions.



PSA SG in Bloom Programme

This programme brings nature & biodiversity into the port through tree-planting and creation of food and recreational gardens. Collectively to beautify the environment, reduce carbon emissions, reap horticultural therapy benefits and eat local to reduce personal carbon footprint.

Phase 1 of Pasir Panjang Park was opened in September 2021. Banners showcasing PSA's sustainability efforts lined the lamp-posts across this 2.5km stretch in front of PSA Liveable City (PSA Horizons and PSA Alongside).



Regional CEO Ong Kim Pong (far right) with Mr S Iswaran, Minister for Transport, during the opening of Pasir Panjang Park Phase 1.



Regional CEO Ong Kim Pong (second from left) with Mr Desmond Lee, Minister for National Development, during the opening of Pasir Panjang Park Phase 1.



One of the banners showcasing PSA's sustainability efforts.

Pasir Panjang Park

In March 2019, PSA SG sponsored S\$3.5m to Garden City Fund (GCF) which supports projects that fulfil the City in Nature vision. The sponsorship goes to the development and beautifying of a 2.5km stretch of the Pasir Panjang Park, which is the first park to be designed and built together with the community, for the community. This is also one of the many ways PSA SG supports the "One Million Trees" movement.

The park forms a physical link and a mutual connection for the public to access the viewing deck at PSA Alongside which overlooks Pasir Panjang Terminal. In line with PSA SG's community outreach programmes, the community can enjoy the greenery and be closer to the port.

In the Urban Redevelopment Authority (URA)'s master plan, the Pasir Panjang Park will connect West Coast Park to Labrador Nature Reserve along the Greater Southern Waterfront in future.



Food Gardens

In 2021, two more food gardens – Sky Harvest at Pasir Panjang Terminal Maintenance Base (PPT MB) and OASIS@NEXUS at Tuas Port - were added, bringing the total number to five. The food gardens, including Botanicals Sky@MB, Botanicals Earth@MB and PATIO@PPTB3, produced more than 530kg of harvest, with over 140 types of flowering plants, fruits, herbs and vegetables planted to-date.



Oil drums planter stands at Botanicals Earth@MB fabricated by term contractor.

Sky Harvest at PPT MB

At Sky Harvest, on-shift colleagues from Service Recovery (SR) bought the materials and fabricated the stands. These self-fabricated stands for upcycled oil drum planters is less than 15% of the cost price compared to externally fabricated stands. A great idea to DIY and reduce costs!



Oil drums planter stands at Sky Harvest fabricated by on-shift SR colleagues.

Doing Good

In February, more than 25kg of our harvested produce from Botanicals Sky@MB was donated to The Haven.



Donation of harvested produce to The Haven.



Community in Bloom (CIB) Awards 2021

PSA SG submitted 3 food gardens – PATIO@PPTB3, Botanicals Sky@MB and Botanicals Earth@MB for this award organised by NParks, marking the first time that PSA SG participated in the CIB Awards.

PATIO@PPTB3 and Botanicals Sky@MB won Platinum whilst Botanicals Earth@MB won Gold in the Organisation category. In addition, Botanicals Sky@MB and Botanicals Earth@MB were among 20 community gardens in Singapore which received the “Outstanding Edibles – Growing Community Garden” title while PATIO@PPTB3 was named “Outstanding Community Engagement Garden”, alongside 17 other gardens in the country. The respective garden’s video submission link is below:

[PATIO@PPTB3](#)

[Botanicals Sky@MB](#)

[Botanicals Earth@MB](#)

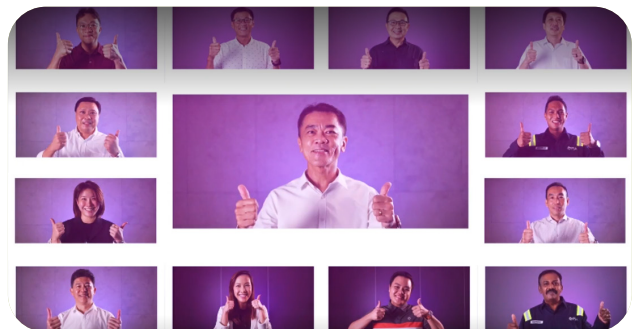
The CIB awards recognise excellence in gardening efforts by community groups and aims to encourage community gardeners to improve the standards of their gardens while identifying gardening as a fun and healthy activity. For PSA SG, it is a validation of our commitment to build and sustain a green movement.

Towards Enduring Partnerships (TEP!) Go Green

This is a partnership with HR, POU and SPWU to encourage all colleagues to Go Green with Management and Unions leaders taking the lead.

A TEP! Sustainability video highlighting PSA SG’s sustainability efforts, encouragement from Management and Unions Leaders and Staff making a personal pledge to care for the environment was shared on July 2021 in conjunction with the Ministry of Sustainability and the Environment’s (MSE) annual Climate Action Week (CAW). The video ended with a call for nominations for Sustainability Champions – PSA SG’s colleagues who have made a difference in sustainability on an individual level.

An online ceremony was held on Zero Emissions Day (21 September 2021), also in conjunction with annual PSA SG Go Green Month, to congratulate and acknowledge the efforts of 10 PSA SG colleagues who received the highest number of votes.



TEP! Sustainability video.

External Partnerships

PSA SG works closely with relevant government ministries and agencies such as the Ministry of Sustainability and the Environment (MSE), PUB, NParks and NEA, together with the People, Private and Public (3P) Network & Engagement team, to coordinate our outreach activities in tandem with national sustainability and environmental efforts and dates.

Singapore World Water Day (SWWD) by PUB

As PUB's corporate partner, PSA SG supported the annual SWWD in March 2021. Other than having a dedicated SWWD banner with PSA logo in blue on PSA SG corporate website and SGconnect (intranet), we held a photo contest and featured colleagues in blue on PSA SG's social media.



SWWD banner on PSA Singapore's website.



PSA SG colleagues in blue to support SWWD.



E-waste recycling drive during CAW.

Climate Action Week (CAW) by MSE

Singapore launched its Year of Climate Action in 2018 and since then, CAW has been an annual feature. 2021's theme is "City of Green Possibilities", in line with the Singapore Green Plan 2030. PSA SG supports MSE's efforts to rally our communities to take collective climate action and secure a sustainable future for Singapore.

Besides launching the TEP! Sustainability video, an e-waste recycling drive and a webinar as part of the Green Port Conversation series were organised.

Ecosperity by Temasek

PSA SG was one of the sponsors for Ecosperity Week which was held from 28 to 30 September 2021, and featured in a 45-min docuseries. PSA SG was featured in the Energy and Materials segment, two of the three segments in the docuseries.

On 28 September 2021, we participated in the Youth Ecosperity Dialogue (YED) with a presentation on PSA SG and our sustainability efforts, followed by a virtual port tour. A total of 80 students from the Institutes of Higher Learning (IHL) in Asia took part in the dialogue session.

Training and Development

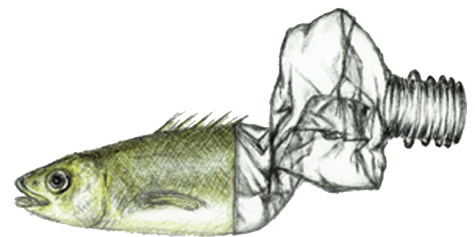
Green Port Conversation Series

This series of talks, jointly organised with PSA University and Human Resource, invites industry speakers to share their perspectives on various sustainability topics and how industry players like PSA can support the global decarbonisation agenda.

More than 100 participants attended the webinar “Research and Innovation in Sustainability – Strategies and Challenges for Singapore and Industries” held on 13 July 2021. The speakers were Dr Henry Wong and Dr Chen Xinwei from National Research Foundation (NRF).



Greenfish Climate Action – Towards a Sustainable Future



This e-learning programme, launched in April 2021, was jointly developed with PSA University, Group Climate Response Command (GCRC) and CREST Competence Sub-Committee.

The programme, which consists of 6 modules, provides an appreciation of the impact of climate change, its causes, and global developments and trends to manage it. It also covers the green efforts and initiatives that PSA is undertaking, and how each of us can support these efforts through the choices we make.

By end 2021, this was rolled out to almost 3,000 PSA SG staff.

Environmental Sustainability Management (ESM)

This 1-day workshop was started in March 2021 and 245 departmental and section managers were trained.

As part of Climate Action Education, the objectives are to build a culture and mindset attuned to organisational goals that support environmental sustainability and its management.

DO YOU KNOW Series, Season 2

This season featured 8 articles focusing on the waste generated in PSA SG and how they are being reduced, reused and recycled.



DO YOU KNOW How PSA SG's Tyres are Recycled?

Training for Environmental Activists

This 1-day course, opened to all staff, was conducted virtually with two runs taking place on 1 and 29 September 2021, reaching more than 40 participants. The course content was updated with the Singapore Green Plan 2030, the latest IPCC report and an update on PSA SG's sustainability efforts.

The participants also upcycled a name card holder from milk carton box, fabric bag from t-shirt and a LED lamp from plastic carton.

ENView

3 issues of ENView were published in 2021.



ENView Issue 8

Others

HSSE Week

Two Go Green activities were organised during HSSE Week in January 2021. The first was a visit to a LNG site at the Pasir Panjang Terminal and the second was a composting workshop by NParks.



Visit to LNG refuelling site during HSSE Week



Composting workshop by NParks during HSSE Week

PSA SG Go Green Month

PSA SG Go Green Month takes place every September.

A Donation and Recycling Drive was jointly organised with POU and SPWU and held from 6 to 17 September 2021. 150kg of new or lightly used items in good condition were collected for The Salvation Army.

An online talk, "An Environmentalist's Zero Waste Journey" was held on 21 September 2021 and attended by close to 30 participants.



OCCUPATIONAL HEALTH





PSA Singapore pledged to inculcate a sustainable and healthy working environment that focuses on the mental wellbeing of all its stakeholders

The global pandemic has brought mental health challenges to the forefront. PSA SG recognises this and has been advocating the importance of workplace mental wellbeing. Winning the Silver Ribbon Mental Health Award in 2021 is a testament to PSA SG's commitment towards creating a better workplace for our employees and stakeholders.

To that end, PSA SG has launched a series of programmes to encourage an active and healthy lifestyle, such as health talks and workshops, health and fitness challenges, and the annual PSA SG Health & Wellness Week. Despite the pandemic putting a halt on physical events, PSA SG adapted in the face of disruptions and re-formatted existing mental wellness programmes into virtual ones.

Many of these events were collaborations with agencies such as the Health Promotion Board (HPB), Singapore Association of Mental Health (SAMH), Silver Ribbon, Care Corner Singapore, Institute of Mental Health (IMH) and HealthServe Ltd.

