SPgroup

Empowering the Future of Energy

SUSTAINABILITY REPORT FY 2024/2025

TABLE OF CONTENTS

ABOUT SP GROUP

SP Group (SP or the Group) is a leading utilities provider in Asia Pacific, empowering the future of energy through low-carbon, smart solutions. We own and operate electricity and gas transmission and distribution networks in Singapore and Australia.

The Group's corporate purpose is captured in the ambition of "Empowering the Future of Energy". It embodies our Strategy 2030 to create a low-carbon, smart energy Singapore and be a regional leader in sustainable energy solutions.

As Singapore's national grid operator, SP serves approximately 1.7 million industrial, commercial, and residential customers with world-class transmission, distribution, and market support services.

Beyond traditional utilities, SP Group delivers integrated sustainable energy solutions across Singapore, China, Thailand, and Vietnam. These solutions include district cooling and heating, renewable energy, EV charging infrastructure, and digital energy platforms tailored for districts, communities, and commercial and industrial customers.

ABOUT THIS REPORT

This is SP's sixth sustainability report. It incorporates the reporting recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD) and includes key initiatives and performance highlights of our operations across key business areas for the Financial Year (FY) 24/25 from 1 April 2024 to 31 March 2025, unless otherwise stated. The scope of this report covers SP's operations in Singapore, China, Vietnam and Thailand.

The report is to be read in conjunction with the Chairman's message in the FY24/25 Annual Report and other sustainability-related information at **SP Energy Hub** on our corporate website. We have included historical data for comparison. In this report, all monetary figures are presented in Singapore Dollars unless stated otherwise.

While we have not sought third-party verification or external assurance for information disclosed in this report, we continue to adopt a phased approach for our reporting and will embark on external assurance in the coming years.

We are committed to progressively adopt reporting standards such as the International Sustainability Standards Board's (ISSB) IFRS S1 and S2 standards which cover sustainability-related risks and opportunities as well as climate-related information. Additionally, we have recently embarked on a double materiality assessment, and we plan to report on the new material topics from the next Sustainability Report.

SP Group's Sustainability Focus

As a leading energy utilities company in Asia Pacific, SP owns and operates electricity and gas transmission and distribution networks as well as a market-support services business in Singapore.

SP deploys sustainable energy solutions regionally, including but not limited to energy efficiency projects, renewable projects and provision of integrated energy solutions to enable different customer segments to achieve their sustainability objectives.

As the national grid operator in Singapore, SP plays a critical role in the transmission and distribution segment of the energy value chain. Our electricity and gas transmission and distribution networks are amongst the most reliable and cost-effective in the world, enabling us to deliver a reliable and efficient supply of electricity and gas to various consumer segments which include residnetial, industrial and commercial users.

A grid network is a vital part of a country's energy transition and plays a key role in mitigating climate change. At SP, we operate our grid sustainably through prioritising environmental responsibility, social impact, and strong governance. This commitment to sustainability extends beyond our role as a grid operator as we apply the same principles across all our operations. By delivering sustainable energy solutions to businesses and supporting their decarbonisation efforts, we help drive greater efficiency across the entire grid.

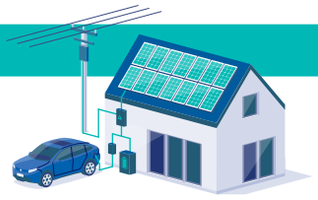
SP's sustainability focus is underpinned by the following 4 pillars:

FUTURE OF GRID

As the national grid operator of Singapore, SP is committed to support Singapore's green energy transition by preparing the grid to integrate low-carbon energy sources. These include low-carbon electricity imports, domestic solar, and hydrogen-ready power plants.

SUSTAINABLE OPERATIONS

Sustainable operations for SP encompass operational safety and efficiency. Initiatives under this pillar are crucial for improving the way we work, reducing social costs, and engaging our key stakeholders, such as our suppliers, in our collective sustainability journey.



TRANSITION ENABLERS

Through our Sustainable Energy Solutions (SES), we help our customers across the region meet their sustainability targets by improving energy efficiency and supporting the transition to renewables.

PEOPLE AND COMMUNITY

People are the foundation of our company. We invest in developing and training our people so that our workforce stays up to date with the latest technologies and our operations are continuously optimised. Staff wellbeing is also prioritised through initiatives that encourage healthier lifestyles. Additionally, SP is committed to supporting our community through philanthropy and volunteerism to uplift the lives of the less privileged.

SUSTAINABILITY GOVERNANCE

Board's Role

Recognising the importance of sustainability considerations as part of the overall corporate strategy and its needed focus and commitment, the Board has formed the Sustainability Committee (SC) in FY24/25 providing advice, direction and governance on our sustainability strategy that is aligned with the overarching business goals and strategy. The SC, which reports to the Board of Directors (Board), plays a critical role in guiding the Management and Sustainability function to further SP's sustainability objectives and progression. The SC convenes quarterly to discuss sustainability issues, including climate-related matters, and updates the Board regularly. By providing robust oversight and guidance, the SC plays a crucial role in driving sustainable growth and fostering resilience in an ever-evolving business landscape.

We recognise the need to ensure that the Board is well-equipped to effectively guide the Management on its sustainability strategy, risk mitigation and ability to capitalise on sustainability-related opportunities. Hence, sustainability training covering different material matters, regulatory changes, reporting regime, etc. are being conducted and planned accordingly for the Board.

Management's Role and Internal Controls

Reporting to the Board is the Executive Leadership Team (ELT), which has the strategic responsibility to assess and manage sustainability issues for SP. Heading the ELT is the Group Chief Executive Officer, who has executive-level responsibility for Environmental, Social and Governance (ESG) matters.

The ELT, guided by the SC, is tasked with implementing practical applications of its sustainability strategy supported by the Sustainability Team. The Sustainability Team monitors sustainability matters, guides the organisation on its corporate sustainability reporting obligations including greenhouse gas (GHG) data collection, embeds sustainability strategies and initiatives in partnership with the business and functional teams and conducts training to further build sustainability capabilities in the organisation.

> **"To enhance sustainability integration across all facets of the organisation, a dedicated Sustainability Taskforce has been established."**

To enhance sustainability integration across all facets of the organisation, a dedicated Sustainability Taskforce has been established. Comprising representatives from various business units and group functions and in partnership with the Sustainability Team, the Taskforce serves as a collaborative platform for driving and executing sustainability initiatives. It ensures alignment with SP's sustainability goals with the overarching business strategy, while fostering cross-functional engagement and accountability in achieving sustainability goals.

OUR IMPACT

NET ZERO INTEGRATOR

- **1,683 MW**[1] of low-carbon generation connected in Singapore
- **S$620.8 million** of capital investment deployed towards transition opportunities
- **0.236 min and 0.2579 min** System Average Interruption Duration Index (SAIDI) achieved for Electricity and Gas respectively

SUSTAINABLE OPERATIONS

- Lost Time Injury Frequency Rate of **0.25** per million working hours
- EVs constitute **54%** of our vehicular fleet
- **Scope 1** emissions: **69,513 tonnes CO_2e**, achieved a **1.2%** reduction year-on-year
- **Scope 2** (location-based) emissions: **362,808 tonnes CO_2e**, achieved a **7.6%** reduction year-on-year
- **Scope 1 & 2** emission intensity: **8kgCO_2e/MWh**, achieved a **10.8% reduction** year-on-year

TRANSITION ENABLERS

- **292,000 RT** of district cooling capacity in operation and secured regionally
- **2,232 MW** in photovoltaic (PV) generation capacity in operation and secured regionally and **3.6 million** RECs sold since 2021
- More than **2,100** Electric Vehicle (EV) charging points installed in Singapore
- Over **1.59 million** electricity and water smart meters installed
- Emissions saved for customers – **2.389 million** tonnesCO_2e, equivalent to planting more than **113.7 million** raintrees, covering over 15 times the entire land area of Singapore[2], or **2.1 million** cars off the road for a year[3].

PEOPLE AND COMMUNITIES

- **157,000** hours of training and development provided to employees
- **S$9.4 million** invested in training
- **S$5.8 million**[4] in donations and staff volunteering towards various community causes and industry initiatives

[1] As of June 2024 (for H12024) from EMA Singapore Energy Statistics

[2] NParks recommends a space of 10m between each raintree

[3] Carbon saved for our customers since 2020, assuming one mature rain tree absorbs 0.0201 tCO_2e a year and annual carbon emissions from 1 internal combustion engine (ICE) car generates 1.1tCO_2e/year.

[4] S$5.8 million covers both cash donations and the monetisation of more than 8,000 volunteering hours

OUR CARBON FOOTPRINT

We measure and report our carbon footprint in accordance with the Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (revised edition) and GHG Protocol Scope 2 Guidance.

Last year, SP announced our 2050 net zero ambitions in line with Singapore's net zero ambition[5]. While decarbonising the energy sector will require time, we recognise the importance of continuing to track and report our carbon emissions to have a clear picture of our emissions profile.

Emissions, tCO_2e	FY22/23	FY23/24	FY24/25
Scope 1	76,721	70,333	69,513
Scope 2[6]	Location Based		
	360,262	392,531	362,808
	Market Based		
	357,046	389,308	359,586
Scope 1 & 2 Intensity ($kgCO_2e$/MWh)	8.52	8.97	8.00

In FY24/25, SP's total emissions amounted to 432,321 tCO_2e, with Scope 1 contributing 16% and Scope 2 (location-based) contributing 84% of the total. Market based scope 2 GHG emissions is based on emissions emitted by the generators from which SP contractually purchases electricity bundled with contractual instruments while location based scope 2 GHG emissions is calculated from the average energy generation factors for the defined geographic locations.

SP operates within the transmission and distribution value chain, ensuring the reliable and efficient delivery of electricity and gas to homes and businesses upholding industry standards and regulatory requirements. While it plays a crucial role in maintaining and managing the infrastructure required for energy flow, it does not engage in energy generation. As such, it is noteworthy that about 92% of SP's total emissions (Scope 1 and 2) stems from electricity and gas transmission and distribution losses which is partly determined by the source of energy which SP does not have control on as it does not partake in energy generation.

Electricity network losses occur during the transfer of energy across transmission and distribution systems. These losses represent the difference between the amount of electrical energy injected into and withdrawn from the network and arise due to various factors. The primary cause is the energy consumed by network infrastructure, such as transformers and cables, while facilitating the transportation of electricity.

Our Scope 1 emissions this year decreased 1.2% compared to last year because of lower consumption of natural gas.

Our Scope 2 emissions this year decreased 7.6% compared to last year mainly due to a decrease in electricity transmission and distribution loss.

[5] While we aim to reach net zero by 2050, covering our absolute scope 1 and 2 emissions, Singapore faces constraints in renewable energy deployment and nascency in hydrogen technology. As more than 90% of our emissions are beyond our direct control - our aim to reach net zero is therefore contingent upon i) rapid decarbonisation of Singapore's power generation and replacement of natural gas with hydrogen; ii) reliability, availability and economic viability of technological advances and low-carbon technologies, such as EVs for industrial uses, green transportation, fuels, SF6 and refrigerant replacements; and iii) effective international collaboration in areas such as carbon credits (e.g. Article 6 of the Paris Agreement).

[6] Scope 2 emissions for FY22/23 and FY23/24 were restated with EMA's updated grid emission factor (GEF) published for 2022 and 2023

Since FY22/23, we have been measuring and reporting our Scope 3 emissions in accordance with the GHG Protocol's Corporate Value Chain (Scope 3) Accounting and Reporting Standard. Among the 15 categories, 9 categories are deemed relevant and material to us with Category 13 (Downstream leased assets) newly included as we started leasing our assets to third-party tenants at Labrador Tower, a newly completed project in this FY.

Scope 3 Emissions	FY24/25 emissions (tCO_2e)	% of the total Scope 3
Category 1: Purchased Goods and Services	47,555	5.25%
Category 2: Capital Goods	358,492	39.60%
Category 3: Fuel- and Energy-Related Activities	97,793	10.80%
Category 5: Waste Generated in Operations	27	0.00%
Category 6: Business Travel	1,528	0.17%
Category 7: Employee Commuting	2,443	0.27%
Category 11: Use of sold products	81,421	8.99%
Category 13: Downstream leased assets	172	0.02%
Category 15: Investments[7]	315,965	34.90%

Our Scope 3 emissions increased this year, largely due to the increased Category 1 and 2 emissions arising from higher procurement activities. These were calculated using the spend-based method, a widely adopted approach recommended by the GHG Protocol. This method estimates emissions by multiplying the cost of purchased goods or services by industry-average emission factors. While practical and accessible, it has known limitations in accurately reflecting actual emissions, as it relies on secondary data and does not account for supplier-specific variations.

	FY22/23	FY23/24	FY24/25
Scope 3, tCO_2e	757,542	684,856	905,396

To improve the accuracy of our Scope 3 accounting, we continue engaging our suppliers, particularly tier 1 partners, by providing training and support to encourage the reporting of supplier-specific emissions data. In parallel, we are exploring lower-carbon products and services as the market evolves.

The rise in our Scope 3 Category 11 emissions is a direct result of the increased uptake of our district cooling solutions, as more plants become operational and serve a growing customer base. While this represents an increase in our reported emissions, it also reflects our expanding role in enabling customers to significantly reduce their Scope 2 emissions. Importantly, district cooling offers a lower-carbon alternative to conventional cooling methods which results in a net positive impact on the energy grid and contributing to broader decarbonisation goals across the value chain.

[7] Refer to Jemena's Sustainability Report for a more comprehensive showcase of their sustainability efforts.

Innovating Today for a Sustainable Tomorrow

Innovation is at the core of SP 's commitment towards a sustainable energy future. We are focused on delivering reliable and efficient utilities services that not only support today's economy and quality of life but also lay the groundwork for resilient, low-carbon systems in the future.

Recognising that the energy sector is evolving rapidly, we embrace continual innovation which is essential to navigating tomorrow's challenges, including decarbonisation, digitalisation, shifting regulatory landscapes, and evolving stakeholder expectations. Our innovation strategy is designed to future-proof our grid and enhance our service delivery through a blend of advanced technologies and bespoke in-house solutions.

We are actively modernising our infrastructure to better accommodate decentralised power generation, the integration of energy from multiple sources, and rising electrification demands. Simultaneously, we drive operational excellence by leveraging data, optimising resources, and fostering a culture of safety and efficiency across our workforce.

Our Sustainable Energy Solutions (SES) business extends SP's impact beyond our core transmission and distribution role. Drawing on our engineering expertise and strong regional partnerships, SES enables local and regional stakeholders to transition towards cleaner energy and net-zero targets. Whether through district cooling, green mobility, or integrated energy solutions, SES exemplifies our commitment to enabling a low-emissions economy.

To support these ambitions, we continue to invest in our people, equipping them with the skills and tools needed to thrive in a dynamic energy ecosystem. By incorporating innovation into our organisational DNA, we are not just adapting to the future, we are actively building it.

FUTURE OF GRID

INNOVATING OUR GRID

The world is undergoing a significant energy transition, and Singapore has pledged to achieve net zero emissions by 2050. As the grid operator in Singapore, we see it as both our duty and our opportunity to enable this green transition. We are working closely with agencies to develop a holistic suite of solutions for a future-ready grid with new energy mix, distributed energy resource (DER) penetration and grid expansion.

As Singapore's grid operator, we play a crucial role as net zero integrators by:

Supporting National Goals: Singapore's commitment to net zero emissions by 2050 requires a robust and reliable energy infrastructure. By integrating renewable energy sources locally and supporting the nation's power imports, all whilst maintaining our grid resiliency, we help the nation meet its climate targets.

Deploying Innovative Technologies: We leverage technologies such as smart grids and energy storage systems to ensure that new, renewable energies are effectively integrated into our network. This not only reduces carbon emissions but also enhances the stability, reliability and efficiency of energy transmission and distribution.

Collaborating for a Greener Grid: SP is actively collaborating with various ecosystem players to drive the energy transition while enabling power imports, national electrification and solarisation. We are also working with international organisations and governments to share expertise and accelerate the global transition to clean energy.

By being net zero integrators, we are not just meeting regulatory requirements but actively contributing expertise and knowledge to a sustainable future for Singapore and setting a benchmark for the industry. Tapping on innovative approaches and technologies, we have embarked on the development and/or execution of Virtual Power Plants, digital twin, Distributed Energy Resource Management System (DERMS), demand response programmes, etc.

The following pages feature the innovations adopted into our grid.

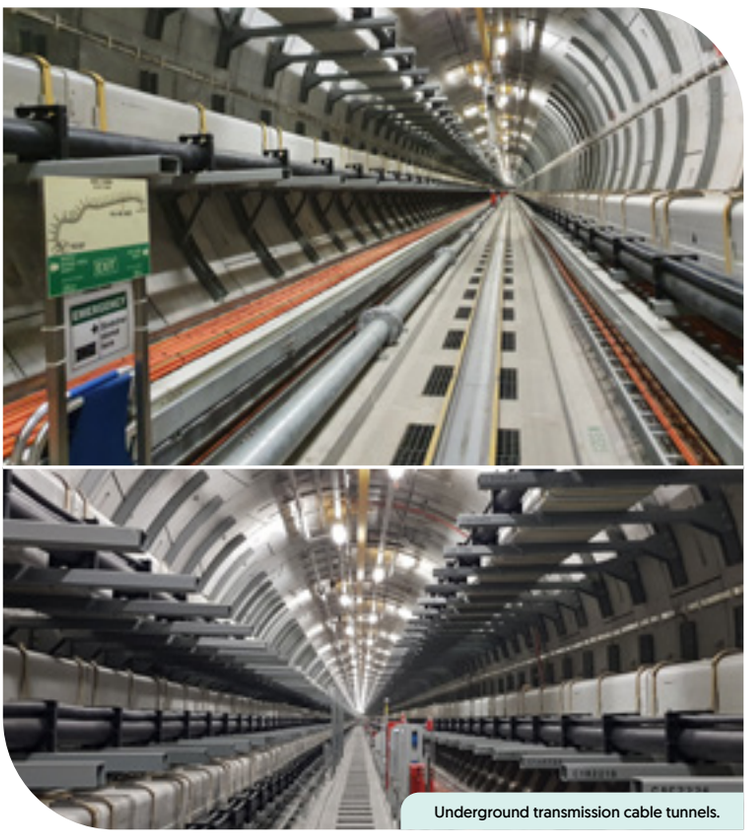
Continual Improvements to Our Network

As part of our ongoing commitment towards co-building a sustainable nation, SP has implemented numerous projects and initiatives aimed at enhancing the efficiency and reliability of Singapore's energy grid and gas network. These efforts include new approaches towards substation design, utilising technology to facilitate upgrades and maintenances more efficiently and safely. Simultaneously, we incorporate new technologies to ensure the grid remains robust and capable of supporting the nation's energy needs. By continuously innovating and improving our infrastructure, we can integrate renewable energy sources more effectively while upholding grid reliability.

Underground Tunnels: The Hidden Heroes Increasing Network Reliability, Solving Space Constraints, Reducing Road Disruptions and Social Costs

SP's critical electricity cables and gas pipelines span approximately 22,500 km and 4,000 km respectively. These essential assets are strategically located underground, a crucial decision in a city-state like Singapore where construction activities are constantly underway. This underground placement significantly reduces the risk of accidental damage during excavation works, which could otherwise lead to electricity disruptions or gas leaks.

Recognising the importance of managing these risks, SP has implemented additional measures, including the construction of underground transmission cable tunnels. As part of SP's long-term strategy to ensure a reliable and efficient electricity supply, cross-island underground transmission cable tunnels were developed and completed in 2019. These tunnels span 40 km across Singapore and are located 60 metres below ground, equivalent to the depth of a 20-storey building.



Underground transmission cable tunnels.

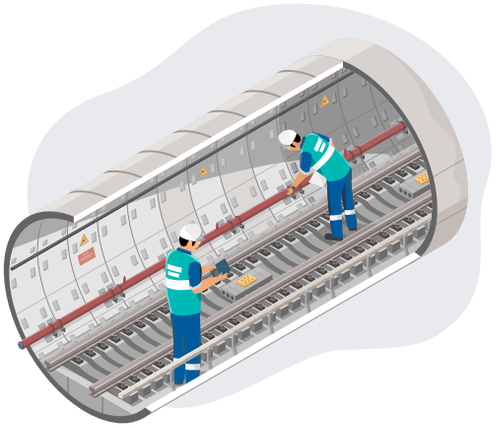
Designed with a lifespan of 120 years, these tunnels provide several key benefits:

1. **Reduced Service Disruptions:**
   By housing cables within dedicated tunnels, the risk of third-party excavation damage is significantly lowered, ensuring uninterrupted service.

2. **Improved Maintenance Access:**
   The spacious tunnel environment allows for easier and safer cable maintenance and installation, contributing to a more reliable network.

3. **Lower Social Costs:**
   The need for surface-level excavation is minimised, reducing noise pollution and disruptions to the public.

4. **Enhanced Worker and Public Safety:**
   Workers operate in a controlled underground environment, reducing exposure to road traffic and other surface-level hazards. Reduced road disruptions contribute to improved traffic and pedestrian safety as well.



The construction of underground transmission cable tunnels reflects SP's forward-thinking approach to infrastructure management. This initiative not only enhances the resilience and efficiency of Singapore's power grid but also demonstrates a strong commitment to sustainable urban development.

Renewing Gas Mains with Polyethylene Pipes: A Modern Engineering Approach

SP has implemented an asset life cycle strategy to manage risks and ensure the gas network is developed, maintained, and operated safely and reliably.

An asset renewal programme tracks performance and efficiently replaces deteriorating assets, while patrols and leak surveys detect unauthorised activities near gas pipeline and gas leaks respectively.

The condition of gas mains deteriorates as they age due to environmental and operational conditions. Hence, renewal of gas mains is necessary to ensure that safety and reliability are upheld. Traditionally, ductile iron (DI) pipes have been used for gas mains, but polyethylene (PE) pipes have become the choice material for replacements during renewal processes.

PE pipes provide superior performance over DI pipes. Key benefits of PE pipes include:

1. **Enhanced Durability and Flexibility:**
   PE pipes are highly resistant to corrosion and environmental stress, ensuring a longer lifespan and reduced maintenance costs.
2. **Environmental Sustainability:**
   PE pipes contribute to a more sustainable gas network by having lower fugitive release of gas due to its robust material properties and homogeneous joints.
3. **Cost-Effective Installation:**
   The lightweight nature of PE pipes simplifies transportation and installation, leading to lower construction costs and faster project completion times.

With the increased deployment of PE pipes in the gas network, the industry is witnessing a transformative shift towards more reliable, sustainable, and cost-effective gas distribution systems. As the number of DI pipes are being progressively replaced with PE pipes, the number of leak cases per km has dropped. This will pave the way for a more sustainable future in gas mains infrastructure.

Modernising Our Gas Network:
Integrating Modern Technologies into Operations

SP implemented various strategies to manage safety and operational risks and ensure the gas network is maintained and operated safely and reliably. Our gas transmission network is continuously monitored from a gas system control centre, with regular inspections and maintenance to uphold its reliability.

The In-Pipe CCTV System detects gas pipeline faults with precision.

In addition to our Supervisory Control and Data Acquisition (SCADA) system for remote operation and monitoring, SP utilises a pipeline CCTV system with video analytics features to monitor unauthorised activities in the vicinity of gas transmission pipelines; and developed Gas Incident Management System (GIMS), a mobile application solution for digital end to end incident tracking and management including response crew activation and incident reporting. Adoption of these technologies have enhanced the capability of the system control centre, ensuring efficient response to incidents and quick performance recovery. These innovations underscore SP's commitment to leveraging advanced technologies for a resilient and efficient energy grid.

Another initiative to improve gas operations is the deployment of in-pipe CCTV cameras for fault tracing in live distribution gas pipelines. This technology provides video footage of internal conditions of gas pipes to improve the efficiency and effectiveness of fault troubleshooting process. This deployment reduces the number of excavations needed to trace faults and shortens the lead time to locate faults. These improvements lead to faster fault rectification, enhancing the resilience of the gas network, while the reduced release of gas into the atmosphere supports greater environmental sustainability.

Additionally, SP's gas emergency response team has utilised a new portable bypass regulator to support their maintenance works. This portable bypass regulator is simple to set up and makes replacements of faulty regulators easier and allows continuous supply of gas to customers when the faulty regulator is being repaired or replaced.

Innovation Highlights: Enhancing Gas Network Safety and Reliability

- **Pipeline CCTV with Video Analytics**
  Advanced surveillance system detects unauthorised activities near gas pipelines, enhancing security and operational awareness.
- **Gas Incident Management System (GIMS)**
  Mobile app enables end-to-end digital incident tracking, crew activation, and reporting for faster response and recovery.
- **In-Pipe CCTV for Fault Tracing**
  Technology captures internal pipe footage, reducing excavation needs and shortening fault location time, minimising gas release.
- **Portable Bypass Regulator Deployment**
  Lightweight regulator allows uninterrupted gas supply during repairs, improving operational efficiency and customer service continuity.

Transforming Urban Infrastructure through Engineering Excellence: Southeast Asia's First Large-scale 230kV Underground Substation

SP is leading a paradigm shift in sustainable urban development with the completion of Southeast Asia's first large-scale 230kV underground substation (UGSS) and the adjacent commercial building above ground.

UGSS while under construction.

UGSS: Engineering Resilience for Urban Density

Built strategically on elevated terrain, the UGSS directly addresses the growing threat of sea-level rise, ensuring continuity of power in low-lying critical zones. Its underground design also optimises land use, freeing up surface land in land-scarce Singapore for other essential developments.

The facility also pioneers the Equipment Water Cooling System (EWCS), which replaces traditional air-cooled methods with a water-based solution that uses heat exchangers, precision piping networks, and rooftop cooling towers. This significantly enhances thermal regulation of key transformer components, increasing operational reliability, extending asset lifespan, and reducing energy consumption typically associated with mechanical cooling.

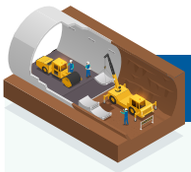
Safety and Environmental Stewardship at the Core

To ensure environmental protection and operational integrity, the UGSS employs gas-insulated transformers (GITs), compact and sealed systems that significantly minimise space usage and the risk of oil-related fire hazards. Supporting this is a closed-loop gas recovery system, including detectors, suction units, compressors, and storage tanks. This system ensures that any gas used in insulation is safely captured and reused or stored, mitigating greenhouse gas emissions and protecting workers from exposure.

Impact at Scale: Setting a New Standard

The UGSS showcases a scalable blueprint for future infrastructure in high-density cities. Beyond their individual innovations, they represent a holistic, systems-thinking approach, that balances operational efficiency, climate adaptability, and safety, while supporting Singapore's national energy transition goals.

This marks a significant step forward in integrating sustainable technologies into essential infrastructure, delivering innovation that is future-ready, climate-resilient, and energy-efficient.



Innovation Highlights: Labrador Underground Substation

- **Underground First**
  Southeast Asia's first large-scale 230kV UGSS, optimising land use in dense urban environment.
- **Climate-Resilient Design**
  Built on elevated ground to safeguard against sea-level rise and support infrastructure continuity.
- **Smart Cooling System**
  EWCS replaces traditional air cooling with water-based heat exchangers for greater reliability.
- **Compact, Safer Technology**
  Gas-insulated transformers (GITs) save space and improve operational safety.
- **Emissions Control System**
  Closed-loop gas recovery prevents leaks, protecting both people and the planet.

Driving Greener Grids with Next-Gen Technologies

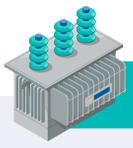
As part of SP's commitment to advancing low-carbon innovation in the power sector, two major breakthroughs are setting new benchmarks in sustainable energy delivery.

In June 2025, SP commissioned Singapore's first 66kV ester-based power transformer that replaces conventional mineral oil with synthetic ester fluid. Known for its superior biodegradability, lower flammability, and enhanced thermal performance, the ester-based transformer represents a safer, more environmentally responsible approach to high-voltage power systems. Having completed on-site testing and installation, the transformer is now contributing to a more resilient and sustainable power grid.

SP's first green 66kV power transformer.

In addition, we are planning for 22kV SF_6-free switchgear pilot trials at our substations. Sulphur hexafluoride (SF_6) is a potent greenhouse gas and phasing it out is a key priority for the industry. The pilot, coupled with ongoing technical collaborations with top switchgear manufacturers, has enabled SP to assess the viability of SF_6 alternatives for broader transmission applications. The findings will also help to address concerns around operational performance and maintenance requirements.