HSS Care, an internal e-newsletter, also carries physical and mental health-related information. Some divisions started a peer support system to promote a culture of care and support and allow individual workers to share their experiences in work-related issues. Several mental wellbeing courses, including training on Mental First Aid Responder, were also organised by PSA University.

PSA Health and Wellness Week

Held annually since 2016, the events in 2021 were focused on educating the staff and solution partners on mental health issues and promoting mental wellbeing. There were four mental health talks and dialogues facilitated by professional counsellors and two art therapy workshops conducted by certified art therapists.

PSA Confidant Programme

To build a sustainable culture of resilience, PSA SG Human Resource launched an in-house para-counselling initiative under its 'Aware, Detect & Support' mental wellness framework to provide an alternative channel and listening ear to staff who need help. Known as the 'Confidant Programme', this channel is supported by specially selected staff who are mature, experienced and passionate about helping others. Staff who require further support will be referred to external professional counselling services by the Confidants.

SPEAK WITH A CONFIDANT

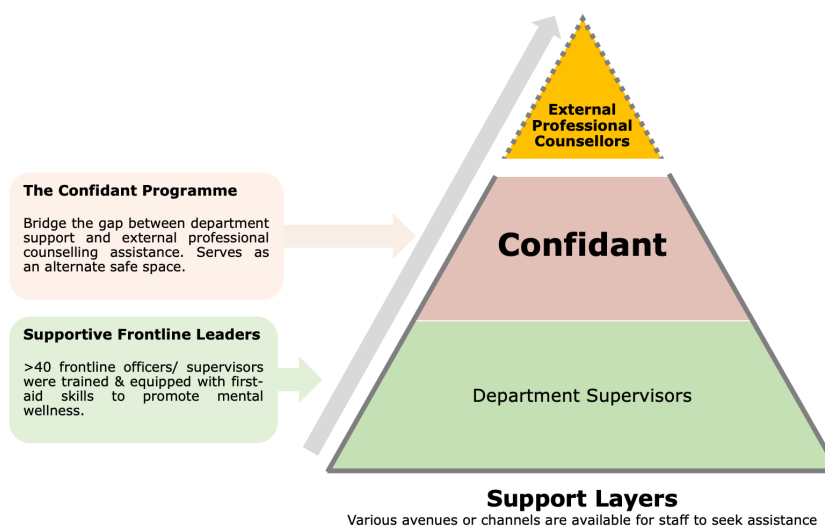
If you are feeling overwhelmed, stressed, anxious or simply need a listening ear, do reach out to us.

We are a team of para-counsellors, affectionately known as your PSA "Confidants".

To speak with us, give us a buzz via the hotline.

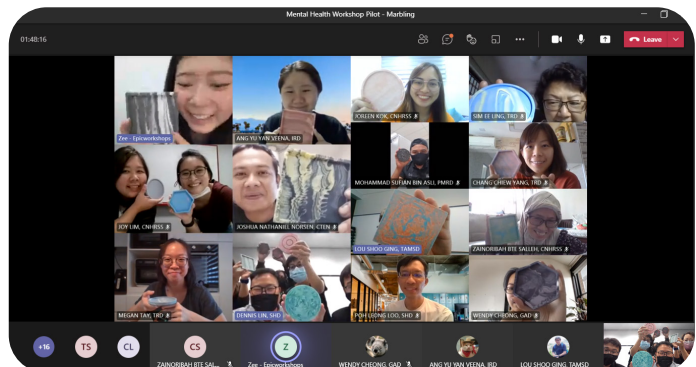


All conversations will be kept strictly confidential.



Psychological Safety

PSA SG will continue to train and empower staff to navigate mental health issues at work, handle difficult conversations, and create supportive workplaces through counselling services, peer listening initiatives, personalised health coaching programmes, health talks and workshops. But it is up to individuals to collectively create and nurture a sense of psychological safety. The workplace can be a psychologically safe place for any one to share and be supported.



Mental Health Experiential Workshop by HPB

Awards and Recognition

Silver Ribbon Mental Health Awards 2021

PSA SG was recognised for its efforts in promoting a mental health-friendly workplace at the Silver Ribbon Mental Health Awards for Employers 2021. PSA supports Silver Ribbon (Singapore)'s vision in promoting a positive attitude towards mental health among our community.

PSA SG was among 12 Singapore-based organisations that were given a nod at this inaugural event, organised by Silver Ribbon (Singapore), a non-profit organisation that aims to combat mental health stigma and promote a positive attitude towards mental health.

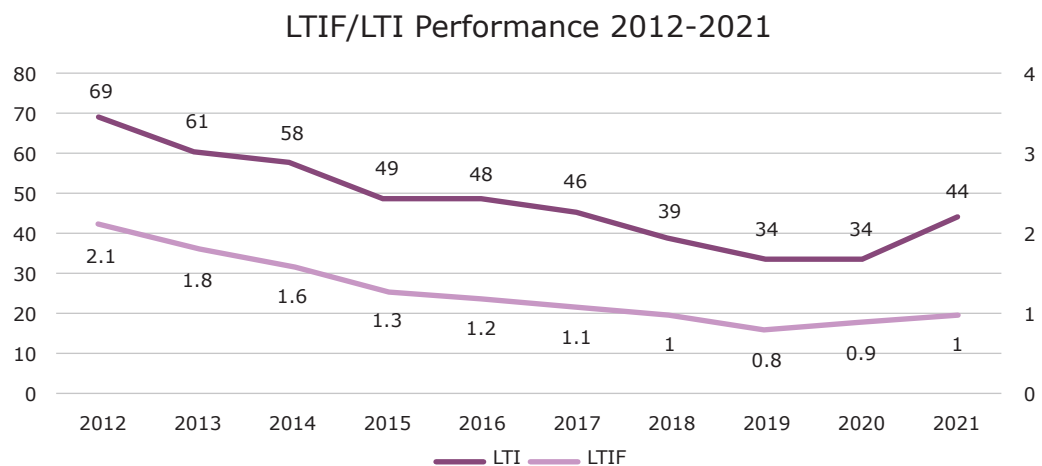


SAFETY



Safety is our topmost priority and the most fundamental requirement for our terminal operations

Loss Time Injury (LTI) and Loss Time Injury Frequency (LTIF) at PSA SG have reduced significantly over the past 10 years. In 2021, there was a slight increase in LTI to 44 and LTIF to 1.0 but these are below the control limit and the threshold of not more than 1.1 for the LTIF.



PSA SG Loss Time Injury (LTI) and Loss Time Injury Frequency (LTIF) Performance from 2012 - 2021



We will continue to instil a safety mindset in our people and solution partners, and work alongside our stakeholders on the 3 key strategic thrusts - build a generative safety culture, feel the ground and leverage on technology as an enabler of safety excellence.

HSSE Launch 2021 is an annual event where PSA SG's leaders, staff, and representatives from government agencies, Unions, associations, and solution partners affirmed our collective agreement to Health, Safety, Security and Environment (HSSE). Accompanying the launch is a week-long programme of activities and events to engage staff and solution providers.

Sustaining a Generative Safety Culture and Feeling the Ground

We continue our culture journey through the Starfish Safety Workshops to instil a safety mindset in our people and solution partners.

In 2021, 840 PSA staff and 149 solution providers staff attended the virtual workshops. Since its inception, 4,659 staff and 626 solution providers were trained.

Take 5+ is reinforced before commencing any task. Colleagues are trained to look out for one another to keep each other safe at our workplaces. Hazard reporting or near-miss reporting, with no fault or blame, is encouraged to achieve a desirable safety

culture. Human capital has always been PSA SG's greatest asset. It is everyone's personal responsibility to create a safe and healthy work environment.



Technology, an Enabler of Safety Excellence

Predictive Analytics for Quay Crane Operators

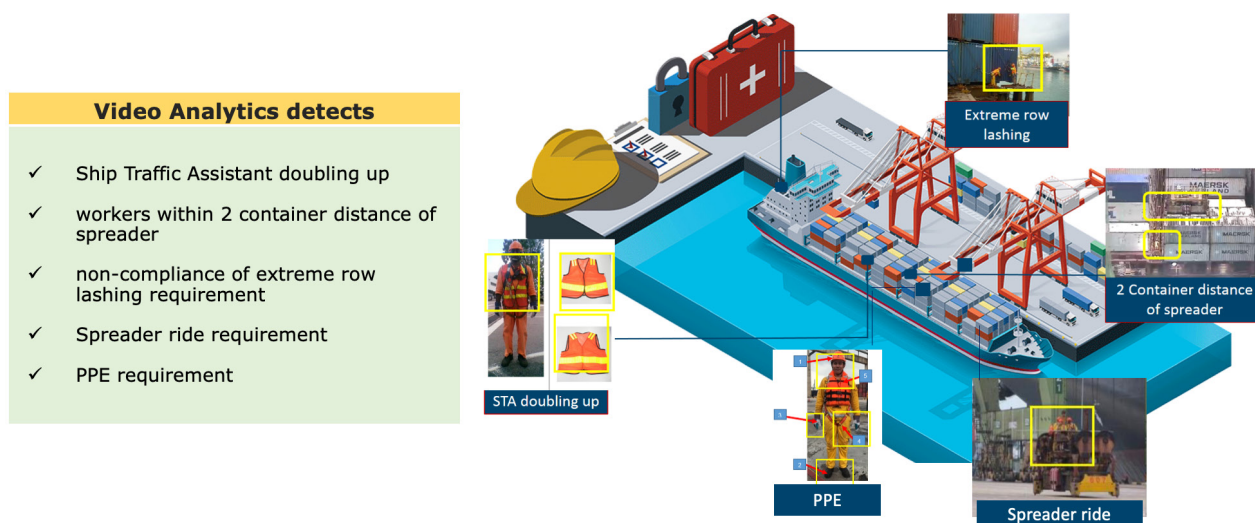
At PSA, data from the cranes' sensors used to track maintenance are also utilised to better understand the operating behaviour of our quay crane operators. This allows early intervention and correct at-risk operating behaviour before an incident happens.

Using historic data and analytics techniques such as statistical modelling and machine learning, operators' past operating behaviours and safety records, the risk scores or probabilities of operators meeting with an accident in near future can be predicted. Quay crane operators with high risk scores are identified and sent for pre-emptive intervention programmes such as counselling, refresher course training, and mentoring to reinforce safe operating behaviour.

The effectiveness of pre-emptive intervention programme is also tracked by comparing the quay crane operator's performance pre and post intervention.

Video Analytics for Lashing Operations

Video analytics have been operationalised for lashing operations. There is 24/7 surveillance of lashing operations onboard vessels. Any violations of safe work procedures while working onboard vessels will trigger the command centre for immediate follow-up. Such video analytics is also used for terminals' traffic management.



Awards and Recognition

Workplace Safety and Health (WSH) Innovation Awards for Logistics and Transport Sector 2021

PSA SG clinched the silver award at the Workplace Safety and Health (WSH) Innovation Awards for Logistics and Transport Sector 2021 for two projects – Predictive Analytics on Quay Crane Operators and Video Analytics for Lashing Operations. The project on Predictive Analytics was shared with the industry at the WSH Symposium on Cranes 2021, organised by the WSH Council in October 2021.

Singapore Road Safety Awards 2021

PSA SG and one of its staff, Mr Balakrishnan S/O S Govindarajoo from Prime Mover Resource Department (PRMD), were both recognised as Champion Winners in the Heavy Goods Vehicle Category in the Singapore Road Safety Awards (SRSA) 2021 organised by the Singapore Road Safety Council (SRSC).

SRSA is a joint effort between SRSC, Traffic Police, Land Transport Authority and WSHC to recognise exemplary companies and company drivers for their efforts in keeping our roads safe.

A PEOPLE-ORIENTED CULTURE



PSA SG recognises the value its employees bring to the overall business success. Developing human capital and transforming our workforce are especially critical in this fast-paced and ever-changing world. PSA SG's many ground-breaking and innovative projects, which value-add to the supply chain and our stakeholders, would not have been possible without our skilled and motivated human capital, and a workforce that embraces rapid change for the company's greater good.

The success of our organisational culture is built upon the strong collaboration and trust forged with our Unions and staff over the years. PSA SG continues to work alongside our partners and stakeholders for a future-ready workforce.

Staff Strength

As at end 2021, we have 9,400 direct employees, of which 1,500 are executives and 7,900 are non-executives.

Staff Category	Male	Female
Executive	1100	400
Non Executive	7500	400

Age Profile	< 30 years old	30 – 50 years old	> 50 years old
Executive	300	950	250
Non Executive	1200	5300	1400

Attractive Working Environment

Global OD Movement to Create a Lasting Culture

On top of ongoing efforts to cascade in-house signature workshops (Tao of Coaching, Catfish, Fish Blazer, Jellyfish, Fish Booster, Starfish) and the corporate orientation programmes, PSA SG continues its strong focus on strengthening its Organisational Development (OD) network to enhance corporate culture. A series of initiatives to prepare PSA SG for the Future of Work were introduced under the Global OD Movement. Through short surveys and engagement activities, the culture track focused on motivation, raising self-awareness and building psychological safety.

To encourage and build a culture of innovation at the workplace, PSA SG's Human Resource Division collaborated with the Innovate@SEA team and launched the Infuse Innovation initiative. This initiative aims to increase collaboration across the Southeast Asia business units and improve the quality and adoption of innovation projects.

The bi-annual Employee Opinion Poll exercise was conducted in November 2021. In alignment with our digitalisation efforts and to go green, almost all responses were submitted online.

On 1 July 2021, PSA SG held its annual SAF Day Rededication Ceremony virtually to recognise and appreciate our promoted NSmen colleagues from the SAF, SCDF, and SPF. The event was attended by 90 participants, including promoted NSmen colleagues, leaders from the two Unions - Singapore Port Workers Union (SPWU) and Port Officers' Union (POU) - and PSA SG management.

To promote mental wellness, PSA SG kickstarted an in-house para-counselling service known as the 'Confidant' programme. The aim of the programme is to provide an additional layer of support to staff who need a listening ear or basic counselling.

Engagement with Institutes of Higher Learning (IHLs) to Grow Talent Pipeline

PSA SG continues to raise its mindshare among local undergraduates through a series of virtual engagement sessions to excite them about various PSA SG's programmes - Management Associate, Junior S.E.A.L. and Scholarships. Leveraging the Gradsingapore portal, PSA SG also partnered institutions such as the Singapore Maritime Foundation and MOE-SgIS to feature career stories, news articles and social media posts to increase PSA SG's visibility and attract talent.

PSA SG also worked with selected junior colleges to offer work attachment programmes for students as part of early mindshare-building efforts.

We continue our branding and recruitment efforts to students and job seekers through institutional outreach, career fairs, virtual engagements sessions and outreach talks. A revamped digital brochure was launched to augment our efforts and expand our digital presence. A virtual hackathon “PSA Code Sprint 2021” was also organised with students from various IHLs invited to work on problem statements related to supply chain, sustainability, and safety and health, providing them opportunities to learn more about PSA SG and its businesses.

Workforce Agility & Transformation

PSA SG continues its recruitment efforts in building up its manpower capabilities to deliver high service levels amidst challenging business conditions.

New job roles for Tuas Port, such as the Automated Equipment Specialist job family, were designed and introduced to harness the full potential of new technologies. As part of ongoing efforts to redesign jobs for better synergy and effectiveness, a new HSS job family was introduced that integrates the role of the

Port Facility Security (PFS) and Emergency Response Services (ERS) Team Lead. This enables multi-skilled staff to be agile in responding to HSS needs with more career advancement opportunities.

To encourage multi-skilling, build agility and develop T-shape managers, PSA SG rotated 17.8% of its senior officers (Assistant Managers or equivalent, and above) in 2021, including positions in PSA Group. These job movements were either within the same domain or across different domains. PSA SG continues to offer employees internal job vacancies to provide them greater empowerment in their career management.

As part of ongoing efforts to grow the “People Developer” culture within PSA, the Career Conversion Workshop continues to be cascaded to senior managers to strengthen our leaders’ competency in engaging staff on career conversations and developmental interactions. Since its pilot in Aug 2019, close to 260 senior managers & department heads had attended the programme.

Alongside the Unions

Strengthening labour management relations and staying alongside our staff and Unions remains key to a safe, agile and resilient workforce. Together with our Unions – SPWU and POU – we embarked

on several initiatives as we walked through the journey of “saving lives, sustaining livelihoods and securing our future”.

SPWU and POU have been in the forefront rallying PSA’s frontline staff to keep the port running 24/7 during the pandemic, encouraging them to be agile in adapting to changes while complying with the safe management measures.



Alongside Conversation with RCEO SEA held on 1 Dec 2021

Fronted by HR, divisions and departments in PSA SG have monthly engagements with the Unions to share new initiatives and workforce related issues. There were several discussions with Unions on the new work arrangements, home-work accessibility and staff transition, as well as the roll out of various automation trials such as the automated wharf supervision system. With strong support from the Unions, PSA SG transited about 300 staff to support Tuas Port.

Dialogues and get-togethers with PSA Senior Management were held regularly to keep Unions’ leaders abreast of the business outlook and future developments. The Unions and Management embarked on joint committees and projects, such as the SkillsFuture Council and Tuas Workgroups, which focus on long-term workforce strategies to steer career developments and

to build a future-ready workforce. As part of its culture building efforts, the Unions and Management also worked together on initiatives aimed at improving mental wellness and promoting sustainability behaviours through its “Towards Enduring Partnership” programmes.

A new PSA Corporation Employees’ Agreement 2021 was signed on 1 November 2021 with SPWU, which is valid for 3 years. The Agreement will meet the needs of PSA staff while driving growth opportunities through re-skilling, upskilling and multiskilling.



Employees’ Agreement signing ceremony

In partnership with POU and the Singapore University of Social Sciences, PSA SG HR also conducts Professional Development Seminars to expand the horizons of senior officers in areas relevant to PSA’s growth in the port and supply chain industry.



Training & Education

Strengthen Key Capabilities for a Future-Ready Workforce

Asynchronous learning through e-learning continues to be vital in staff development and training as Covid-19 persists. To date, PSA SG staff have participated in more than 44,500 training placements in key e-learning programmes such as Greenfish – Climate Action Education, Razorfish, Power BI Basic and TOPSIS.

Average Training Hours Per Employee

Executive	65
Non Executive	78
Overall	76

PSA SG also continues to implement programmes such as Automation Familiarisation, Gearing Up for a Digital Workplace, and sustainability-related courses to develop future-ready competencies, raise the technology quotient and sustainability awareness of staff.

The use of big data analytics can help PSA enhance operational efficiencies and identify new opportunities. We seek to uplift employees' data competencies and capabilities through initiatives such as Data Analytics (DA) Gym, and training programmes such as the Razorfish e-learning, Power BI courses and the Appreciation of Data Analytics workshop. There were more than 3,500 training placements in these DA-related programmes in 2021.

Build a Continuous Learning Culture

PSA SG launched its inaugural issue of Get Hooked! Learning bites, an internal quarterly newsletter, on 10 September 2021 to encourage self-directed and continuous learning. This initiative provides bite-size learning resources covering three key areas – The World at Large (geopolitical, economic, business & social trends), Tech Insights (technology, data and digital trends), and Leadership & People (personal mastery and general management topics).

PSA SG signed a Memorandum of Understanding with NTUC LearningHub (LHub) on 24 November 2021 to enable our staff to subscribe to the NTUC Lhub Learning eXperience Platform (LXP) which has access to 75,000 online courses. This is for companies to remain competitive and to help workers stay relevant, via business transformation and upskilling. To support staff in their learning, PSA SG extended the use of the Lifelong Learning Fund (LLF) for junior officers to pay for the annual subscription fee. Senior officers can tap on their Self-Development Scheme (SDS) to subscribe to the LXP.

COMMUNITY RELATIONS





PSA recognises the importance of connecting with our communities by listening, understanding and engaging. Being alongside the community defines our DNA. PSA SG's corporate social responsibility (CSR) efforts focus on the ageing population, amidst the increasing life expectancy and low fertility rates in Singapore. With more than 65,000 persons aged 65 and above in 2020, or about 15% of the total population, resources used to manage this sector are stretched. PSA SG embarked on its CSR initiative, 'Health@Home', in 2015, and have diligently pursued two fundamentals – sharing caregiving knowledge with staff to help the seniors and themselves; and building a spirit of volunteerism amongst employees, fulfilling both societal and community needs. By being alongside the needy seniors and the less privileged, PSA seeks to touch the lives of both employees and the seniors through a range of socially responsible and sustainable programmes.

PSA SG partners and collaborates with organisations such as HCA Hospice, Lions Befrienders, National University Health System (NUHS) and St Luke's ElderCare to enable sustainable support, progress and development for both volunteers and beneficiaries. Leveraging on its strengths, skills and resources, PSA SG takes positive and enduring actions to benefit these groups. The CSR programmes also add to the good health and wellbeing of all involved.