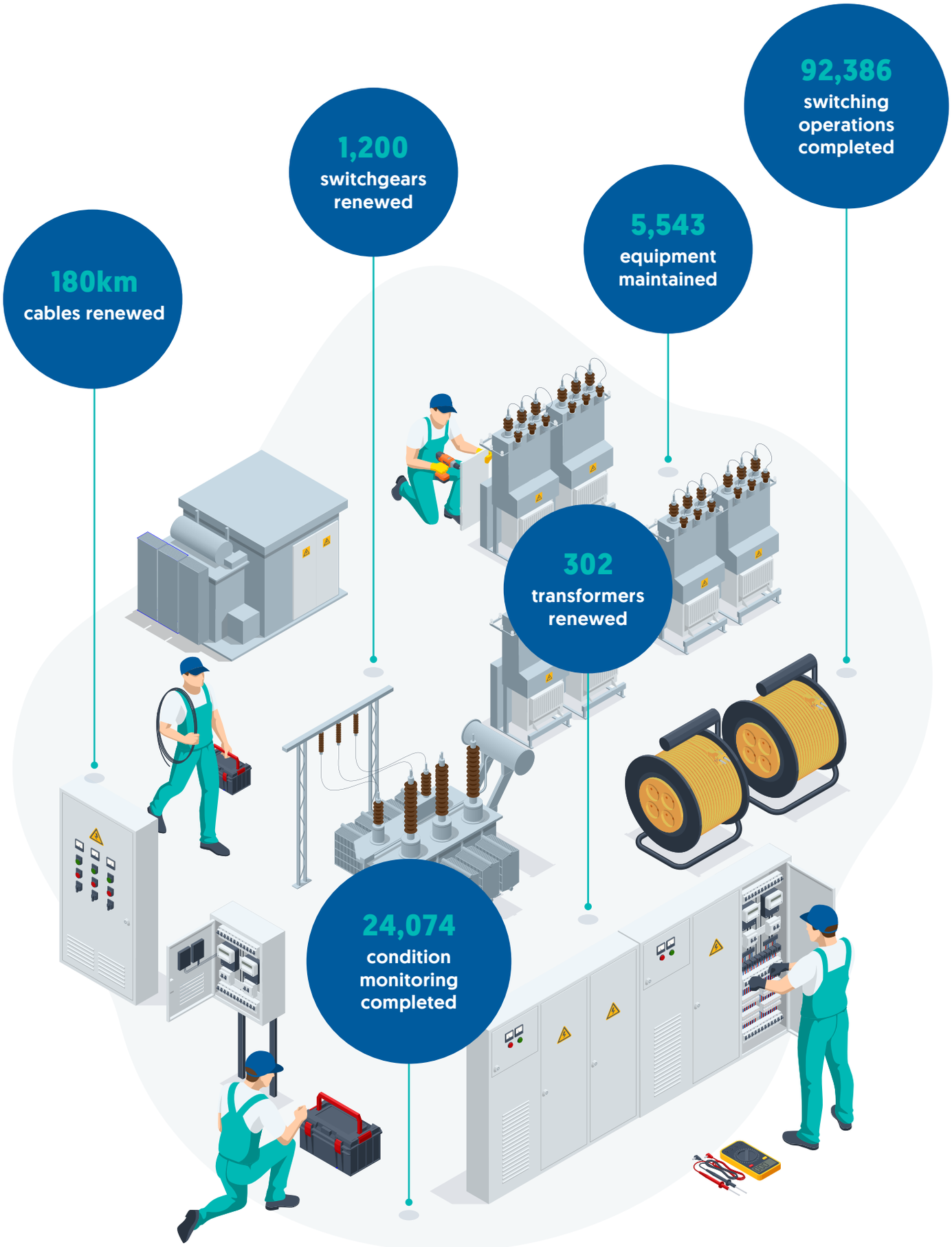
SP continues to monitor and evaluate emerging SF_6-free transmission switchgear and stands ready to pilot deployment as technology maturity improves. These innovations collectively reflect SP's leadership in delivering safe, scalable, and environmentally conscious power solutions.



Innovation Highlights: Sustainable Grid Technologies

- **Singapore's first 66kV ester-based transformer**
  Utilise synthetic ester fluid instead of mineral oil, enhancing fire safety, thermal stability, and environmental performance. Marks a national milestone in deploying sustainable high-voltage transformer technology.
- **SF_6-Free Switchgear Trials**
  Pilot launched in 2024 across five substations to replace a high-impact greenhouse gas with cleaner alternatives.
- **Transmission Innovation Ready**
  SP is preparing to pilot SF_6-free solutions in transmission systems as the next-generation technologies mature.
- **Supply Chain Collaboration**
  Technical workshops with global manufacturers help validate solutions and guide implementation strategies.

SP's Commitment to Reliability



Future-Proofing Singapore's Power Grid

Future-proofing the power grid is essential to ensure it can handle growing electricity demand, integrate renewable energy sources, and adapt to new technologies. As populations and economies expand, the grid must remain reliable to manage increasing energy demands. Renewable energy like solar requires an agile grid to handle their variability. Technological advancements, such as EVs, require seamless integration into the grid. SP has undertaken significant effort to future-proof Singapore's power grid through numerous initiatives ensuring that we have a reliable and resilient grid infrastructure for future generations. This involves supporting the import of low-carbon electricity while maintaining grid reliability, looking into frontier technologies that can help augment and decarbonise our grid, and the incorporation of smart technologies and learning to adopt Artificial Intelligence (AI) to optimise grid operations.

Enabling Low-Carbon Power Imports

Singapore is strategically transitioning to a more sustainable energy landscape to fulfil its ambitious decarbonisation objectives. Central to this endeavour is the plan to import around one-third of the projected electricity demand from regional power grids. By tapping into cleaner energy sources beyond its borders, Singapore aims to reduce its carbon footprint significantly. Singapore is targeting to import around 6 GWp of low-carbon electricity by 2035, up from the initial target of 4 GWp. The Energy Market Authority (EMA) has issued conditional approvals to import low-carbon electricity.

> **"Singapore is targeting to import around 6 GWp of low-carbon electricity by 2035"**

To support the country's renewable energy imports, SP is evolving to become a flexible, digitally enabled orchestrator of cross-border energy flows, integrating low-carbon power into our current grid. As the national grid operator in Singapore, SP possesses the technical expertise and operational capabilities in the transmission and distribution of electricity. We continually build our capabilities in areas, such as High-Voltage Direct-Current (HVDC) and subsea capabilities, in preparation of more complex grid interconnection. Other requirements call for grid flexibility and storage integration, cybersecurity and digital infrastructure, rethink grid topology and control systems given decentralised and multi-source integration.

Enabling Electrification in Singapore

As Singapore accelerates its transition toward a low-carbon future, electrification has emerged as a cornerstone of national climate action, most notably in the transport sector, where the government aims to phase out internal combustion engine vehicles and deploy 60,000 EV charging points by 2030. At SP Group, we are enabling this transformation not only by expanding grid capacity and reliability, but also by deploying advanced technologies such as Distributed Energy Resources Management Systems (DERMS) and Virtual Power Plants (VPPs). These innovations allow us to integrate and orchestrate decentralized energy assets like rooftop solar, EV chargers, and battery storage into a flexible, intelligent grid that supports Singapore's electrification ambitions while enhancing resilience and sustainability.

Enabling Vehicle Electrification in Singapore

The Singapore Green Plan 2030 outlines the commitment to electrify the nation's vehicle fleet, supporting Singapore's goal of transitioning to 100% cleaner energy vehicles by 2040. We have observed an increasing adoption of EVs. Singapore targets to deploy 60,000 EV charging points by 2030.

SP plays a pivotal role in national electrification through tight coordination with agencies and ecosystem players for holistic planning to support charging demand. SP is working with the Land Transport Authority (LTA), EV-Electric Charging and the Housing Development Board (HDB) to ensure that Singapore remains on track to deploy 60,000 charging points for electric vehicles by 2030. Looking ahead, future initiatives will involve the upgrading of over 400 substations across HDB estates as demand for EV charging grows. We will also be undertaking initiatives to support the deployment of charging for heavy vehicles such as buses and trucks.

Innovative Grid Management with DERMS

To cater to potential demand for renewable energy sources and maintain reliability in a distributed energy landscape, we have piloted the Distributed Energy Resources Management Systems (DERMS) to manage the influx of solar photovoltaic, and energy storage systems connected to our electricity network. In November 2024, SP successfully completed the EV managed charging segment of its DERMS pilot. Alongside other Distributed Energy Resources (DERs) like photovoltaic systems and energy storage, EVs are a growing addition to the grid network that requires effective management. With a target of installing at least 60,000 EV chargers in Singapore by 2030, the grid must be prepared to meet the associated challenges.

The pilot demonstrated that the DERMS platform can send intelligent control signals to dynamically adjust the charging capacity of EV chargers. It also showcased the ability to monitor and control a network of chargers at the district level, managing demand within allowable thresholds and avoiding grid constraints.

Overall, this innovative capability will be a vital tool for managing local network constraints and system-level incidents, supporting Singapore's national target of full vehicle electrification by 2040. Additionally, it will be an effective solution for managing electricity demand as Singapore becomes more reliant on intermittent renewable energy sources. Through our real-time monitoring and smart control capabilities, integration of these distributed energy resources can be optimised while ensuring the reliability of our electricity network.

Virtual Power, Real Impact: A Smarter Grid Takes Shape

At the forefront of Singapore International Energy Week (SIEW) 2024, a new chapter in the nation's energy transformation was unveiled, the launch of the development of a 15 MW Virtual Power Plant (VPP) pilot within a regulatory sandbox. This marks a major leap in harnessing the untapped potential of DERs through digital integration.

While solar panels, battery storage systems (BESS), and EV chargers may seem like modest contributors on their own, the VPP aggregates these decentralised assets currently operating in silo into a single, intelligent energy entity. Think of it as a digital conductor, orchestrating thousands of energy nodes to act like one dynamic power plant. In doing so, it can feed reliable electricity into the national grid on demand, balancing supply and demand in real time and delivering essential services like frequency regulation and provision of reserves.

Virtual Power Plant

This unlocks flexibility, resiliency, and scalability in the grid, using assets already embedded in our homes, businesses, and communities.

The VPP's deployment within a regulatory sandbox gives SP and the EMA a critical runway to simulate, stress-test, and refine how these virtual networks perform under actual operating conditions. The results will shape regulatory frameworks and technological standards, paving the way for nationwide adoption.

Its importance to the energy transition includes:

Decentralisation with Precision
VPPs shift the energy paradigm from top-down generation to bottom-up participation, empowering consumers and small distributed generators to become producers and grid contributors.

Grid Stability, Digitally Delivered
By intelligently dispatching stored or generated energy, the VPP acts as a buffer during peak loads or renewables fluctuations to ensure seamless and stable power delivery.

Accelerating Renewables
As solar and EV adoption grows, the VPP ensures these assets can be coordinated, monetized, and integrated without compromising grid performance.

Regulatory Innovation
The sandbox approach removes barriers to experimentation, enabling agile development while safeguarding reliability and stakeholder trust.

The VPP is more than a technical trial, it's a vision for a cleaner, smarter, and more inclusive energy ecosystem. By turning fragmented resources into unified power, it signals how digital innovation will not only support, but accelerate, Singapore's path to net zero.

Enabling Solarisation

Singapore aims to deploy at least 2 GWp of solar energy by 2030. As of 2024, the total installed capacity of grid-connected solar PV systems reached 1.54 GWp, achieving the interim 2025 target of 1.5 GWp. This progress underscores the nation's strong momentum and positions it well to achieve the 2030 target. While the industry is increasingly adopting solar energy as a key strategy for decarbonisation, the integration of solar PV systems presents challenges for the grid, particularly in managing power quality and lead time for upstream infrastructure readiness.

We will continue working closely with EMA and other government agencies in this transition by consistently optimising grid capacity to enable seamless connection of solar PV systems through monitoring the impact of solar integration on the grid. In addition, we are doing our part by generating green energy by solarising our electricity substations since 2023. As of March 2025, rooftop solar panels have been installed at 22 substations, contributing a total installed capacity of 12 MWp.

Enabling Network Resilience through Digitalisation

In 2021, Singapore initiated the Grid Digital Twin project to enhance grid resilience, reliability, and support cleaner energy deployment. The Grid Digital Twin consists of two main models: the Digital Asset Twin and the Digital Network Twin, which serve as virtual replicas of the physical grid network and infrastructural assets. Developed in collaboration with government agencies, industry players, and academia, the project has shown significant progress in research and development.

The Digital Asset Twin, created by SP and in research collaboration with Nanyang Technological University (NTU), allows us to monitor and analyse the condition and performance of grid assets, facilitating timely maintenance and renewal decisions. SP has developed key AI analytics and algorithms for real-time integration with sensors to enable progressive deployment of sensors from 2025.

The Digital Network Twin, developed by EMA with partners such as The Public Sector Science & Technology Policy & Plans Office, Agency for Science, Technology and Research's Institute Of High Performance Computing, and TUMCREATE, a multidisciplinary research platform of the Technical University of Munich (TUM) at the Singapore Campus for Research Excellence and Technological Enterprise (CREATE), uses advanced modelling and simulation software to assess the impact of increased EV demand on the grid and identify necessary infrastructure upgrades. This model has provided insights into optimising substation capacity for EV charging and is undergoing further research to develop solutions by 2025.

Innovation Highlights: Grid Digital Twin

- **Asset Health Intelligence**
  Digital Asset Twin monitors real-time equipment performance, supporting predictive maintenance and lifecycle optimisation.
- **AI-Enabled Monitoring**
  SP-developed algorithms integrate live sensor data to detect issues early, improving reliability and reducing downtime.
- **Electric Vehicle Grid Readiness**
  Digital Network Twin simulates EV demand scenarios, guiding infrastructure upgrades for fast, future-proofed charging.

SP Group - NTU Joint Lab Projects

Researcher working at the SP Group - NTU Joint Lab.

SP and NTU has successfully completed four years of collaboration projects on SP's grid assets, marking a huge progress in asset risk management for SP, developing science-based approach for asset renewal. The projects conducted involved studies on asset lifespan, failure analysis, asset monitoring as well as asset planning and helps to optimise asset renewal planning and uphold grid reliability. One such research project is the development of degradation models of distribution switchgear's critical components using scientific data to determine its remaining lifespan. This enables us to implement measures to enhance switchgear engineering design, maintenance regime and renewal policies. The project delivered significant value by developing methodologies and software for our distribution engineering team to enhance switchgear design specifications for more precise, reliable, and future-ready design standards.

Empowering Asia's Energy Future:
SP Group's Stewardship in Regional Collaboration

With SP Group helming the leadership of the Association of the Electricity Supply Industry of East Asia and the Western Pacific (AESIEAP), Singapore has taken a prominent role in facilitating regional dialogue and action toward a more connected and sustainable energy future. AESIEAP, established in 1975, is the leading non-governmental organization for power and utility companies across East Asia and the Western Pacific. It serves as a collaborative platform for knowledge sharing, technical exchange, and strategic cooperation among utilities, policymakers, and energy sector stakeholders across more than 18 countries and regions. AESIEAP Technical Committee comprises five working groups with regular meetings on models, policies, case studies and best practices covering (1) Smart Grid and Asset Management (2) Sustainable Power Generation (3) Electric Mobility (4) Standardisation (5) Transmission System. SP Group will assume Technical Committee Chairmanship in term 2026-2027.

In its capacity as AESIEAP President for the 2024-2025 term, SP Group is responsible for steering the association's agenda during a pivotal period in the global energy transition. This leadership was exemplified by Singapore hosting the 25th AESIEAP CEO Conference in October 2024, a milestone event that brought together over 200 senior leaders from utilities, governments, and industry to discuss the structural and collaborative pathways needed to advance regional decarbonisation.

AESIEAP President and SP Group CEO Mr. Stanley Huang

Themed "Empowering the Energy Transition", the 2024 CEO Conference focused heavily on the role of power imports and cross-border grid interconnection as practical enablers of a low-carbon future. Recognising the region's uneven distribution of renewable resources, participants examined how enhanced interconnection, through initiatives like the ASEAN Power Grid and bilateral power purchase agreements, can help nations tap into each other's strengths. The discussions acknowledged that energy transition is not only a national imperative but increasingly a regional one, requiring collective infrastructure planning, harmonised regulation, and coordinated investment.

AESIEAP Executive Committee & Council Members for term 2024-2025

SP Group's subsidiary, SP PowerInterconnect (SPPI), featured prominently as a key enabler of these efforts. Working closely with the Energy Market Authority of Singapore, SPPI plays a critical role in developing infrastructure to support the import of up to 6 gigawatts of low-carbon electricity by 2035. This initiative, and others like it across the region, underscore the importance of infrastructure and systems that transcend borders, supporting energy security and decarbonisation at the same time.

Looking ahead, Singapore's leadership will continue as the country prepares to host the Conference of the Electric Power Supply Industry (CEPSI) 2025, the region's largest electric power conference. Together, these efforts signal not only AESIEAP's evolving role as a facilitator of energy transition but also the growing momentum behind regional interconnectivity as a cornerstone of Asia's path to net zero.

SUSTAINABLE OPERATIONS

INNOVATING OUR OPERATIONS

At SP, safety and efficiency are critical to our operations. As such, we believe that operational sustainability is not just about environmental responsibility but also about reducing social costs and enhancing community well-being.

We therefore continuously innovate and invest in improving the following:

Safety as Our Highest Priority:

We incorporate safety into every operation and design of our equipment and processes to protect our staff and mitigate risks.

Achieved an LTIFR of 0.25

Resource Efficiency:

Efficient use of resources minimises waste and reduces operational costs. This is crucial for efficient management of resources while adhering to environmental standards.

Environmental Stewardship:

We actively manage our environmental impact through rigorous monitoring and compliance with environmental regulations. This not only protects natural resources but also builds trust with stakeholders.

64% of residential customers opting for electronic bills

Social Costs Reduction:

Sustainable operations also focus on minimising social costs by enhancing community convenience as well as safeguarding our employees. This involves delivering public benefits and maintaining safe working conditions throughout the planning and execution of our activities.

Engineering Excellence:

Meticulous engineering and asset renewal processes form the foundation of Singapore's energy infrastructure. Before any major projects, extensive long-term planning is conducted. This includes assessing network needs, budgeting, scheduling, and manpower allocation. Precision engineering designs and calculations ensure that field operations proceed smoothly. These behind-the-scenes efforts have made Singapore's grid one of the most reliable in the world.

System Average Interruption Duration Index (SAIDI): 0.236 min, one of the lowest in the world[8]

[8] A study published in The Electricity Journal found that many countries experience SAIDI values ranging from 20 minutes to several hundred minutes per customer annually, reflecting significant disparities in electricity reliability worldwide [Measuring "Reasonably Reliable" access to electricity services (Moss et al., 2020)]

Workplace Safety: Innovating for a Safer Future

At SP, safety is our highest priority, driven by top management's commitment to a safe working culture. Our Group Safety & Health Policy, endorsed by the Group Chairman and the Group Chief Executive Officer, underscores this commitment, extending it to our contractors.

Overall safety and health management is overseen by the Management Safety & Health Committee (MSC), chaired by the Chief Corporate Officer, with senior management representatives from each business unit. Each unit has its own Workplace Safety & Health committee that comprises representatives from management, Union representatives, and ground staff from various operational entities.

To ensure that SP's safety initiatives are effective and forward-thinking, we leverage innovative new ideas whether be it in carrying out modern practices or utilising new technologies to strengthen workplace safety measures not only for our employees but also for our contractors.

Leveraging Technology for Safety Management: SAFE365

One of the most notable innovations is the adoption of SAFE365, a safety management tool designed to improve collaboration between SP and its contractors for effective safety management at sites. Built in-house by our digital team, SAFE365 provides a one-stop platform for contractors to register daily worksite information and submit toolbox meeting records, safety documents, and onsite safety measures. Furthermore, SAFE365 transforms the inspection process by enabling SP officers to input the data into a centralised system, facilitating data analytics, documentation depository, safety communications and end-to-end incident management for their reports digitally.

SP staff using the SAFE365 App onsite.

Additionally, SAFE365 enables our officers to submit their safety inspection reports and feedback on safety matters. The application's real-time data accessibility ensures efficient safety and site management for both SP and contractors, fostering a proactive and engaging safety management culture. The capability to trigger real-time alerts to notify key personnel when unsafe conditions are observed ensures swift mitigating action and enhances safety monitoring. SAFE365 aims to promote a proactive engagement between SP and contractors to better build a positive safety culture.

Safety@SP Courses

Mandatory safety courses (i.e. Safety@SP) conducted in the native language of foreign workers have been provided to contractors since 2014. The objective is to raise safety awareness and to equip them with the necessary skillsets and knowledge to carry out works safely at our worksites. All workers are required to undergo Safety@SP prior to worksite deployment. The course was further extended to include practical stations, covering high-risk work activities, to enhance the learning experience of the contractors, supervisors and workers.

In-house safety management course materials to address specific safety needs

Practical stations feature activities commonly conducted at SP worksites, including excavation, working at height, traffic control management, and lifting operations. By showcasing these high-risk tasks, participants gain a deeper understanding of the work environment and the associated risks before beginning their assignments with SP. Classrooms are equipped with tablets, enabling seamless digital interaction between trainers and trainees. Technology supports efficient course assessments and tracks trainees' progress, transforming traditional training methods into a dynamic, innovative, and engaging learning environment.

SAFETY INFORMATION MANAGEMENT SYSTEM

This system allows staff to access health and safety information via the intranet, including ISO45001 documentation, learnings from past incidents, and training materials. The use of a centralised digital platform for safety information is a modern approach to ensuring accessibility and transparency.

SAFETY CIRCLE OF EXCELLENCE (SCOE)

The SCOE committee actively engages business partners to discuss safety issues and brainstorm initiatives. Twelve key contractors have been engaged since the commissioning of SCOE in 2022. The exchange of ideas within the SCOE also allows for trials on technological solutions to improve site safety. The collaborative approach and regular engagement with contractors to proactively identify and implement safety solutions is innovative.

PROJECT SAFETY MANAGEMENT COURSE

Designed in-house to build capabilities and skill sets in managing site safety, this course helps participants better understand SP safety requirements. Creating specialised training programmes that address specific safety needs is an innovative approach to workforce development. To date, 850 project officers has received this Project Safety Management training.

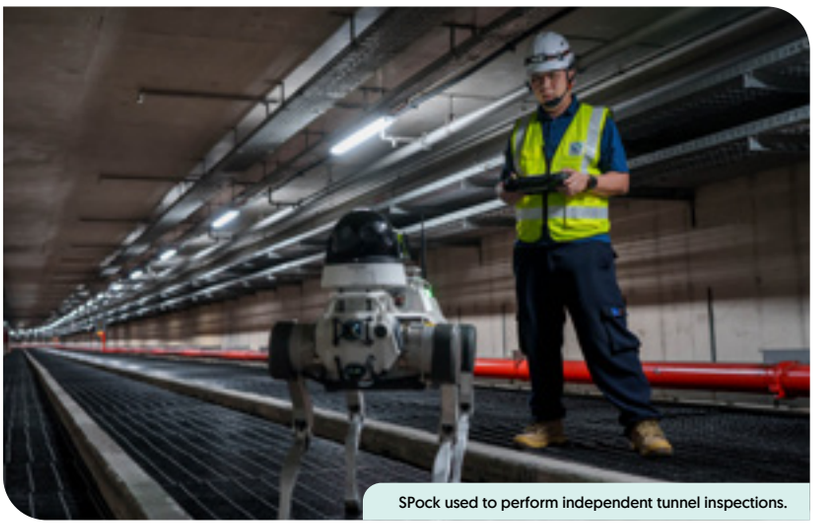
Operational Efficiency: Integration of New Technologies

Technology and innovation play a big part in increasing efficiency and safety at our work sites. SP has been equipping our workforce with new technology while providing training to efficiently incorporate these new innovations into our work processes.

Use of Robotics for Preventative Potential Hazard Identification and Inspection

SPock, a robotic dog, represents a groundbreaking innovation for our grid operations. By revolutionising tunnel inspections with real-time data, SPock significantly enhances both safety and efficiency. Traditionally, tunnel inspections require hours of laborious and physically demanding visual checks. SPock drastically reduces this time, allowing the maintenance team to focus on critical repair works instead.

Beyond efficiency, SPock is a game-changer for safety. It improves emergency preparedness by acting as a first responder, assessing situations, and providing real-time updates before emergency teams arrive on site. This innovative approach ensures that potential hazards are identified and addressed swiftly, safeguarding Singapore's power tunnels.



SPock used to perform independent tunnel inspections.

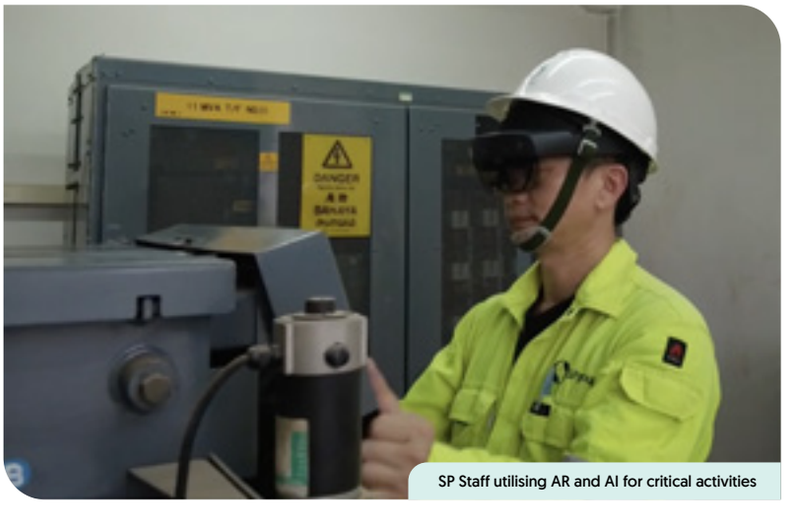
The integration of SPock into SP's operations exemplifies how advanced robotic technology can transform routine maintenance tasks, making them faster, safer, and more effective. This not only enhances operational efficiency but also sets a new standard for safety and reliability in the power grid industry.

Innovation Highlights: Robotic Tunnel Inspection

- **Autonomous Inspection with SPock**
  SPock, a robotic dog, transforms tunnel inspections by capturing real-time data to enhance both safety and operational efficiency.
- **Efficiency Through Automation**
  Replaces hours of manual visual checks with rapid robotic assessments, allowing teams to focus on critical repairs.
- **Emergency Response Capability**
  Acts as a first responder in emergencies, providing real-time situational updates before human teams arrive.
- **Hazard Identification**
  Improves safety by swiftly detecting and reporting potential risks in power tunnels.
- **Operational Transformation**
  Showcases how robotics can elevate routine maintenance, making it faster, safer, and more effective.
- **Safety Innovation Leadership**
  Sets a new benchmark for safety standards in the power grid industry through advanced robotic integrations.

Digital Field Crew - AI Buddy

Switching activities in utility operations are inherently complex, requiring precision, safety, and efficiency. These high-risk tasks can lead to disruptions or safety hazards if not performed correctly. To address these challenges, the AI Buddy project was launched, integrating Augmented Reality (AR) while trialling the adoption of AI into these critical activities. This innovative initiative equips authorised personnel with advanced tools for decision-making, training, safety, and knowledge sharing, revolutionising the execution of such tasks.



SP Staff utilising AR and AI for critical activities

The first phase of the AI Buddy pilot programme has been successfully completed. This phase validated the feasibility of integrating AR and AI into switching activities, showcasing the effectiveness of these technologies in enhancing decision-making, safety, and efficiency. Key outcomes included successful testing of automated assistance capabilities, real-time monitoring, and procedural compliance features.

Building on the success of Phase 1, future phases will focus on integrating Internet of Things (IoT) devices with AR and AI, further enhancing real-time data acquisition and analysis. This will also broaden the applications of AR to encompass a wider range of maintenance and operational tasks. These advancements aim to deepen the impact of the AI Buddy project, ensuring sustained improvements in safety, efficiency, and knowledge management.

By leveraging AR and AI, the AI Buddy project exemplifies how cutting-edge technology can transform high-risk utility operations, making them safer, more efficient, and more effective. This innovative approach not only enhances operational performance but also sets a new standard for safety and reliability in the power grid industry.

Innovation Highlights: Digital Field Crew – AI Buddy

- **AR + AI for High-Risk Operations**
  AI Buddy integrates augmented reality and artificial intelligence to support complex switching tasks, enhancing safety, precision, and efficiency.
- **Smart Assistance in the Field**
  Provides real-time guidance, procedural compliance checks, and automated support to authorised personnel during critical operations.
- **Future-Ready with IoT Integration**
  Next phase will incorporate IoT for deeper data insights and expand AR applications across maintenance and operations.
- **Knowledge Sharing**
  Facilitates training and knowledge transfer, ensuring consistent performance and safety across teams.
- **Raising the Bar for Grid Safety**
  Pioneers a new standard in utility operations by transforming high-risk tasks into safer, smarter workflows.

Transforming Building Inspections with Drone Technology

Previously, building inspections were labour-intensive and required teams to work at height using gondolas, posing significant safety risks. That changed in 2019 when a group of SP's Technical Officers were trained to operate drones for inspection tasks.

Utilising drones to provide efficiency in inspections

After upskilling, they earned their Drone Pilot Licence from the Civil Aviation Authority of Singapore, enabling them to conduct inspections more accurately and enhanced the safety standards. This shift has significantly improved fault detection and minimised the potential hazards associated with working at height. The electricity operations team harnessed drone technology to make their work smarter, safer, and more efficient.

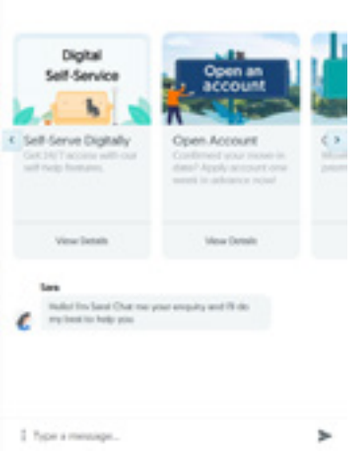
This initiative is part of SP's ongoing efforts to spotlight job transformation stories, empowering a future-ready workforce through innovation and continuous learning.