14

retiree volunteers
between the ages of
67 – 75 years old, and to
keep themselves active
and fit by continuing to
volunteer with PSA

570

volunteers
in 6 years

21,000

volunteering hours
accumulated over
the past 6 years

volunteer age range
24-69

7.5

hours per volunteer
spent on H@H activities
= almost 1 full
day's work

Volunteerism is Part of Our DNA

The spirit of volunteerism shines strong in PSA. Its internal culture built on the FISH!* principles such as 'Be There', 'Play', 'Make Their Day' and 'Choose Your Attitude' forms the essence of PSA's DNA. These principles mirror that of volunteerism and enable PSA employees to harness a strong spirit of volunteerism.

*FISH! is a trademark or service mark of ChartHouse Learning.
For further information on the world-famous Pike Place Fish
Market and the FISH! Philosophy, please go to
<https://www.fishphilosophy.com/fish-philosophy-story>

Connecting with Our CSR Partners



Since 2015, PSA SG has forged a strong bond with our CSR partners, fuelled by a common goal to remain alongside and support the seniors in our society, many of whom are pioneers who helped build Singapore. Despite restrictions during the pandemic, PSA SG continues to actively engage our community partners through

regular meetings, and understanding their needs, especially during the challenging times. This has allowed PSA SG to stay connected and to calibrate and adapt our support accordingly. The constant communication is also a barometer for organising targeted virtual activities for the beneficiaries.

Volunteering Activities Continue During the Pandemic



The evolving safe management measures continued in 2021 and PSA's Health@Home team remains agile to adjust creatively to stay connected with our community partners. PSA SG's initiative "PSAssist", with the tagline "Apart in Distance, but Never in Heart!", motivates its beneficiaries through the sending of 'love and care gifts' to frontline healthcare workers, boosting their morale. The team also leveraged technology by organising virtual CSR activities. The subsequent removal of certain safe management measures allowed PSA volunteers to reach out in a hybrid format.

Strength in Numbers

As the pandemic continues to cause disruptions in social lives and livelihoods, PSA SG remains committed to engage its beneficiaries through various national initiatives.



Together, Singapore Cares Campaign

PSA SG collaborated with its subsidiary, CrimsonLogic, where they co-sponsored learning resources such as thumb drives, USB mouse and stereo headsets, to enable a conducive e-learning experience for 560 underprivileged students in Chua Chu Kang Primary School and Teck Whye Primary School.



Wishes for 500 Smiles

PSA SG again collaborated with CrimsonLogic, to organise the "Wishes for 500 Smiles" initiative for the second year. Volunteers came together to fulfil the wishes of 500 individuals with gifts including household items and daily necessities. This initiative coincides with SG Cares Giving Week 2021. PSA SG also reached out to the People's Association and the Children's Cancer Foundation.

Keeping our Community Green

PSA SG sponsored S\$3.5 million to the Garden City Fund (GCF) for the development of a 2.5km stretch of Pasir Panjang Park, located in front of PSA Horizons - the corporate headquarters of PSA. The Phase One opening of the park in September 2021 was a strong testament to PSA's green efforts. Phase Two will open in 2023. The park includes a linkway to connect the public to a viewing deck at PSA Alongside, which overlooks Pasir Panjang Terminal. This is part of PSA's community outreach to bring the community closer to the port.



Howe Yoon Chong PSA Scholarship

The Howe Yoon Chong PSA endowment fund was set up in 2008 in honour of the late Mr Howe Yoon Chong, a visionary who made significant contributions to Singapore, including building Singapore's first container terminal. The former Minister was also the Chairman of the then Port of Singapore Authority.


Through his astute leadership, Mr Howe transformed the port and laid the foundation for PSA's growth into a leading global port group. To honour him, PSA set up an endowment fund to award bond-free scholarships to Singapore citizens. The endowment fund is under the auspices of Trailblazer Foundation Ltd, a

registered charity under the purview of the Commissioner of Charities of Singapore, and comprises contributions from PSA, Temasek Holdings and NSL Ltd.

The Howe Yoon Chong PSA Scholarship aims to provide financial assistance to Singaporean students from lower income families, especially those who have made a difference to their community or society. The scholarship covers tuition fees, book and living allowances, as well as other compulsory fees. To date, the scholarship has touched the lives of more than 300 students from diverse backgrounds, helping them to achieve both their educational and life goals.

NAVIGATING THE ROAD TO LIVING WITH COVID-19





Saving lives, sustaining livelihoods and securing our future while we continue to keep the port and global supply chains open

Covid-19 continued to rage in 2021 and remains one of the most serious global health crisis of the century, affecting lives and livelihoods. It continued to disrupt our daily lives and affect global economic activities. Variants coupled with high infection rates, border closures, travel restrictions and lockdowns grabbed global headlines, contributing to supply chain anxieties and increased unemployment.

As an essential business, PSA SG is responsible for ensuring our terminals remain operational to keep supply chains open and trade flows smooth. The risk exposure for our people was kept at a minimum with the high vaccination rate of 99% for PSA SG staff and solution partners. Our staff and solution partners also took part in the Rostered Routine Test (RRT) regime to detect infection early, preventing further spread.

PSA SG stayed vigilant and adhered to the guidelines from the Multi-ministry Task Force. Everyone took responsibility for their own personal hygiene, followed the prevailing safe management measures and continued to serve our customers and stakeholders to the best of our abilities. PSA SG also supported the nation's Covid-19 battle by providing its facility at Tanjong Pagar Terminal for Community Care and Recovery and participated in the Sea-Air Vaccination Exercise (SAVE) programme.

Community Care and Recovery Facility at Tanjong Pagar Terminal

The community care facility for infected migrant workers can accommodate up to 3,500 persons at any one time and was set up at Tanjong Pagar Terminal in May 2020. This facility served more than 5,000 migrant workers in 2021.

In November 2021, the capacity was increased to accommodate 4,500 workers and the facility was operated and managed by the Ministry of Manpower (MOM) as a Centralized Recovery Facility (CRF). The CRF is to house fully vaccinated migrant workers and dormitory residents who were infected with Covid-19, for their self-recovery.

PSA SG assisted in the capacity expansion and facilitated the conversion to a CRF. The operations and management of the facility will be handed to MOM on 1 January 2022.



PSA Singapore's Participation in SAVE Programme

The Port of Singapore started vaccinating resident foreign sea crew against Covid-19 virus in April 2021, under the SAVE programme



From 30 August 2021, this multi-agency initiative was expanded to include non-resident foreign sea crew. Sea crew staying longer than 30 days, crew going onboard vessels, and those entering Singapore at least once a month are eligible for the vaccination.

To protect the crew, PSA SG worked with Singapore Shipping Association (SSA), Singapore Maritime Officers' Union and Fullerton Healthcare Group to vaccinate crew onboard ocean-going vessels calling at Singapore, and crew signing onto ships in Singapore. 12,000 vaccine doses were made available and funded by the Shipping Tripartite Alliance Resilience Taskforce, an international tripartite alliance led by SSA.

INNOVATION AND TECHNOLOGY



PSA Singapore embraces and leverages innovation and technology to multiply its sustainability efforts, build workforce resilience and reduce carbon footprint through circularity

Innovation and technology are key enablers of PSA's sustainability efforts. To stay ahead of the curve, PSA seeks to create value and achieve business success through innovations and technologies. With continued investment in R&D projects, PSA can achieve greater operational efficiency and sustainability, as well as reduce its carbon footprint.

Smart Grid Management System (SGMS) and Battery Energy Storage System (BESS)

PSA SG is developing smart grid solutions and battery energy storage systems to optimise energy use in port operations. Together with the Energy Market Authority (EMA), PSA SG awarded a grant of S\$8 million to a consortium led by Envision Digital International to develop an Artificial Intelligence-based SmartGrid Management System (SGMS) and a 2MW/2MWh Battery Energy Storage System (BESS). The design for BESS is completed and the battery container has been fabricated. The EnOS™, Envision Digital's proprietary AIoT operating system, has also been deployed. This supports the smart power analytics dashboard to drive energy management and operational excellence.

The SGMS operates BESS and other distributed energy resources as a virtual power plant for peak power management and energy market participation. It is equipped with algorithms performing economic analysis, to better facilitate business decisions in energy generation, purchase and trading, without compromising operations performance.

The following key milestones were achieved in 2021

Deployment of Energy Dashboard for electrical infrastructure planning and energy management

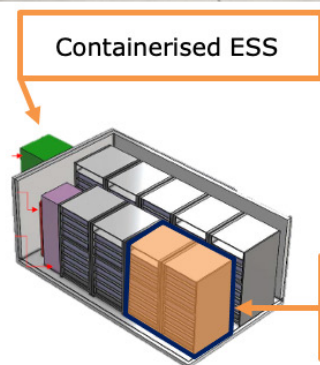
Deployment of IoT platform for digital asset modelling and data streaming

Design of deterministic optimisation algorithm for bidding into energy market

Design and delivery of BESS system

Scale Up BESS Capacity with Retired Batteries

From 2MW, BESS is projected to grow exponentially to 156MW by 2035. The exponential growth is possible with the Battery Charge and Swap Station (BCSS) coming on-stream in 2024 and with the reuse of retired batteries from the Automated Guided Vehicles (AGVs) and electric Prime Movers, after the batteries reach their designed end-of-life in 8 to 10 years. The retired batteries will be re-purposed into BESS to store energy, extending the batteries' life span up to 16 - 20 years.



AGV Battery Pack

AGV Battery Pack Form Factor

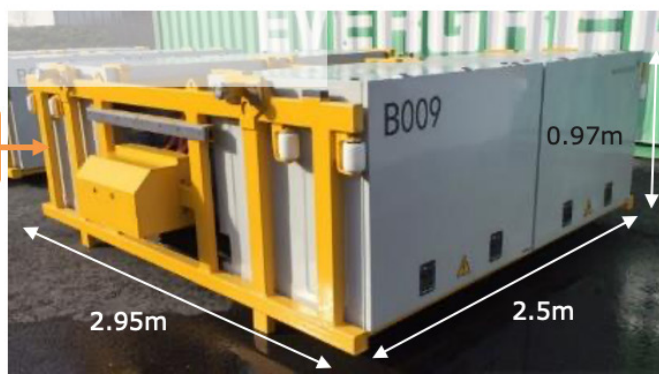


Photo and stated dimensions are for illustration only



AGV battery pack

Key Benefits of BESS

Integration with Smart Grid and serve as distributed energy resources for port energy optimisation

Distributed energy resources or DERs are small scale power generation units that are typically owned by consumers and connected to the national grid at the distribution level. Examples include Solar Photovoltaic (Solar PV) systems, Electric Vehicles (EVs) and Energy Storage Systems. PSA SG's DERs that are integrated with the Smart Grid are Solar Photovoltaic Systems and BESS.