Environmental Stewardship and Customers Empowerment through Digitalisation

We are advancing sustainability across our operations while equipping customers with greater control over their energy choices. Through continuous innovation and smart technologies, we're streamlining processes, reducing our environmental footprint, and delivering services more efficiently. At the same time, we're creating meaningful ways for customers to engage, whether through our SP app, self-help kiosks, Digital Ambassadors, enabling them to make informed, eco-conscious decisions. This dual helps build a resilient, future-ready business that supports both environmental goals and empowered communities.

Further Enhancing Customer Experience through Digitalisation

As part of an ongoing commitment to customer experience and sustainability, SP has implemented numerous self-service options and digital initiatives. A significant milestone is the transition to paperless billing, with 64 per cent of residential customers now going green by opting for electronic bills. SP is striving to go full paperless, contributing to waste reduction.



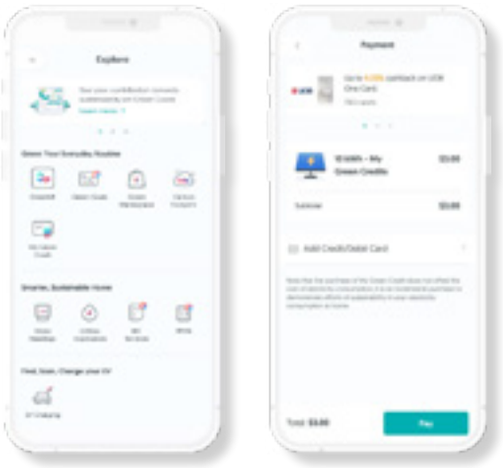
SP's chat bot enhancing customer experiences

In our continuous drive for improvement to empower our customers, SP has significantly enhanced the functionalities of our online web portal, and the SP app. Customers now have access to a comprehensive suite of digital utilities services designed to enhance convenience and deliver a seamless, contactless experience. Notably, a key enhancement introduced last year was the ability to top up Prepaid Metering System accounts via PayNow through the SP app, coupled with automated notifications for added convenience and flexibility. Additionally, a slew of online self-services were made available on SP's chat services, the SP app and even WhatsApp Messaging, allowing customers to submit and verify their meter readings using Optical Character Recognition technology and even seek help on billing matters anytime, anywhere, saving time and enhancing convenience. For customers who prefer in-person assistance, SP has deployed self-help kiosks at our Customer Service Centres in Toa Payoh HDB Hub. These kiosks empower customers to manage their utilities accounts, make payments, and access various services efficiently without the need to queue. Additionally, dedicated Digital Ambassadors are readily available to assist as required, ensuring a smooth and supportive customer experience.

Self-service kiosk improving efficiency

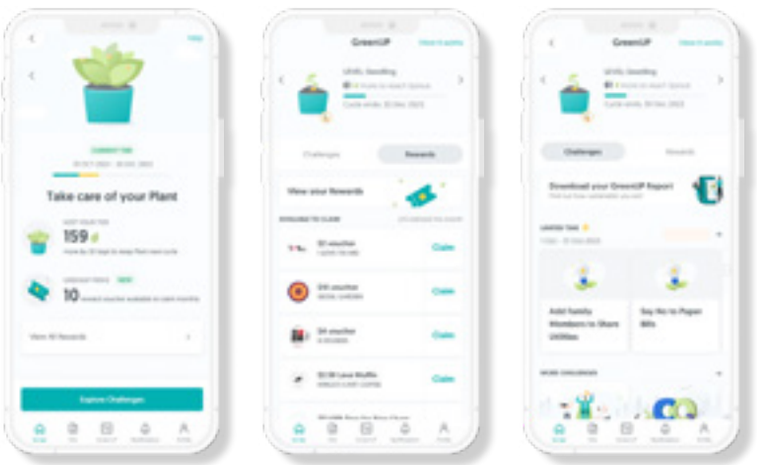
SP Mobile Application

The SP app is an initiative that was launched to create a digital ecosystem where SP can incentivise users to make conscientious decisions about their energy usage, thereby reducing the overall load on our grid. Over the past few years, the SP app has made significant strides in environmental innovation, establishing itself as a leader in promoting sustainable living. To date, the app has registered more than a million users.



Promoting Sustainability through the SP app: GreenUP Initiative

One of its major achievements is the successful implementation of the GreenUP initiative, which serves as the cornerstone of its digital ecosystem. This initiative includes eco-challenges, a comprehensive content library, and tools like the Carbon Footprint Quiz and GreenUP Report. These features have empowered users to measure their environmental impact, gain actionable insights, and stay informed about their sustainability journey, fostering accountability and progress.



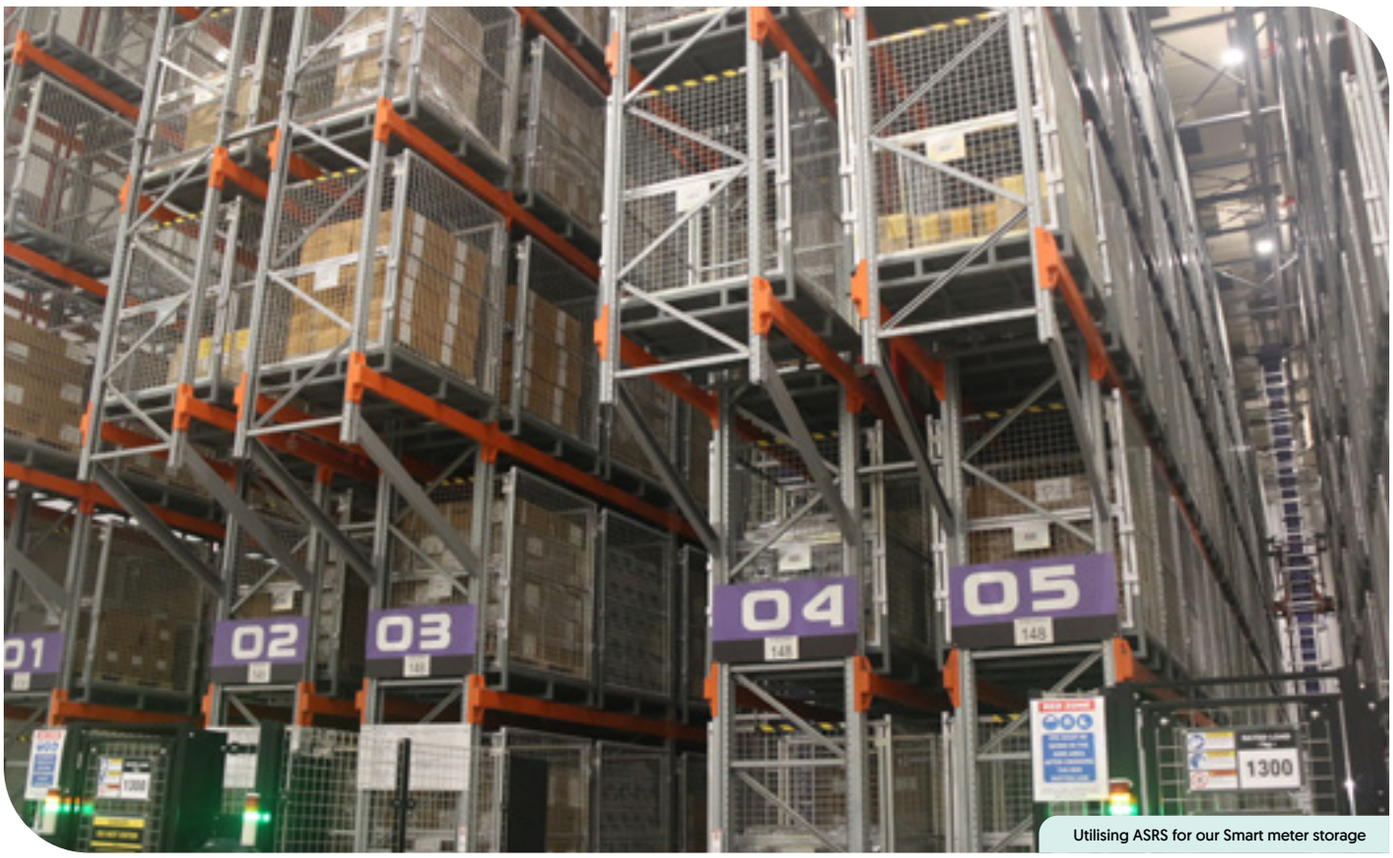
Empowering Efficient Energy Use: Residential Demand Response Programme and Smart Meters

With over 1.2 million smart meters installed to date, users can track granular energy consumption data, enabling them to make informed decisions to conserve energy and reduce their environmental impact. These efforts not only enhance grid resilience but also contribute to Singapore's sustainability goals by balancing demand and supply, showcasing SP's commitment to innovative and sustainable energy solutions.

Launched in partnership with the EMA in September 2024, the Household Demand Response Pilot empowered 1,000 participating residential households with smart meters to actively reduce electricity usage during peak demand periods, supporting Singapore's green energy transition. Integrated into the SP app, the 6-month pilot which ended in February 2025, allowed users to monitor their consumption in half-hour intervals and respond to real-time notifications during simulated 'live' events. By adjusting usage in response to these events, participants not only contributed to grid reliability but also earned monetary incentives, highlighting the potential of residential demand response as a scalable solution for a more sustainable energy future.

Automated Smart Meter Storage System

SP has deployed an advanced Auto Storage and Retrieval System (ASRS) to manage its inventory of meters. Traditional systems require manual storage and retrieval that requires workers to operate forklifts to process cargo and inventory. This potentially puts the workers at risk of falling items or even forklifts tipping over. The ASRS that has been implemented is able to reduce this risk by automating the entire storage process with machinery, eliminating the need for forklifts and human intervention. This allows much quicker storage and retrieval as well as an increased capacity as inventory can now be stored at a much higher height than before.



Utilising ASRS for our Smart meter storage

In addition, the system utilises a smart software to process and manage storage and retrieval, ensuring effective use of space, smart allocation of racks to reduce down-time when any of the aisle is under repair and tracking of storage and retrieval dates of items to create a first in first out system.

This ASRS has demonstrated improvements in safety and efficiency.

Green Solutions Transforming Our Own Operations

We have implemented advanced technologies within our offices and achieved significant energy savings. This allowed us to be a leader in building energy management and even clinched prestigious Green Mark awards from the Building and Construction Authority.

Innovative Green Building Solutions: Transforming SP Group Headquarters

SP Group headquarters has earned the prestigious Green Mark Platinum Super Low Energy Building (SLEB) status from the Building and Construction Authority. By harnessing advanced technologies and eco-friendly practices, we have reduced our environmental carbon footprint, spearheading a greener future.

Key initiatives include overhauling the cooling systems and upgrading to LED lighting. We have also deployed our micro-climate control system, leveraging AI and IoT system to optimise air-conditioning and energy use for maximum occupant comfort.

Key innovations to achieve the SLEB

Latest Development in Green Building Solution: Labrador Tower

Labrador Tower.

The Labrador Tower, a grade A mixed-use commercial property, exemplifies vertical integration of sustainable design. It houses a 1,500 m³ underground thermal energy storage tank, a keystone of its efficient Cooling System. This system operates on a load-shifting principle: chilled water is produced and stored during off-peak night hours when energy demand and carbon intensity are lower. During the day, this stored energy is harnessed to cool the tower. This reduces peak energy usage, lowering operational carbon footprint, and easing demand on the national grid.

The building also incorporates energy-saving features such as a micro-climate control system, high-performance facade, optimal building orientation and floor plates. With its various sustainable features, Labrador Tower is expected to use 40 per cent less energy annually compared to other conventional similar-sized buildings. This building features innovations such as a 255 kWp rooftop photovoltaic system, a micro-climate control system, an efficient chiller plant, thermal energy storage and electric vehicle charging stations allowing us to attain the Green Mark Platinum (Super Low Energy) Building certification. Its Temporary Occupation Permit (TOP) in 2024 cements its role as a benchmark for climate-conscious commercial developments.

SP aims to propel the nation in achieving its Green Plan, which targets 80 per cent of buildings to be green, with 80 per cent of new buildings to be SLE and an 80 per cent improvement in energy efficiency by 2030.

Innovation Highlights: Labrador Tower – Super Low Energy Landmark

- **Green Mark Super Low Energy Certified**
  Recognised for best-in-class energy performance under BCA's Green Mark Certification Scheme.
- **Integrated Sustainable Design**
  Combines micro-climate control, high-performance facade, and optimal orientation to reduce energy use by 40 per cent.
- **Smart Energy Technologies**
  Features GET® Control, efficient chiller plant, and thermal energy storage for intelligent energy management.
- **Onsite Renewable Energy**
  Equipped with a 255 kWp rooftop solar PV system to harness clean energy.
- **EV-Ready Infrastructure**
  Includes electric vehicle charging stations to support green mobility.
- **Model for Singapore's Green Plan**
  Supports national targets for 80 per cent of new buildings to be SLE and 80 per cent energy efficiency improvement by 2030.
- **Integrated Infrastructure Model**
  Combines utility-grade power and green building development, setting new benchmarks for cities.

Electrifying Our Own Fleet

As of March 2025, we have electrified 54 per cent of our service fleet, replacing Internal Combustion Engine (ICE) vehicles with EVs. We aim to fully electrify our regular size vehicles[9] by 2026 via an accelerated electrification plan. For heavy-duty vehicles, we continue to assess the conversion when suitable EVs such as twin-cabin truck, lorry and prime mover are homologated.

[9] Regular sized vehicles include small vans, small lorries and light twin-cab trucks.

TRANSITION ENABLERS

BRINGING INNOVATIONS TO OUR PARTNERS

SP plays a pivotal role in enabling our customers' transition towards a sustainable energy future in the region by developing and deploying our sustainable energy solutions. We recognise that the energy transition is a multifaceted journey, one that demands collaboration, innovation, and continuous learning.

As the Distributed System Operator (DSO), we leverage our capabilities to support our customers in achieving their sustainability goals through:

Collaborative Partnerships:
Working closely with governments, businesses, and communities allows us to develop and implement sustainable energy solutions for them. These partnerships are essential for driving collective action towards sustainability.

Education and Advocacy:
Engaging in educational initiatives raises awareness about the importance of sustainability and empowers people to take action. This fosters a culture of environmental responsibility and helps attract and retain like-minded partners and talents.

Innovative Solutions:
Providing tailored solutions helps our customers reduce their carbon footprint and transition to cleaner energy sources. Innovation is key to developing effective and scalable sustainability solutions.

Financing Solutions:
Capital is a critical enabler of climate action and SP utilises varying financing structures such as non-recourse and green financing to implement sustainable energy solutions across the region.

By enabling this transition, we create value for our stakeholders and contribute to a greener future, ensuring that sustainability is a shared and achievable goal. SP facilitates this transition through our SES business, which encompasses district cooling, solar, EV charging, and building efficiency solutions in Singapore, China, Vietnam, and Thailand.