Allow for potential commercial collaboration with industry players on peer-to-peer energy trading

Due to its storage capabilities, a third application of the BESS is for energy arbitrage where electricity can be charged and stored at times when energy prices are lower and be discharged when energy prices are higher. This creates an avenue for energy to be "purchased" at a lower price, stored and be "sold" at a higher price, creating revenue in the process.

Load demand management

BESS can be used as a load demand management tool to perform peak shaving, by charging and discharging the stored energy at strategic time intervals to achieve an overall reduction in peak demand. This helps PSA SG to avoid additional charges from the electricity supplier in cases where the load demand exceeds a pre-determined threshold, also known as contracted capacity.

Enable energy market participation to enhance grid resilience and as back-up energy source for Singapore

PSA SG is establishing regulatory sandbox with EMA to unlock the full potential of BESS applications in the market.

BESS can also be used to provide frequency regulation services to stabilise Singapore's grid intermittency. The process involves dispatch of BESS by the Power Systems Operator (PSO) to fine tune the match between demand and supply in the National Electricity Market of Singapore (NEMS).

PSA SG's BESS can also be used as backup facilities for green electricity import. This will also support Singapore's plan of having at least 200MW of Energy Storage System beyond 2025 to address intermittency, grid resilience and transition towards a greener energy mix.

Future Plans for BESS

Potential plans include engaging with relevant ministries, agencies and industry partners to explore the possibility of multi-level stacking of BESS to optimise land use, contribute towards establishing standards and operating parameters for second life batteries, as well as the safety and operational standards for potential multi-level battery stacking.

Exploring Hydrogen as a Low-Carbon Alternative

PSA SG has partnered six companies to develop a commercial scale and sustainable hydrogen economy, extending to design, technical development, safety, and operations in adopting Chiyoda Corporation's SPERA Hydrogen™ technology.

In addition, PSA SG is one of the industry collaborators supporting Nanyang Technological University (NTU) in developing new technologies to extract hydrogen from liquid organic hydrogen carriers to power Singapore's green energy future. Collaborations with like-minded stakeholders allow knowledge sharing and capacity building across all teams. Collectively, we can realise the vision of using hydrogen as a viable energy source for Singapore.

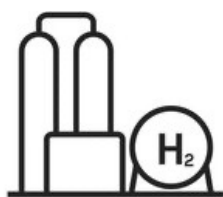
PSA SG is to develop the first proof-of-concept (POC) hydrogen use project for horizontal port transportation, fueled by Chiyoda's SPERA Hydrogen™ technology. The POC seeks to develop an ecosystem for use of hydrogen-based container handling equipment and future adoption of green hydrogen. This project aims to contribute to the design of a cost-effective hydrogen supply chain network for Singapore.

The POC scope covers upstream, midstream and downstream, and the designed outcomes include:

- Gaining insights into the viability and scalability of Methylcyclohexane (MCH) as a potential hydrogen vector for PSA and Singapore
- Building the first modular hydrogen refuelling station (HRS) in Singapore
- Developing safety and operational standards (Technical Reference or Singapore Standards) for HRS for broader adaptation by the industry
- First operational model using hydrogen fuel cell prime mover to support PSA's port operations
- Aggregating demand and accelerating the development of hydrogen economy and proliferate the adoption of hydrogen fuel cell prime movers for PSA and the haulier community
- Developing talent pool and capabilities in this domain within Singapore

Upstream

Hydrogen supply through dehydrogenation process

**Midstream**

Development of hydrogen refueling station

**Downstream**

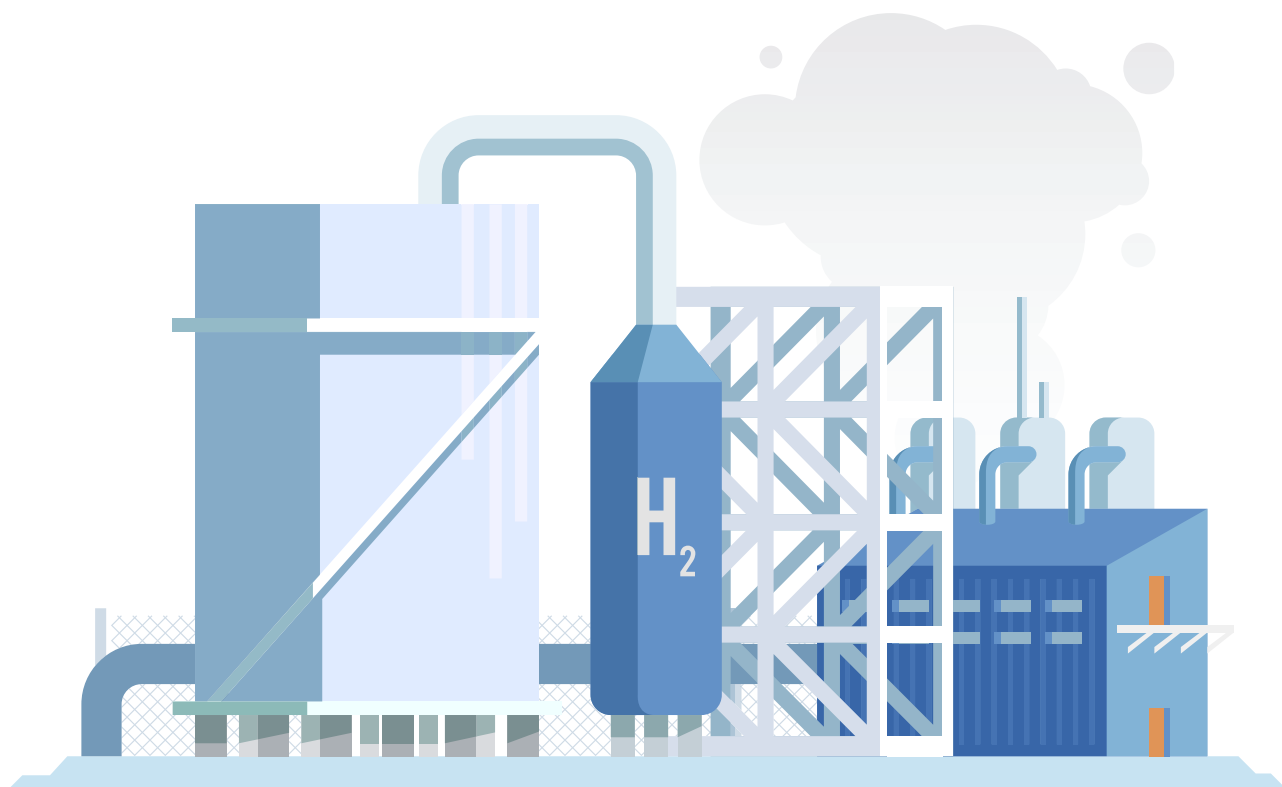
Hydrogen utilisation
(Hydrogen fuel cell prime mover)



For the upstream segment, PSA will demonstrate a use case using Chiyoda's SPERA Hydrogen, Liquid Organic Hydrogen Carrier (LOHC) technology to allow hydrogen to be safely transported in chemical tankers at normal atmospheric temperature and pressure.

For the midstream segment, PSA will develop the first modular hydrogen refuelling station in Singapore. It will be fully operational with optimal refuelling design that meets international standards. In addition, its design and system can be used as a blueprint for future hydrogen stations in Singapore.

For the downstream work package, PSA is partnering with hydrogen fuel cell suppliers on mobile equipment to validate its reliability, operations, and build local capability in maintenance.



Construction of the modular hydrogen refuelling station will begin in 2022 and is expected to be completed by January 2024. The POC will then run for a year.

If hydrogen reaches cost parity and the POC proves viable, PSA SG plans to replace its existing diesel prime movers with 300 units of hydrogen fuel cell prime movers, utilising up to 4 million kg of hydrogen from 2030 onwards. Through this, PSA SG aggregates hydrogen demand and supports proliferation of this 4th national switch - "Low-carbon alternative" to reduce both PSA and Singapore's carbon footprint.

Greening Horizontal Transport

Automated Guided Vehicles (AGVs)



The AGVs play a significant role in automating yard and wharf operations at Tuas Port due to their versatility and manoeuvrability in picking up and transporting containers. These driverless electric vehicles are greener and more sustainable, compared with diesel prime movers, reducing carbon emissions by about 50 per cent. These battery-powered AGVs with automated charging facilities require less maintenance and have a

lifespan of about 20 years, double that of a diesel prime mover.

The fleet of AGVs will increase in tandem with growing port operations. AGVs were first test-bedded at Pasir Panjang Terminal and have since gone through some refinements in the technical specifications to suit Singapore's weather conditions and the robust operational conditions. For example, every 20-min fast charge (120kWh per charge) will support 4 to 6 hours of continuous operations.

PSA SG had also signed a research collaboration agreement with the Agency for Science, Technology and Research's (A*STAR) Institute of High-Performance Computing (IHPC) in Singapore to jointly develop a large-scale fleet management solution for the AGVs to move containers efficiently and securely at Tuas Port. This research collaboration allows knowledge sharing between PSA and IHPC.

PSA SG and IHPC will co-develop advanced automation and digitalisation solutions that can meet the demands of a large AGV fleet in terms of computational load, responsiveness and scalability. Upon successful development, PSA will apply the smart solutions to future enhanced fleet management systems as operations in Tuas Port gradually scale up.

Liquified Natural Gas Prime Movers (LNG PMs)

Singapore's first LNG kiosk was built in Pasir Panjang Terminal and commissioned in 2021. PSA SG currently has 160 LNG PMs. Compared to their diesel equivalents, these LNG PMs reduce carbon emissions by about 20%.

The global maritime industry also benefitted from PSA's contributions to 2 Singapore Standards Technical Reference - TR 56 (LNG Bunkering) and TR 74 (Code of Practice for Storage, Land Transportation and Handling of LNG).

On 23 March 2021, PSA SG handled SIMOPS on CMA CGM Scandola, marking the first time such operations are conducted in Asia. SIMOPS refers to simultaneous operations - ongoing container loading and discharging operations on an LNG containership berthed alongside, with LNG bunkering done concurrently.

Electric Prime Movers (ePMs)

Singapore has made some headway with electric vehicles, but there is no proliferation of electric trucks. PSA SG is spearheading the implementation of ePMs in PSA terminals in Singapore, leading to the homologation of ePMs in the industry.

In addition, PSA is building a Battery Charging and Swap Station (BCSS), another first in Singapore, to reduce charging time for the ePMs. A battery swapping station enables centralised, seamless autonomous charging operations.

PSA SG will be testing vehicle to grid technology. BCSS can function as a BESS and add to the overall BESS capacity. PSA SG's team will be able to contribute to TR 25 in terms of battery swap technical and operational parameters.

Autonomous Prime Movers (aPMs)

PSA SG is currently conducting trials to develop autonomous prime movers, with the objective of deployment in mixed traffic conditions in the yard and thereafter extend to wharf operations.

aPM adopts autonomous vehicle technology for port horizontal transport, enabling deployment with minimal changes to layout, environment, equipment and processes.

Automated Quay Cranes (aQCs)

This quay crane automation project requires the integration of numerous sub-systems such as Remote Operator System, and Chassis Alignment System.

It is an amalgamation of technologies such as sensors, video analytics, optimisation algorithms for quay crane moves, and remote handling. aQC trials are currently ongoing.

As with all automation projects, energy use will be optimised with more efficient operations and consistency in equipment handling.



Super Low Energy Building (SLEB) in Tuas Port



Energy consumption of buildings typically contributes about 5% of our total annual carbon emissions. The Tuas Port Administrative Building is PSA SG's first Super Low Energy Building and was awarded the Platinum Super Low Energy Building Award by Singapore's Building and Construction Authority.

There are three main innovative technologies:

- Passive Displacement Cooling
- Building-applied photovoltaic system, also known as BAPV
- Model Predictive Control

With this project, PSA SG enhances its built environment capabilities and uplifts the local energy, green building, and construction sectors. The innovative technologies in SLEB can be applied to all new building constructions, locally and internationally.

Ammonia Bunkering

PSA is involved in the ammonia bunkering safety study by the Global Centre for Maritime Decarbonisation (GCMD) in Singapore (DNV is the lead). The pioneer study aims to define a robust set of safety guidelines and operational envelopes that will establish the basis of a regulatory sandbox for ammonia bunkering trials at two local sites.

CYBERSECURITY & DATA PROTECTION





PSA Singapore participated in Exercise CyberMaritime 2021

PSA SG was a key participant in Exercise CyberMaritime 2021 conducted annually by the Maritime and Port Authority of Singapore (MPA). MPA is the Critical Information Infrastructure (CII) Sector Lead. PSA SG and Jurong Port are Critical Information Infrastructure Owners (CIIOs). This sectoral table-top exercise validates CIIOs' ability to manage cybersecurity incidents and operationalise decision-making and coordination abilities in crisis management.

Held across 3 days in November 2021, this joint exercise involved PSA SG's senior management and representatives from Infocomm & Technology, Operational Technology, subject matter experts for the respective systems, Container Business, Enterprise Risk and Corporate Branding and Communications. The test scenarios covered Supply Chain, Data Leak, Ransomware, Operational Technology and Denial of Service attacks. This year, Pacific International Lines was invited as a guest participant.

PSA SG met and exceeded the Maritime sectoral assessment in this exercise which also brought about a closer collaboration among internal and external stakeholders in the wider Maritime industry.

Personal Data Protection Office

The Personal Data Protection Office (PDPO) was set up in 2021 to ensure corporate compliance of the Personal Data Protection Act (PDPA). The office is responsible for internal policies to minimise risk of regulatory or legal exposure by designing data protection management programmes, develop capabilities and foster a culture of data protection.

SUSTAINABLE PROCUREMENT



PSA SG stays committed to the responsible procurement of high-quality resources (products and services) from ethical sources, are environmentally sustainable, and technologically innovative at competitive prices.

In our procurement approach, we remain guided by the following key considerations when opting for products.

- Originates from responsible and sustainable sources
- Provides durability and is energy efficient
- Utilises clean technology and/or clean fuels
- Has lower impact on landfill and GHG upon disposal
- Has reduced packaging
- Made from high recycled content and recyclable

Highlights	Details	Impact
TRANSITING TO ELECTRIC VEHICLES	Committed to purchase electric vehicles (3 cars, 3 vans and 1 passenger bus) for Tuas Port The electric vehicles will be ready for use by mid-2022	Reduce Scope 1 emissions
GREEN CONCRETE	Cement usage in port development projects will be replaced with GGBS by up to 80%	Reduce carbon emissions and embodied carbon in built environment Estimated 1.4 million ton CO ₂ e of carbon savings from using PBFC
CARBONCURE TECHNOLOGY	Collected and purified CO ₂ are injected into the concrete during mixing to produce greener concrete	Estimated carbon savings of 35,334 ton CO ₂ e from using CarbonCure for the remaining rigid pavement in Tuas Port development

Test bed construction using CarbonCure Technology was started in 2021 and will be completed in 2022.

DRIVING SUSTAINABILITY THROUGH CARGO SOLUTIONS



PSA Cargo Solutions (SEA) intensified sustainability efforts and introduced several new green initiatives, including a greener trade corridor to bring about sustainable benefits to the logistics and supply chain industry

PSA Jurong Island Terminal (JIT)

- A Greener Mode of Transport for the Energy and Chemicals Manufacturers at Jurong Island

PSA SG continues to work closely with the Jurong Island community to promote barging as a greener alternative to trucking. In 2021, the barging volume increased 45% year-on-year and PSA JIT achieved the 100k TEU milestone of converting container trucking volumes into container barging volumes. The solution saves more than 30% in carbon emissions per TEU. This enables the energy and chemicals companies to streamline their supply chain processes, and optimise truck utilisation and driver productivity. Sharing of critical information also enhances reliability and efficiency.

From Node to Network

- Sustainable Trade Route Solutioning

Besides creating a more sustainable supply chain for the local energy and chemical companies, PSA Cargo Solutions (SEA) further enhanced the JIT barging solution by synergising with a cross-border multimodal trade-lane solution – the New International Land-Sea Trade Corridor (ILSTC). With this, the petrochemical shippers from Jurong Island are able to export their products to South-western China in a more sustainable, efficient and reliable manner.

Instead of transiting via traditional ocean freight to Shanghai, followed by barging via Yangtze river, shippers can now use ocean freight to Qinzhou, followed by rail freight. This new route reduces transit time by converting river barging to rail, a greener form of transport.

Digital visibility of the cargo along the ILSTC provides shippers with peace of mind while the reliability of the intermodal solution allows for shippers to plan for a more robust, resilient and sustainable supply chain.

Creative Cargo Solutions Initiatives to Reduce Inefficiencies and Enhance Sustainability

PSA Cargo Solutions (SEA) was appointed as the lead logistics service provider by Sembcorp in 2021 for its Tengeh Floating Solar Farm project. PSA was engaged to help Sembcorp optimise and achieve a more sustainable supply chain in the construction of Singapore's first large-scale solar floating farm at Tengeh.

PSA provided Sembcorp with visibility of inbound shipments and worked closely to coordinate for just-in-time delivery of cargo, preventing work stoppage and wastage of resources. This tight coordination also eliminated double handling of cargo, which will be incurred under the conventional model, thus reducing supply chain costs and scope 1 and scope 3 carbon emissions.

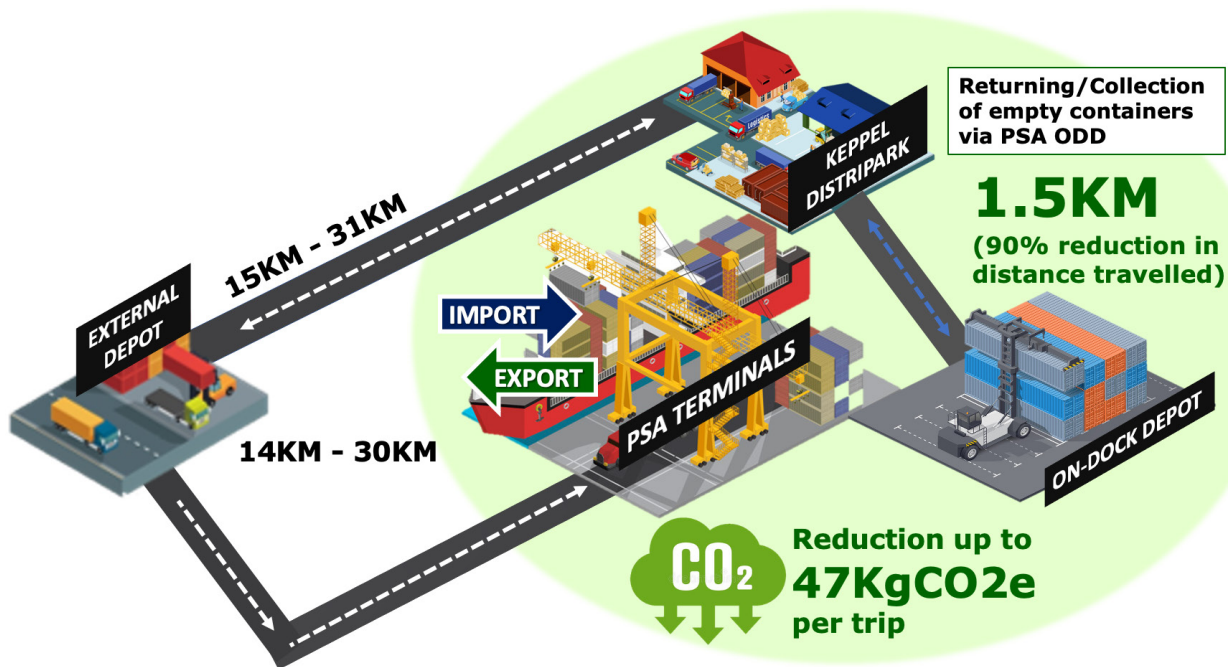
With an optimised supply chain, the Tengeh Floating Solar Farm was constructed within a year despite global supply chain disruptions.



Tengeh Floating Solar Farm. Photo credit : Sembcorp

Driving Sustainability via Improved Container Flow between Keppel Distripark and PSA On-Dock Depot

PSA Cargo Solutions (SEA) works closely with shipping lines and local logistics community to reduce the overall trucking distance for empty container collection and returns within Singapore. By enhancing the container flow between PSA's on-dock depot (ODD) and Keppel Distripark (KD), where huge amounts of cargo consolidation/deconsolidation and stuffing/unstuffing works are done, we are able to reduce carbon emissions from truck trips and improve productivity for the local haulage community.



PORT SECURITY



PSA Singapore is committed and will do what it takes to ensure the safety and security of the port

PSA SG is committed to provide a safe and secure port with a set of security regime, and by leveraging technology and the collective efforts of Port Facility Security Officers (PFSOs), Emergency Response (ER) Team, Auxiliary Police Officers and operational staff. Our Pass and Access Control System (ACS) also effectively controls the access of personnel and vehicles.