Integrated Sustainable Energy Solutions

SP empowers a low-carbon, smart energy future for Singapore and the region by delivering comprehensive and innovative Sustainable Energy Solutions. Leveraging our advanced in-house energy technologies and digital capabilities, we design and implement tailored solutions for Commercial and Industrial (C&I) customers locally and in the region. Our strength lies in our ability to offer a wide spectrum of sustainable energy solutions, ranging from solar PV systems and district cooling to energy optimisation with our smart utilities solutions and electric mobility, and seamlessly integrate them to meet our customers' unique needs. Through this holistic approach, we position ourselves as a preferred partner to ensure efficient, scalable, and impactful green transformations across diverse asset portfolios.

Enabling STMicroelectronics' 2027 Journey to Being Carbon Neutral

SP is proud to be a strategic sustainability partner to STMicroelectronics (ST), supporting its global ambition to achieve carbon neutrality by 2027 through a suite of integrated, future-ready energy solutions.

In 2022, ST appointed SP to design, build, own, and operate Singapore's largest industrial district cooling system (DCS) at its Ang Mo Kio (AMK) TechnoPark facility, the company's single largest wafer-fabrication site by volume.

With a massive 36,000 RT cooling capacity, the system is engineered to deliver 20 per cent savings in cooling-related electricity consumption and reduce carbon emissions by up to 120,000 tonnes annually, equivalent to removing over 100,000 ICE cars from the road. The implementation of the DCS freed up more than 4,000 sqm of space, enabling SP to install Perfluorocarbon (PFC) abatement systems and solar panels, further amplifying its decarbonisation efforts.

STMicroelectronic Ang Mo Kio TechnoPark

In addition to cooling solutions, SP is also supporting ST in green mobility across both Ang Mo Kio and Toa Payoh facilities. An initial four electric vehicle chargers have been installed at Ang Mo Kio, with another fourteen scheduled for expansion. At Toa Payoh, two have been provisioned for installation. These chargers provide essential infrastructure for employees and visitors who use electric vehicles.

Building on this success, ST once again partnered with SP in 2025 to upgrade the cooling infrastructure at its Toa Payoh site, a key hub for packaging R&D and wafer testing. The new dual-temperature cooling system, also designed and operated by SP, eliminates the need for heat exchangers and delivers both low and medium temperature cooling directly improving energy efficiency and reducing carbon emissions by approximately 2,140 tonnes annually. It is expected to save up to 5 GWh of energy per year, enough to power over 1,100 four-room HDB households

In addition to the engineering and infrastructure benefits, SP's chilled-water-as-a-service model provides ST with predictable long-term energy costs, reduced operational complexity, and ensures compliance with Singapore's Minimum Energy Efficiency Standards (MEES). The DCS also enhances system resilience and reliability essential for ST's high-precision manufacturing operations while allowing for scalability to meet future production growth.

As part of our suite of sustainable energy solutions, ST will implement our innovative Energy Management Information System (EMIS) for ST AMK TechnoPark and Water Monitoring System for both ST's sites at AMK and Toa Payoh. Through close collaboration with ST's sustainability and operations teams, the solutions are tailored to each site's unique requirements, balancing performance, compliance, and long-term environmental impact. SP is responsible for all aspects of the project management, from design and installation to operations and maintenance, ensuring seamless execution with minimal disruption to ST's mission-critical operations.

Together, these projects demonstrate SP's ability to deliver holistic, integrated energy solutions that go beyond infrastructure, empowering ST to meet its sustainability targets, enhance operational efficiency, and future-proof its facilities. This partnership exemplifies how sustainable infrastructure, digital innovation, and deep domain expertise can accelerate decarbonisation in energy-intensive industries.

Innovation Highlights: Carbon-Neutral Cooling for STMicroelectronics

- **Singapore's Largest Industrial District Cooling System**
  Delivers up to 36,000 RT of cooling capacity, enabling large-scale energy efficiency for industrial operations.
- **Carbon Emissions Reduction**
  Achieves 120,000 tCO_2e annual reduction through 20 per cent lower cooling energy use and repurposing freed-up utilities space for clean tech.
- **Freeing Up Space for Clean Tech**
  Frees up more than 4,000 sqm of chiller plant space at AMK TechnoPark, enabling ST to install Perfluorocarbon (PFC) abatement systems and solar panels, further amplifying its decarbonisation efforts.
- **EV Charging Integration**
  EV chargers installed, contributing to carbon reduction and supporting green mobility.

A Continuous Partnership Powering Net-Zero Ambitions with SP's Integrated Energy Solutions for Frasers Property Singapore

SP is proud to be a trusted integrated energy solutions partner to Frasers Property, supporting its sustainability journey towards net zero. Through a series of strategic collaborations, SP has delivered a full spectrum of smart, clean energy solutions, from solar and electric mobility to district cooling and digital energy management, tailored to Frasers Property's diverse portfolio of commercial, retail, and industrial assets.

SP Group EV charging points at Alexandra Technopark

In Singapore, SP and Frasers Property have successfully completed the nation's largest single solarisation roll-out for retail malls, installing nearly 4,500 sqm of solar panels across 7 properties. This landmark initiative is now generating approximately 920,000 kWh of renewable energy annually, reducing over 370 tonnes of carbon emissions, equivalent to removing 80 ICE cars from the road. With the roll-out concluded, Frasers Property now boasts a total of 14,250 sqm of solar panels across 10 properties, underscoring its commitment to achieving 215 MW of renewable energy capacity by 2030.

Frasers Property is also a key partner in SP's pioneering brownfield distributed district cooling (DDC) network in Tampines regional town centre, the first of its kind in Singapore. Two of its malls, Century Square and Tampines 1, serve as injection nodes in the network. The DDC has 10,500 RT of cooling capacity and serves seven buildings. The system is expected to reduce carbon emissions by 1,000 tonnes annually, equivalent to removing 909 ICE cars from the roads and save over 2.3 million annually and save over 2.3 million kWh of energy - enough to power more than 710 three-room HDB households. By leveraging existing chiller plants and interconnecting them through a smart piping network, the DDC optimises cooling capacity, reduces equipment costs, and frees up valuable leasable space.

To further enhance building performance and tenant engagement, Frasers Property has adopted SP's smart tenant metering solution across 14 properties. This enables tenants to monitor and manage their energy usage, plan efficiency improvements to support sustainability goals at the occupant level. SP has also supported Frasers Property's EV readiness, having installed 26 electric vehicle charging points across 8 of their properties.

District Cooling

District cooling (DC) is a shared utility system where chilled water is centrally produced and distributed via a network of insulated pipes to nearby buildings for air-conditioning. Serving clusters of buildings within a defined area, it replaces the need for individual cooling systems.

By tapping into economies of scale, optimising the performance of centralised assets, and maintaining high operational standards, district cooling can deliver substantial energy savings for customers with effeciency gains of up to 10-15% over the lifespan of the installed system compared to other cooling options in the market.

We have established an extensive DC network in Singapore and are extending our DC capabilities built up in Singapore to support our regional customers in their sustainability journey. SP district cooling journey in China began in 2015 and has now successfully executed both greenfield and brownfield projects across commercial & industrial customer segments. Additionally, SP has commissioned its first district cooling project in Thailand.

Singapore's Largest DC Operator

In Singapore, cooling takes up significant energy due to our hot and humid tropical climate. Cooling demand will continue to grow due to rising temperatures caused by climate change. We are the largest DC operator in Singapore, with 209,450 refrigerant tonnes (RT) of cooling capacity in Singapore. We own and operate the world's largest underground district cooling network at Marina Bay, which has achieved zero supply disruptions since it became operational in 2006 and is the largest underground district cooling network in the world. The Marina Bay network serves 24 buildings and will expand to serve 38 developments in the CBD. SP is committed to supporting more buildings to decarbonise their cooling operations through the implementation of brownfield Distributed District Cooling (DDC) systems.

SP DC operation in Singapore

Greener Future Ahead: Suntec City Connects to SP's Cooling Network

Suntec City

Suntec City, located in the heart of Marina Centre, comprises a vibrant mix of retail, commercial, and convention spaces. Given its proximity, Suntec City has joined SP's Marina Bay district cooling network. SP will operate and optimise Suntec's cooling system, connecting it to the network by 2027.

The cooling system will be made up of a single chiller plant with an installed capacity of close to 20,000 RT, covering all five of its office towers, retail mall and convention centre. This integration will help Suntec City cut carbon emissions by over 346 tonnes annually over 30 years, equivalent to removing 315 ICE cars from the road.

Innovation in Cooling: CapitaLand's Geneo Cluster

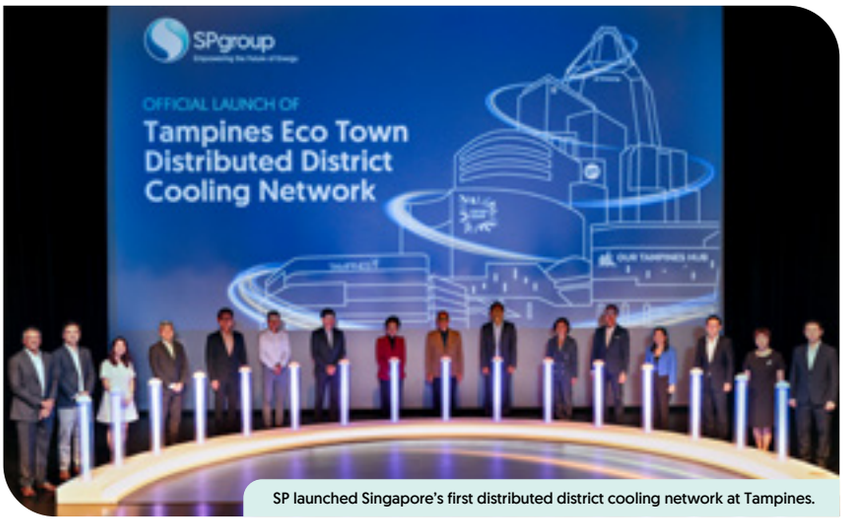
SP's Distributed District Cooling network will be a cornerstone of sustainability at CapitaLand's Geneo cluster, the newest life sciences and innovation hub at Singapore Science Park. In operation since March 2025, SP's Geneo DDC is designed to deliver a 14 per cent higher energy efficiency level than conventional in-building cooling systems, enabling 666 tonnes of carbon emission abatement annually over the 30-year operating period, equivalent to removing 605 ICE cars from the road. The total cooling capacity of the Geneo DDC cluster is 10,400 RT.


Geneo cluster at Singapore Science Park

From commercial districts to industrial projects, we are now helping business parks and clusters achieve their sustainability targets through innovative applications of district cooling.

Brownfield Cooling Solutions:
Tampines Distributed District Cooling Network

Launched in March 2025, the Tampines DDC network marks a national first, transforming Singapore's most established regional town centre into a model of sustainable urban retrofitting. Unlike greenfield developments, brownfield projects like this face a host of technical and logistical challenges: navigating existing infrastructure, coordinating with multiple stakeholders, and ensuring minimal disruption to daily life in a densely built-up environment.



SP launched Singapore's first distributed district cooling network at Tampines.

SP's successful implementation of this complex system, replacing traditional chiller plants across seven operational buildings with an interconnected DDC network delivering 10,500 RT of cooling, demonstrates deep engineering expertise and meticulous planning. The project required precision execution to avoid interrupting traffic flow and business operations, achieved through sustained engagement with building owners, residents, and the public.

Beyond its technical achievement, the Tampines DDC delivers tangible environmental benefits: reducing carbon emissions by 1,000 tonnes annually (equivalent to removing 910 ICE cars from the road) and saving over 2.3 million kWh of energy, enough to power more than 710 three-room HDB households for a year. This pioneering brownfield solution not only strengthens Tampines' Eco Town ambitions but also sets a new benchmark for sustainable retrofits in mature urban areas, offering a replicable blueprint for future developments across Singapore and beyond.

Innovation Highlights: Tampines Brownfield Cooling Retrofit

- **Singapore's First Brownfield District Cooling System**
  Replaced traditional chiller plants in seven buildings with a distributed system delivering 10,500 RT of sustainable cooling.
- **Energy-Efficient Design**
  Engineered to save over 2.3 million kWh annually, enough to power 710 three-room HDB homes for a year.
- **Carbon Emissions Reduction**
  Reduced 1,000 tonnes of CO_2 annually, equivalent to removing 910 cars from the roads.
- **Optimising Assets and Space**
  Optimised cooling infrastructure frees up and repurposes chiller plant space.
- **Minimising Disruption to Public**
  Minimised disruption through proactive engagement with building owners, residents, and businesses.
- **Scalable Retrofit Model**
  Established a blueprint for future brownfield cooling projects across Singapore.

Integrating Sustainability with Sports at the Chengdu International Sports Park City

SP is developing a district cooling and heating system for Chengdu's new International Sports Park City, a flagship urban development that integrates world-class sports infrastructure, public amenities and sustainable urban planning.

Artist Impression of Chengdu's new International Sports Park City.

The district cooling and heating system, which will deliver a cooling capacity of 12,500 RT, is designed to achieve over 30 per cent energy efficiency in cooling and more than 50 per cent in heating. These improvements are expected to result in annual savings of 2,900 MWh of electricity and a reduction of 1,700 tonnes of carbon emissions, equivalent to removing 1,545 ICE cars off the road. Once completed in 2026, it will be SP's largest district cooling system in Chengdu.

A key feature of the system is the integration of an ice thermal energy storage solution, SP's first in China. This technology stores cooling energy in the form of ice during off-peak hours and releases it during peak demand, helping to maintain a consistent supply of chilled water. This approach supports grid stability, reduces peak load demand, and enhances overall system reliability.

These solutions enable the project to meet the several key areas assessed under the China Three Star rating, including:

- **Energy efficiency and operational performance**
- **Reduction of greenhouse gas emissions**
- **Innovation in building systems**
- **Support for renewable and low-carbon energy integration**

This project reflects SP's commitment to advancing sustainable urban infrastructure and supporting China's goals for green development. The project exemplifies how integrated energy solutions drive innovation and sustainability in the design and operation of modern urban spaces while advancing national and municipal climate goals.

SP Energises Chengdu Future Medical City with Sustainable Cooling & Heating

We continue to expand our footprint in Chengdu, bringing our experience and capabilities to the Chengdu Future Medical City, an upcoming world-class healthcare hub in Sichuan, China.

Over a 10-year period, SP will operate and maintain the district cooling and heating system serving the Advanced Medical Achievement Transformation Centre (AMATC) at the Future Medical City.

This energy-efficient system has an installed cooling capacity of 4,800 refrigeration tonnes. It began operations in December 2024 and will enable AMATC to reduce its electricity consumption by 17.5 per cent and natural gas usage by 40 per cent while abating 880 tonnes of carbon emissions per year, equivalent to removing 800 ICE cars off the road.

Through this partnership with the Chengdu Future Medical City, we look forward to demonstrating our district cooling and integrated energy solutions capabilities, leveraging our experience in operations and maintenance to enable the low carbon, sustainable development of China's healthcare and life sciences sectors.

China's First Distributed District Cooling at the International Urban Design Centre, Wuhou

SP is the sustainable energy solutions partner of China's first distributed district cooling (DDC) at the International Urban Design Centre. This partnership helps to position Wuhou as a benchmark for smart eco-districts in Chengdu.

International Urban Design Centre Wuhou

Unlike conventional centralised cooling, the DDC solution affords greater scalability for configuration and operation. The Wuhou district project covers about 45,000 sqm, with a total cooling capacity of 1,950 RT, comprising 3 chiller plants interconnected to a centralised control system developed by SP. The rooftop design factors in the original buildings' conditions, demonstrating the flexibility of the DDC system and its advantage in the renovation of any old building types. Additionally, SP is also able to provide district heating through the network. The solution has achieved energy efficiency of up to 35 per cent for cooling, and over 50 per cent for heating, as compared to conventional cooling and heating systems.

Since it was commissioned in October 2022, the Wuhou Project has enabled property owners to benefit from energy savings and efficiency, lowering of carbon emissions and equipment lifecycle costs and improved comfort. This has the potential to be expanded to more developed cities and regions, enabling our customers in China to achieve its low-carbon, sustainable development goals.

Shudu Project: Upgrading Energy-Efficient Cooling and Heating

SP has upgraded the aging Shudu Central District Cooling and Heating System and is applying 20 years of experience running Singapore's Marina Bay District Cooling network into the project's redesign. As part of the project, SP upgraded the original set-up to a 7,000 RT cooling and heating system that serves seven commercial, retail, and office buildings within the 250,000 square metre complex. The plant is equipped with a 20,000 Refrigeration Tonne-hour ice thermal storage facility, which produces ice during off-peak hours and discharges the ice stored for cooling during peak electricity consumption.

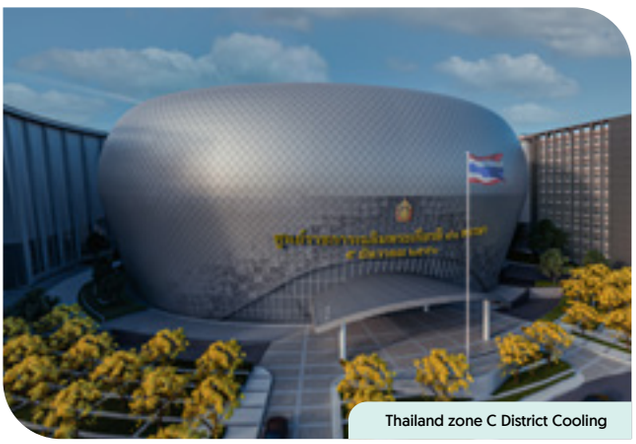
Shudu Central District Cooling

This method not only reduces grid peak load but also enhances the stability and reliability of the cooling system during high-demand periods. A digital management model has been established to help balance ice storage and usage against peak user load and electricity prices. This strategy effectively reduces operating costs while improving energy efficiency.

Pioneering SP's first District Cooling in Thailand

In November 2024, SP completed its first district cooling system in Thailand at the Government Complex Center Zone C in Bangkok. Designed, built, and owned by a joint venture between SP and Banpu NEXT, the system enhances energy efficiency while maximising usable space.

The cooling system has a total capacity of up to 12,600 RT and will provide sustainable cooling for the complex's 660,000 square meter floor area. This system is expected to achieve a 20 per cent energy savings and reduce carbon emissions by up to 3,000 tonnes annually, equivalent to removing about 2,727 ICE cars every year.



Thailand zone C District Cooling

Solar

Solar energy systems generate renewable energy, reducing costs and carbon footprint. SP's rooftop solar PV systems integrated with advanced digital energy management technology deliver reliable, high-yield performance.

Singapore is a country that receives abundant sunlight while having limited land space. SP is able to utilise unique and innovative spaces to enable commercial and industrial (C&I) customers to install and utilise solar energy for their energy needs. In Singapore, SP supports C&I customers in adopting solar energy as part of our integrated sustainable energy solutions, complemented by a suite of energy-efficient initiatives (see 'Integrated Sustainable Energy Solutions' for more examples).

Building on our success in Singapore, we are progressively expanding our integrated SES to selected overseas markets. These initiatives are tailored to suit local regulatory frameworks, energy demands, and climate conditions to ensure relevance and impact. By leveraging our expertise in solar deployment, energy efficiency, and digital energy management, we are helping commercial and industrial customers in countries such as China, Vietnam and Thailand to reduce carbon emissions and achieve their sustainability targets. Our expansion underscores a commitment to driving the energy transition not only in Singapore, but across the region, in support of the global net-zero agenda.

As of March 2025, SP has secured more than 1.7 GWp of solar projects across 18 provinces and municipalities in China. SP's investments span greenfield developments and acquisitions, with a focus on commercial estates and industrial parks in high-demand regions such as Shandong, Guangdong, Jiangsu, and Zhejiang. Our capabilities offered include utility-scale solar farms, ground-distributed and rooftop PV systems, and on-site energy solutions with integrated storage, all tailored to meet the energy needs of China's rapidly evolving industrial landscape.

SP Extends Renewable Footprint with Agrivoltaics Project in China

SP has extended its footprint in China with a 186 MWp agrivoltaics project in Guangdong, combining solar power with agriculture over 610 acres. This project will produce 5.35 billion kilowatt-hours of green electricity over 25 years, reducing carbon emissions by 5 million tonnes. The project plays an important role in meeting the Greater Bay Area's green energy needs, where land for solar generation is limited. This initiative supports low-carbon agriculture and infrastructure development.

SP extends Renewable footprint with Solar-Agriculture project in China

Investing and Building a 90-Megawatt Aquavoltaic Farm in Shandong, China

Representatives from SP Group and Chinese officials at the groundbreaking ceremony for the aquavoltaic farm.

SP has partnered with Qingdao Daneng Environmental Protection Equipment Co. Ltd., a leading environmental technology provider in China, to develop a 90-megawatt aquavoltaic farm in Qingdao City, Shandong, which supplies clean power to Qingdao's first green hydrogen production plant. This project will integrate solar photovoltaic panels across 300 acres of aquafarm, an area roughly equivalent to 161 soccer fields. The solar farm has been connected to the grid in 2024 and will generate approximately 162 million kilowatt-hours of green electricity annually, resulting in a reduction of 160,000 tonnes of carbon emissions.

The project exemplifies innovative land use by combining solar energy generation with aquaculture, which not only optimises land efficiency but also brings ecological benefits such as reduced water evaporation and ecosystem restoration. It will also support Shandong's first green hydrogen production facility, marking a significant step in the province's clean energy transition.

The operational model includes renewable energy generation, grid integration, demand-side management, and energy storage. This comprehensive energy management system is designed to maximise efficiency and balance energy supply and demand across the green energy value chain. The initiative addresses the growing demand for green energy in China's industrial sector and reflects SP's commitment to supporting regional energy transitions through strategic partnerships and technical expertise.

Lianyungang 104MW Aquavoltaic Project

Located in Jiangsu Province, the Lianyungang aquavoltaic project stands as a prominent development within the Yangtze River Delta Economic Belt. With a total installed capacity of 104 MWp, the project was successfully connected to the grid and commenced full-scale power generation in October 2024.


Lianyungang 104 MW Project

This initiative exemplifies the integration of renewable energy with sustainable aquaculture, contributing significantly to regional decarbonisation efforts. Over its projected 25-year life cycle, the project is expected to generate approximately 3.4 billion kilowatt-hours of clean electricity. In environmental terms, this translates to an estimated reduction of 830,000 tonnes of carbon emissions and a savings of 480,000 tonnes of standard coal.

The Lianyungang project reflects SP's commitment to innovative, large scale renewable energy solutions that align with China's broader sustainability goals. It also reinforces the strategic importance of aquavoltaic systems in optimising land use and enhancing ecological resilience.

Accelerating Clean Energy Transition in Southeast Asia

SP continues to deepen its commitment to sustainable energy across Southeast Asia, with a growing portfolio of renewable energy projects in Thailand and Vietnam. In 2024, SP made significant strides through strategic investments and partnerships that support Thailand's transition to a low-carbon future, aligned with Thailand's Alternative Energy Development Plan (AEDP), which targets 30 per cent renewable energy in the national mix by 2037.

Thailand

Project Name	Project Description	Project capacity (MWp)	Annual generation (MWh)	Annual carbon abatement (tCO_2e)
Prachuap Khiri Khan Solar farms	SP acquired three ground mounted utility scale solar farms located in the Ang Thong and Prachuap Khiri Khan provinces. These farms will supply clean energy directly to the national grid. By deploying utility-scale solar in provincial areas, SP is helping decentralise energy production, reduce transmission losses, and promote energy equity across the country.	9	12,500	6,075
Betargro Rooftop Solar	SP partnered with Betagro, a leading integrated food company in Thailand, to install rooftop solar panels across seven of its factories. This collaboration supports Betagro's sustainability goals and demonstrates how clean energy solutions can be scaled across multiple industrial sites to deliver measurable environmental and economic benefits.	8.2	11,000	4,400
Pattani Food Industry Rooftop Solar	SP partnered with Pattani Food Industries Co. Ltd. to install a rooftop solar system at its factory. This initiative highlights SP's commitment to enabling smaller enterprises to participate in the clean energy transition, contributing to broader national sustainability efforts.	1	1,397	400

Vietnam

Project Name	Project Description	Project capacity (MWp)	Annual generation (MWh)	Annual carbon abatement (tCO_2e)
Hoa Sen Rooftop Solar	SP entered a landmark partnership with Hoa Sen Group, one of Vietnam's largest steel manufacturers and the leading exporter of steel sheet in Southeast Asia, to accelerate the integration of clean energy solutions across their manufacturing facilities. This partnership is a pivotal step in Hoasen's journey toward sustainable steel production and supports Vietnam's national target of achieving net-zero emissions by 2050.	18.68	22,000	10,360
TCE Vina Denim Rooftop Solar	In January 2025, SP partnered with TCE Vina Denim to install rooftop solar power system at its manufacturing facility in Nam Dinh, Vietnam. This initiative will supply 15 per cent of the factory's energy needs with renewable sources. The project was also completed four months ahead of schedule, showcasing SP's technical expertise and commitment to accelerating clean energy adoption.	5.2	5,200	2,400

Electric Vehicle Charging Solutions

Advancing E-Mobility for a Sustainable Future

SP Group continues to play a pivotal role in supporting Singapore's transition to electric mobility. Through SP Mobility, our dedicated EV charging arm, we have built the nation's largest public high-speed EV charging network, with over 2,100 charging points across nearly 550 locations. This extensive infrastructure supports the growing demand for cleaner transport and helps reduce range anxiety for EV users.

Since pioneering EV charging in Singapore in 2016, SP has remained at the forefront of innovation. We have designed and builit the Charging Station Management System (CSMS) enabling seamless integration across different charger brands, real-time monitoring, remote diagnostics and direct connectivity with the SP app, offering users an intuitive and reliable experience. Our solutions now extend beyond traditional four-wheelers, with battery swap stations for two-wheelers developed by Gogoro and in partnership with Cycle & Carriage, and hybrid charging systems co-developed with local start-up Power-UP Tech to offer flexible mobile and fixed charging options.

Attracting Strategic Investment

SP Mobility's strong foundation and growth trajectory have attracted strategic interest from global investors. In 2025, HSBC Asset Management made an investment into SP Mobility, a milestone event that signals confidence in our business model and the long-term sustainability of our EV ecosystem. This investment allows SP to continually develop its green mobility business, enabling the electrification of Singapore's vehicles and accelerating Singapore towards its net zero goals.

Expanding Beyond Borders

SP's commitment to regional connectivity is reflected in our cross-border collaboration with EV Connection, a Malaysian charging point operator. This collaboration is particularly significant as both nations see a rise in EV adoption: Malaysia has seen a 150 per cent increase from 2023; while in Singapore, one in three new car purchases in 2024 are EVs, nearly doubling from the previous year. This partnership will eventually enable seamless EV charging across Singapore and Malaysia, allowing users of both the SP and JomCharge apps to charge their vehicles conveniently when travelling across the Causeway. With EV adoption rising sharply in both countries, this initiative supports regional decarbonisation and enhances user experience.

SP's partnership with JomCharge

Electrifying the Maritime Sector

In a landmark move, SP extended its EV charging capabilities to the maritime sector. On April 8, 2024, SP launched Singapore's first direct-current fast-charging pilot for electric harbour crafts (e-HCs) at Marina South Pier, in collaboration with Pyxis Maritime Pte Ltd and the Maritime and Port Authority of Singapore (MPA). The pilot installation can charge an e-HC with a 500 kWh battery in approximately three hours, supporting an operational range of up to 50 nautical miles.

This initiative marks a significant step in decarbonising maritime transport, supporting Singapore's net-zero goals and establishing SP's leadership in sustainable marine infrastructure. Insights from the pilot will inform future planning for maritime charging standards and infrastructure.

SP Group has made significant strides in advancing EV mobility in Singapore, scaling infrastructure, attracting global investment, expanding regionally, and innovating into maritime applications. These achievements reflect our commitment to supporting Singapore's climate goals and shaping a cleaner, smarter transportation future across land and sea borders.

PEOPLE AND COMMUNITY

Key Achievements (Awards & Accolades)

SP's commitment to our people and community has been recognised in the various awards received over the years. These awards are a testament to our strong mandate of developing a great workplace for everyone. Our accomplishment in the community also shows our dedication to give back and serve. Through this, we hope to foster great relationships within the workplace and be an example to society.

Achievements and Awards

Singapore's Best Employers 2025

(Top in utilities category)

(30 April 2025)

Threat-Oriented Person Screening Integrated System (TOPSIS) Outstanding Award

MHA
(27 December 2024)

Safety and Security Watch Group Outstanding Individual Award

MHA
(27 December 2024)

Excellent Customer Centric Service

49 Colleagues received silver, gold and star awards

30th Excellent Service Awards (EXSA)
(November 2024)

Global Healthy Workplace

Global Centre for Health Workplaces
(2H 2024)

Pinnacle award

First to receive the highest accolade for two consecutive years

Community Chest Singapore
(7 October 2024)

Enabler Award, Volunteer Partner Award and Charity Platinum Award

Community Chest Singapore
(7 October 2024)

Champion of Good

Exemplary organisation influencing stakeholders for multiplied impact

National Volunteer & Philanthropy Centre
(18 July 2024)

Plaque of Commendation (Star)

Highest award NTUC confers for organisations

National Trade Union Congress
(10 May 2024)

SP HQ has been awarded a Platinum Super Low Energy Building

(May 2024)

Outstanding Community Partnership Award

Singapore Police Force
(19 February 2024)

Workplace Health & Well-being

SP developed a comprehensive workplace health programme which is based on the World Health Organisation (WHO) model for healthy workplaces. The programme has been developed with the objective to prevent occupational disease and promote staff's personal health and well-being. These programmes are supported by the Union of Power and Gas Employees (UPAGE) and supported by the joint efforts of the MSC, the Workplace Health Programme (WHP) committee, and the ReCharge committee.