PSA SG's Security Regime

Together with the Maritime and Port Authority of Singapore (MPA), Immigration and Checkpoints Authority (ICA), Singapore Customs (SC) and Singapore Police Force (SPF), we ensure compliance to all legislations in force with the baseline security measures.

We comply with the International Maritime Organisation's International Ship and Port Facility Security (ISPS) Code, MPA Act, ICA Act, Free Trade Zone (FTZ) Act and Infrastructure Protection Act (IPA).

PSA SG is certified under the SC's Secure Trade Partnership Programme (STP), which is consistent with World Customs Organisation's SAFE Framework of Standards to secure and facilitate global trade. It supports SC's initiatives such as the Cargo Targeting System (CTS), Container Security Initiative (CSI) for US-bound goods and Radiation Detection Initiative (RDI) for export containers. In conjunction with this, PSA has also attained the premium band by SC. This is in recognition of our partnership with the agency to make trade easy, fair and secure.

Alongside Heroes Cross-trained to Uplift Capabilities

The Security and Emergency Response Department (SERD) was formed on 1 September 2021, merging Terminals Security Department and the Emergency Response Section from the Safety and Health Department. This marked the launch of the Health Safety Security (HSS) Executives Scheme where PFSOs and ER Team members are cross-trained. With the cross-training, there is synergy to better coordinate quick first response to all security, fire safety, first aid and emergency related incidences.

Fight Against Covid-19

As part of PSA SG's coordinated efforts, more than 1,000 disinfections were carried out in offices and equipment and areas with high human traffic.



Support the Commencement of Operations at Tuas Port

In August 2021, in the lead up to Tuas Port starting operations, PSA SG received the Statement of Compliance of Port Facility for Tuas Port from MPA. With this endorsement on the compliance to the ISPS code and Security Standards, Tuas Port is permitted to commence operations.

Together with the Enterprise Risk and Resilience team, SERD also reviewed the risk assessments for Tuas Port with all control measures implemented.

Use of Technology to Streamline Processes and Enhance Security

Tuas Access Control System was upgraded to the latest version with facial recognition (FR) incorporated as an added authentication factor and use of the Singapore Standard for Smart Card Identification (SSID) with the Advanced Encryption Standard, AES 256, a globally adopted standard.

In 2021, PSA SG invested in body-worn and vehicle-mounted cameras with live-streaming to Pasir Panjang Fire Station, where the future HSS Command Centre will be sited. The live streaming provides on duty HSS managers and officers a better understanding of on-ground situations and enables quicker responses and deployment of resources. The video recordings also support post-incident investigations and process reviews.

Joint Exercises with Agencies

PSA SG and SC conducted the annual “Chemical, Biological, Radiological, Explosive and Nuclear (CBREN)” exercise in January 2021, with participation from SERD and the Haulier & CargoCare Services Department.

In this simulated exercise, a container passed through the X-Ray scanner and the image showed it was loaded with drums of organic contents without an applicable permit and hazard label displayed on the container. The container is then directed for secondary inspection to ascertain its contents and any CBREN threats before it was escorted to Dangerous Goods (DG) Reworking yard for isolation and monitoring.

This exercise allowed PSA SG and SC to validate the joint operating procedures, familiarise with work flows and prepare the frontline officers for such exceptions.





PSA SG also works closely with the Singapore Civil Defence Force (SCDF). As a key installation, we regularly conduct joint exercises with SCDF to ensure both teams coordinate effectively in all emergency responses.

Staff and Port Users Alongside

In 2018, PSA SG implemented the Threat-Oriented Person Screening Integrated System (TOPSIS). This Ministry of Home Affairs' structured framework involves training staff to recognise, report and resolve all security threats. All frontline staff have been trained. PSA SG continues to train new staff in TOPSIS during the orientation programme and briefing to new port users.

A TOPSIS e-learning module was also launched in 2021 as a refresher for all frontline and office-based staff.

Awards and Recognition

Immigration & Checkpoints Authority (ICA) Commissioner's Commendation (Silver) Award 2021

For excellent collaboration with ICA to enhance overall security within Free Trade Zone (FTZ) and maintaining an efficient and secure cargo clearance regime at Singapore's Ports Command

Outstanding Company Emergency Response Team (CERT) Awards 2021 by Singapore Civil Defence Force

PSA SG's Emergency Response (ER) Team received the two awards for its commendable efforts in mitigating incidents at the terminals

Appreciation from Central Narcotics Bureau (CNB)

For assistance rendered to CNB's operations in the port and PSA's support in keeping the country drug free



ETHICAL BUSINESS CONDUCT





Embedding a Culture of Integrity

PSA is committed to conducting business with the highest standards of ethics and integrity.

PSA's employee guidebook - The Code - reflects our business principles and serves as a moral compass to provide guidance on the standards of behaviour expected of all employees. It guides our ethical choices and aligns us with a common understanding of what it means to do the right thing and to do things right.

All PSA employees are required to understand and comply with The Code which is made readily available online and reinforced during internal training and dialogue sessions. The Code e-learning course was also developed and rolled out.

As part of PSA's commitment to upholding integrity at all times, The Code also includes the Whistle Blowing policy and different channels are made available for employees to report their concerns, such as via their immediate supervisor, a Whistle Blowing hotline or email.

<https://www.globalpsa.com/#homeTheCode>



COLLABORATIVE PARTNERSHIPS WITH COMMON GOALS



Extending sustainable development beyond the port

In line with UN SDG 17 “Partnership for the Goals”, we support the notion that a successful sustainable development agenda requires collaborative partnerships between governments, the private sector and civil society.



Ministry of Sustainability
and the Environment
— SINGAPORE —

- National sustainability-related policies and plans guide PSA SG’s corresponding policies and plans
- Support MSE’s Climate Action Week



- Support and guidance on PSA SG’s sustainability and decarbonisation progression as part of the maritime sector



- Support for “PSA SG in Bloom” Programme via sharing of NParks talks and workshops with our volunteers
- Co-creation of Pasir Panjang Park
- PSA SG’s support for “Give to the Gardens” programme



- Resource and advisory support on water conservation initiatives
- Support for PUB’s annual SG World Water Day

Industry collaboration on technology and standards

Decoupling business and economic growth from carbon emissions requires the development, adoption and localisation of green technology both within and outside of the port. PSA SG believes in playing a proactive role to collaborate with our stakeholders and industry partners to build and operationalise local green technology capacity and standards.



- Support from the Low Carbon Economy Research (LCER) to drive hydrogen, carbon capture utilisation and storage R&D, and industry adoption
- LCER Funding Initiative is a multi-agency initiative involving A*STAR, the Economic Development Board (EDB), the Energy Market Authority (EMA), the National Climate Change Secretariat (NCCS) and the National Research Foundation (NRF). It is co-driven by EDB and EMA, with A*STAR as the implementing agency on behalf of the Government



- MOU to collaborate with like-minded organisations including Jurong Port, City Gas, Sembcorp Industries, SLNG, Chiyoda Corporation and Mitsubishi Corporation to develop a Singapore-based hydrogen economy





- Funding for Tuas Port Maintenance Base Super Low Energy Building development via GBIC programme
- Tuas Port Maintenance Base will be the first port-based, large scale super low energy building, with a 58% energy use reduction as compared with a standard building



- Development of a port-based smart grid and battery energy storage systems, as well as enabling energy market participation



- Singapore's first LNG refuelling kiosk was built in PPT and commissioned in year 2021
- Pioneered adoption of LNG prime movers for land transportation use with a starting fleet size of 160 units
- Developed LNG-related technical, safety and operational standards including setting up of refuel kiosk and simultaneous operations



REGIONAL DEVELOPMENT



Highlights from PSA's Southeast Asia Terminals

(excluding Singapore Terminals)

The five PSA SEA business units are:

Thai Connectivity
Terminal (THCT)

LCB Container
Terminal 1 (LCB1)

ESCO Eastern Sea Laem

Chabang Terminal (ESCO)

SP-PSA International
Port (SP-PSA)

New Priok Container
Terminal 1 (NPCT1)

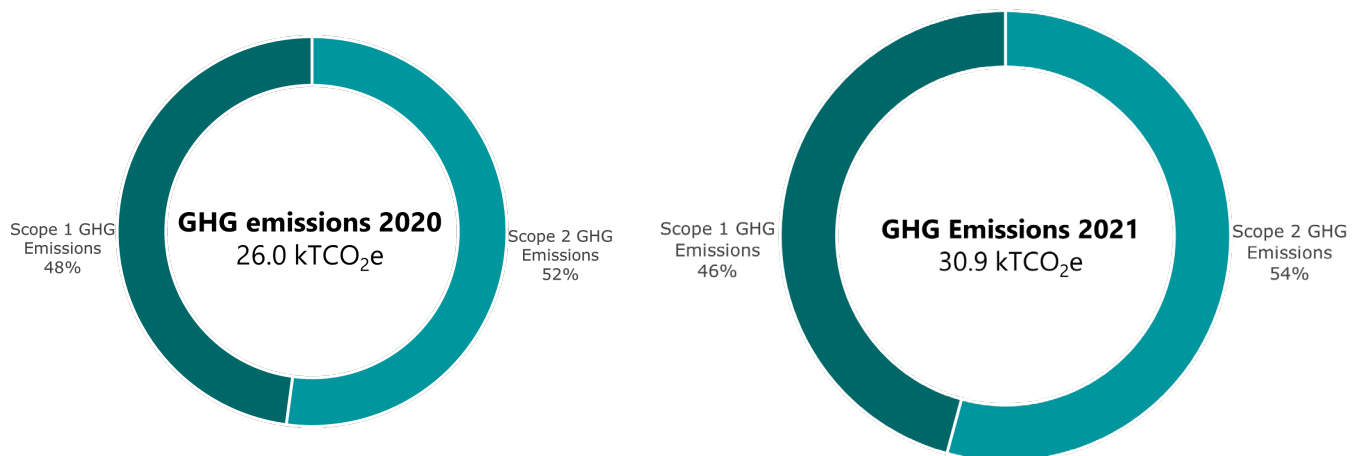
Scope 1 And 2 Emissions

	2020	2021	%
DIRECT SCOPE 1 EMISSIONS (^000 TCO2E)	12.45	14.16	13.7% ↑
INDIRECT SCOPE 2 EMISSIONS (^000 TCO2E)	13.55	16.75	23.6% ↑
TOTAL (^000 TCO2E)	26.00	30.91	18.9% ↑

The increase in total emissions in 2021 compared with 2020 is mainly contributed to higher container volume, longer dwell time and higher electricity utilisation due to increased reefer container demands as a result of Covid-19.

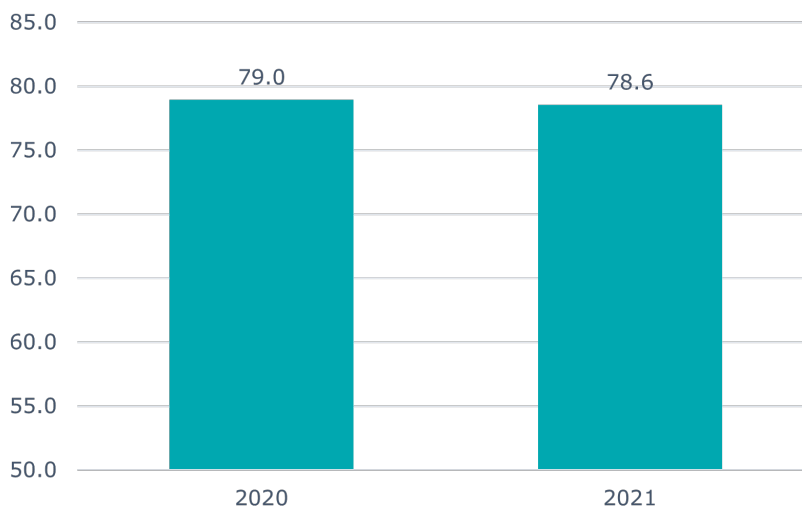
In 2021, Scope 1 emissions accounted for 46% of Scope 1 and 2 emissions with Scope 2 emissions making up 54%.

Total Scope 1 & 2 Emissions



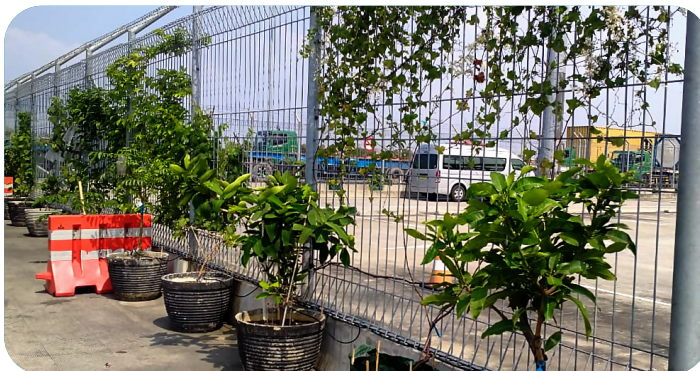
WATER WITHDRAWAL (excluding Singapore Terminals)

Water Withdrawal ('mil litres)



Water withdrawal by SEA terminals in 2021 was comparable with 2020, with a -0.4% change registered overall.

Promoting Environmental Sustainability in Southeast Asia



NPCT1 planted a total of 55 plants within and around the port premises.

The importance of a clean work environment is emphasised through various workplace cleaning activities. A total of 230kg of rubbish was collected and disposed responsibly.



ESCO participated in the Little Green Steps challenge by encouraging staff to go paperless, increase green spaces, save energy and to say no to plastic.



LCB1 participated in the Little Green Steps challenge by organising a terminal and community clean up. The activity ended with a collection of about 100kg of rubbish.



THCT organised activities to raise awareness of the importance to conserve natural resources and reduce carbon emissions, such as the planting of over 80 plants, reduce plastics and disposable containers. Staff are also encouraged to bring their own reusable cutlery, plates and cups for their meals, instead of single-use plastics. Additionally, efforts to save energy by switching off and unplugging appliances when not in use is also inculcated. Lastly, waste separation and recycling are highlighted to staff as well.



SP-PSA encouraged staff to use reusable bags and to say no to plastic. Additionally, an attitude of repair and reuse and to save energy by switching off and unplugging appliances after use are inculcated among staff. SP-PSA colleagues also regularly participate in park and community cleaning activities.

GRI STANDARD	GRI DISCLOSURE NUMBER	GRI DISCLOSURE ASPECT	PAGE REFERENCES
GENERAL DISCLOSURES			
GRI 102: General Disclosures	ORGANISATIONAL PROFILE		
	102-1	Name of the organisation	9
	102-2	Activities, brands, products, and services	9
	102-3	Location of Headquarters	9
	102-4	Location of operations	9
	102-5	Ownership and legal form	9
	102-6	Markets Served	9
	102-7	Scale of the organisation	9
	102-8	Information on employees and other workers	11, 57
	102-9	Supply Chain	9, 87 - 89
	102-10	Significant changes to the organisation and its supply chain	9, 87
	102-11	Precautionary Principle or approach	4-7, 27, 35
	102-12	External initiatives	43-45, 69-71, 99-100
	102-13	Membership of associations	Refer to PSAI SR2021, Pg4, 8
	STRATEGY		
	102-14	Statement from senior decision-maker	4-7
	ETHICS AND INTEGRITY		
	102-16	Values, principles, standards, and norms of behaviour	10, 97
	102-17	Mechanisms for advice and concerns about ethics	97
	GOVERNANCE		
	102-18	Governance structure	Refer to PSAI SR2021, Pg26
	102-19	Delegating authority	Refer to PSAI SR2021, Pg26
	102-20	Executive-level responsibility for economic, environmental and social topics	Refer to PSAI SR2021, Pg26
	102-21	Consulting stakeholders on economic, environmental and social topics	Refer to PSAI SR2021, Pg23, 26
	STAKEHOLDER ENGAGEMENT		
	102-40	List of stakeholder groups	Refer to PSAI SR2021, Pg23
	102-41	Collective bargaining agreements	60
	102-42	Identifying and selecting stakeholders	Refer to PSAI SR2021, Pg26
	102-43	Approach to stakeholder engagement	Refer to PSAI SR2021, Pg26
	102-44	Key topics and concerns raised	Refer to PSAI SR2021, Pg 27-29
	REPORTING PRACTICE		
	102-45	Entities included in the consolidated financial statements	Refer to PSAI AR2021
	102-46	Defining report content and topic boundaries	3
	102-47	List of material topics	15-17
	102-48	Restatements of information	22, 23
	102-49	Changes in reporting	-
	102-50	Reporting period	3

REPORTING PRACTICE		
GRI 102: General Disclosures	102-51	Date of most recent report
	102-52	Reporting cycle
	102-53	Contact point for questions regarding the report
	102-54	Claims of reporting in accordance with the GRI standards
	102-55	GRI content index
	102-56	External Assurance
ENERGY		
GRI 103: Management Approach	103-1	Explanation of the material topic and its Boundary
	103-2	The management approach and its components
	103-3	Evaluation of the management approach
GRI 302: Energy	302-1	Energy consumption within the organisation
EMISSIONS		
GRI 103: Management Approach	103-1	Explanation of the material topic and its Boundary
	103-2	The management approach and its components
	103-3	Evaluation of the management approach
GRI 305: Emissions	305-1	Direct (scope 1) GHG emissions
	305-2	Energy indirect (scope 2) GHG emissions
CLIMATE CHANGE ADAPTATION		
GRI 103: Management Approach	103-1	Explanation of the material topic and its Boundary
	103-2	The management approach and its components
	103-3	Evaluation of the management approach
INNOVATION AND TECHNOLOGY		
GRI 103: Management Approach	103-1	Explanation of the material topic and its Boundary
	103-2	The management approach and its components
	103-3	Evaluation of the management approach
OPTIMISATION OF GLOBAL SUPPLY CHAINS		
GRI 103: Management Approach	103-1	Explanation of the material topic and its Boundary
	103-2	The management approach and its components
	103-3	Evaluation of the management approach
PEOPLE DEVELOPMENT		
GRI 103: Management Approach	103-1	Explanation of the material topic and its Boundary
	103-2	The management approach and its components
	103-3	Evaluation of the management approach
GRI 404: Training and Education	404-1	Average hours of training per year per employee
	404-2	Programs for upgrading employee skills and transition assistance programs
SUSTAINABLE PORT DEVELOPMENT		
GRI 103: Management Approach	103-1	Explanation of the material topic and its Boundary
	103-2	The management approach and its components
	103-3	Evaluation of the management approach

GRI 103: Management Approach	WATER USE AND POLLUTION		
	103-1	Explanation of the material topic and its Boundary	17, 31-32
	103-2	The management approach and its components	31-33
	103-3	Evaluation of the management approach	31-33
GRI 303: Water and Effluents	303-5	Water withdrawal	32
GRI 103: Management Approach	WASTE MANAGEMENT AND RECYCLING		
	103-1	Explanation of the material topic and its Boundary	17, 28
	103-2	The management approach and its components	28-31
	103-3	Evaluation of the management approach	28-31, 39-40, 44
GRI 306: Waste	306-3	Waste generated	28-29
	306-4	Waste diverted from disposal	28-29
	306-5	Waste directed to disposal	28-29
GRI 103: Management Approach	OCCUPATIONAL HEALTH AND SAFETY		
	103-1	Explanation of the material topic and its Boundary	16, 49, 53
	103-2	The management approach and its components	49, 53
	103-3	Evaluation of the management approach	49-51, 53-55
GRI 403: Occupational Health and Safety	403-5	Worker training on occupational health and safety	54
	403-6	Promotion of worker health	25, 26, 49-51
	403-9	Work-related injuries	53
GRI 103: Management Approach	LABOUR RELATIONS AND WORKER WELLBEING		
	103-1	Explanation of the material topic and its Boundary	59
	103-2	The management approach and its components	57-60
	103-3	Evaluation of the management approach	4-7, 31, 43, 53, 57-60
GRI 103: Management Approach	COMMUNITY RELATIONS		
	103-1	Explanation of the material topic and its Boundary	17, 63
	103-2	The management approach and its components	63-67
	103-3	Evaluation of the management approach	63-67
GRI 103: Management Approach	ETHICAL BUSINESS CONDUCT		
	103-1	Explanation of the material topic and its Boundary	15, 97
	103-2	The management approach and its components	97
	103-3	Evaluation of the management approach	97
GRI 103: Management Approach	SUSTAINABLE PROCUREMENT		
	103-1	Explanation of the material topic and its Boundary	17, 85
	103-2	The management approach and its components	85
	103-3	Evaluation of the management approach	85
GRI 103: Management Approach	PORT SECURITY		
	103-1	Explanation of the material topic and its Boundary	16, 91
	103-2	The management approach and its components	91-95
	103-3	Evaluation of the management approach	91-95
GRI 103: Management Approach	CYBER SECURITY AND DATA PRIVACY		
	103-1	Explanation of the material topic and its Boundary	15
	103-2	The management approach and its components	83
	103-3	Evaluation of the management approach	83



PSA Horizons, 1 Harbour Drive, Singapore 117352
+65 6274 7111
www.singaporepsa.com