WHP committee spearheads the workplace health initiatives to drive total WSH within the organisation, in line with WHO framework of healthy workplace. WHP develops and implements SP Groupwide workplace health programmes in collaboration with ReCharge Committee.

ReCharge committee aims to create a dynamic and energetic workplace for staff in strengthening company unity and promoting preventive healthcare through active participation in sports and fitness, increase awareness of preventive healthcare via knowledge sharing, social and festive events that liven up the workplace and encourages team bonding.

To further support employees, the LIVE WELL Portal was also set up as a one-stop centre for all health and well-being information for all SP staff. The portal provides access on health information, self-help resources, publication of upcoming programmes and employee assistance programme. Annual lifestyle survey is also conducted to help improve programmes, targeting at employee's interests and providing more values to staff's health and wellbeing.

Workplace Wellness Programmes

SP encourages staff to take care of their health and well-being through participation in activities organised by Workplace Health Programme committee and ReCharge committee.

A comprehensive approach is adopted in the planning and execution of these activities under four dimensions as illustrated below:

Preventive Healthcare

- Health Screening & Immunisation
- Healthy Talks
- Statutory Occupational Screenings

Intervention Healthcare

- Turning-23 Programme
- Smoking Cessation
- Chronic Disease Management

General Healthcare

- Physical Workouts
- Social activities by ReCharge
- WHP Bazaar

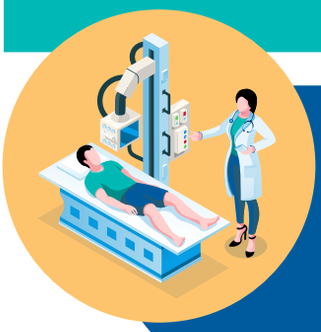
NEW INITIATIVES

Mental Healthcare

- Employee Assistance Programme
- Self-Help Online Resources
- CARE Ambassadors Workshops
- Mindfulness & Self-Care Talks
- Financial Literacy
- Parenting Workshops
- Support for Mature Workers

Key highlights for FY24/25 are as follows:

As part of **Preventive Healthcare**, SP facilitated year-end seasonal influenza vaccinations held within SP premises for both employees and their family members at subsidised rates. The subsidy was extended so as to allow more time for employees to receive vaccinations (onsite/clinics).



SP achieved 100 per cent Compliance with the Statutory Medical Examinations mandated by the Workplace Health and Safety Act. This includes an annual audiometric examination, annual mercury exposure examination, annual spirometry for SCBA (Self-contained Breathing Apparatus) users.

An annual health screening was made available to all staff at no charge. This provides staff with an assessment of their current health status such as cholesterol levels, BMI, and diabetes risk so that they are aware and able to take timely action where required. The data collected is also taken into consideration for the development of workplace health programme in the following year.

Turning-23, a weight management programme currently at its 6th year, aims to provide staff with **Interventive Healthcare support**. The programme helps to cultivate good health habits with weekly physical workouts, monthly talks and participants' tracking of diet and calorie intake. SP partnered with Sengkang General Hospital to provide private consultation sessions to offer insights and tips on weight management, at no cost to the employee.

SP collaborated with Parkway Shenton Group to introduce "Healthier SG SP-CDMP," a chronic disease management programme designed to support employees in achieving a better quality of life. Employees diagnosed with chronic diseases are encouraged to join the programme and are incentivised to achieve health targets, at no cost to the employee.

In collaboration with ReCharge on **General Healthcare**, various health and financial talks were held throughout the year to ensure staff are equipped with relevant knowledge to support staff's general well-being. The talks covered a range of topics including, planning for retirement, financial planning, parental workshop, stress management and healthy habits.

The well-being of SP's employees remains as one of our main priorities under **Mental Healthcare**. The SP Mental Health Week was a two-day event comprising educational mental health talks, pound fitness workouts and a mental health fair. The Mental Health Fair was the main highlight of the week with curated activities and educational materials to take care of both the mind and body. Community partners from supported Singapore Association of Mental Health, SAFE, Samaritans of Singapore, Singapore Police Force and its Anti-scam Unit, Red Pencil and Fitness First were invited to the event.

A network of Care Ambassadors was established to offer peer support to staff. These Care Ambassadors underwent a management training refresher workshop in October 2024 to discuss acquire skills in psychological first aid to help staff who are suffering from mental health issues.

New initiatives for FY24/25 include hosting parental workshops to provide tips on effective communication with children and improving family relationships. Additionally, talks relating to chronic disease management and retirement preparation were also organised to cater to the growing number of matured employees in SP.

SP has been recertified as a Global Healthy Workplace by the Global Centre for Healthy Workplace (GCHW) for the period of 2024 to 2026. The certification recognises SP as an employer of choice, demonstrating sound ethical business principles, performance, and value to stakeholders.

In recognition for its efforts in Workplace Health, SP Group was awarded the Company Excellence Award (for Workplace) under the Singapore Health Award, presented by the Health Promotion Board.

ReCharge Day kicks off at SPHQ

Recharge Committee 2024

SP launched ReCharge Day at SPHQ on August 21, 2024, initiating a series of roadshows at all SP offices and depots until December 4. This initiative aimed to engage staff and foster a sense of community and fun.

Over 850 staff members participated, enjoying games, entertainment, sweet treats, and coffee for a good cause. A live band performance encouraged the crowd to sing along to popular and classic hits, with some colleagues showcasing their musical talents. The carnival-like atmosphere was further enhanced by SP's sports interest groups, which were on-site to recruit new members through try-outs and friendly competitions.

The ReCharge events aim to bring colleagues together, get active, and have fun. ReCharge Day serves as a platform for enjoyment and an opportunity for colleagues to get to know each other better in a relaxed setting.

Prioritising Staff Well-being at SP

Workplace health and safety programme committee

To commemorate World Mental Health Day, SP's headquarters was lively with activities aimed at raising awareness about physical and mental well-being. On October 9, 2024, we hosted a mental health fair supported by community partners such as the Singapore Association of Mental Health, SAGE, Samaritans of Singapore, Singapore Police Force and its Anti-scam Unit, Red Pencil, and Fitness First. These partners curated activities and educational materials focused on mind and body care. The event brought together over 800 staff from various business units through interactive games, art therapy, free eye screenings, and shoulder massages, all designed to promote relaxation and mental wellness.

Colleagues participated in a mental health quiz

In addition to the mental health fair, colleagues participated in a pound fitness workout and a mental wellness talk by the Institute of Mental Health on October 8. Staff feedback indicated that they found the activities informative and stress-relieving, and they looked forward to more such sessions in the future.

Creating a supportive environment for staff well-being remains a priority for SP. Beyond the mental health week activities, SP offers regular financial and health talks, weekly physical workouts, and annual health screening benefits for staff.

SP Recognised for Creating a Healthy Work Environment

SP is proud to be recognised for its proactive efforts in promoting health and wellness among its 3,700 employees. In recognition of its commitment to employee well-being and corporate responsibility, SP was honoured with the Company Excellence Award at the Singapore Health Awards 2024, presented by the Health Promotion Board.

SP awarded the Company Excellence Award

With a comprehensive workplace health framework and strong leadership support, SP designs and implements purposeful programmes to achieve its wellness objectives. Notable initiatives led by SP's Workplace Health Programme Committee and ReCharge Committee include the Care Ambassadors programme for peer mental health support, Turning-23 weight management programme, regular financial and health talks, physical workouts, and annual health screenings. SP's in-house sports facilities, such as futsal, basketball, and badminton courts, are always bustling with activities led by its sports interest groups.

SP is also pleased to have received recertification as a 'Global Healthy Workplace' for 2024-2026 by the Global Centre for Healthy Workplaces and has enhanced its health programmes over the past two years.

> **"Care Ambassadors programme for peer mental health support, Turning-23 weight management programme, regular financial and health talks, physical workouts, and annual health screenings."**

Training and Development

Number of employees

3,767

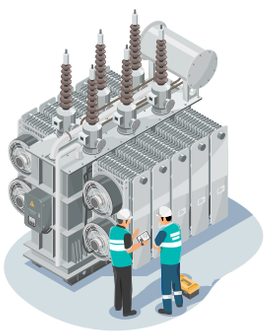
Total training hours

157,000

Average training hours per employee per year

42

Examples of courses rolled out in FY24/25 for:



Network Reliability and Resiliency

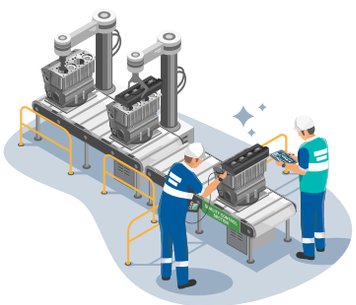
- 66kV Switchgear Maintenance
- Introduction to Energy Storage Systems

Decarbonisation and Sustainability

- Hydrogen Industry Masterclass
- High Voltage Direct Current Workshop

Digitalisation

- Applying Smart Tech in a Smart Way: The Right Approach to Digital Transformation
- Microsoft Power Business Intelligence (BI)



Artificial Intelligence

- Introduction to AI and Machine Learning
- Machine Learning and Advanced Analytics using Python

For employees going into retirement, reporting officers engage them about six months prior to re-employment to discuss possible re-employment arrangements, and the training needed should they be redeployed to a different job. There is also flexibility on working arrangements subject to operational needs extended to returning retirees, for example moving into shorter work week as a transition to the eventual retirement.

Expanding SP's team of Technical Experts

On April 17, 2024, SP welcomed a new Technical Expert (TE) in Pipeline Integrity Engineering, further strengthening its community of 22 Technical Experts dedicated to advancing engineering excellence across the organisation. This appointment reflects SP's continued commitment to deepening technical capabilities and nurturing domain expertise in critical infrastructure areas.

The newly appointed TE brings extensive experience in corrosion control systems and pipeline integrity management, with a strong background in the oil and gas industry. Currently serving in the Gas Asset Strategy and Condition Monitoring team, the expert will play a key role in mentoring the next generation of engineers and supporting operational excellence.

SP's current batch of technical experts

SP's Technical Experts programme was established to recognise engineers with deep technical knowledge and a passion for advancing their field. These experts provide technical advisory, lead investigations, and drive operational improvements, ensuring that SP remains at the forefront of engineering innovation and reliability.

This appointment underscores SP's strategic focus on building a resilient, future-ready workforce through continuous learning, knowledge sharing, and technical leadership.

May Day Recognition for Building a Future-ready Workforce

With strong support from the Union of Power and Gas Employees (UPAGE), SP received the Plaque of Commendation (Star) award, the highest honour for organisations, at the National Trades Union Congress May Day awards on 10 May 2024. This accolade recognises SP's ongoing dedication to fostering career growth and development opportunities for its workforce.

Among the initiatives celebrated are SP's efforts to equip employees with future-ready skills, including sponsorships for advanced education and specialised training such as drone piloting and electrical power engineering. These programmes reflect SP's proactive approach to upskilling and empowering its people to take on evolving roles in the energy sector.

SP Group and Union of Power and Gas Employees representatives at May Day Awards 2024.

The achievements embody SP's commitment to preparing its workforce to lead the future of energy through continuous learning, innovation, and strong partnerships with labour unions.

Caring for Our Community

SP's giving focus is anchored on making sustained contributions to programmes for seniors, children and youth from lower-income backgrounds. Through sustained philanthropy and a vibrant staff volunteering culture, SP's contributions totalled S$5.8 million last year.

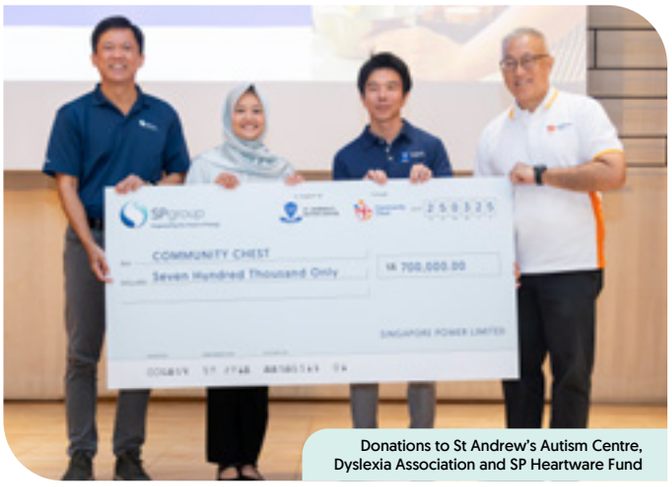
A record S$1 million was raised for the SP Heartware Fund thanks to the generosity of our corporate partners at SP's annual Charity Golf event, our customers' contributions via their utilities bill and the SP app, as well as donations of SP employees, which SP has matched dollar for dollar.

SP's annual charity golf

We reaffirmed our multi-year support for KidSTART Singapore with a S$1.1 million donation, bringing our total contribution to S$4.3 million since 2021. This latest donation will benefit more than 3,500 KidSTART families through PowerUP Playtime, with resources and workshops to help parents foster joy in learning and quality interactions with their pre-school children.

Our outreach to children and youth was further expanded to support those with special education needs. SP donated S$700,000 to St. Andrew's Autism Centre for its Dignity of Work programme and the St. Andrew's Autism Home Accessibility Fund. Dignity of Work trains students with autism in baking to create a pathway for employment opportunities while the accessibility fund provides relief for caregivers of autistic family members.

KidSTART families launching the programme and getting a sneak preview of the items in the PlayFULL Pack.



Donations to St Andrew's Autism Centre, Dyslexia Association and SP Heartware Fund

Through our S$300,000 donation to Dyslexia Association of Singapore, we provided bursaries to struggling learners to receive literacy training that enables the students to cope better and improve in their academic journey.

More than one in three SP staff participated in volunteer activities last year. Our SP Heart Workers contributed over 8,000 hours of volunteer service, an uplift of almost 50 per cent from the previous year. Besides grocery shopping, recreational games and festive celebrations, we introduced new activities such as trips to a fish farm, and learning journeys to enhance awareness about caring for the environment. We delivered over 10,000 Power Packs of daily essentials, with customised items for each age segment of recipients.

Beyond Singapore's shores, SP is committed to supporting vulnerable communities in the markets in which we operate. We donated one billion VND in support of families in Hai Phong City, Vietnam, who have been displaced by the effects of Typhoon Yagi, one of the most severe storms to hit Southeast Asia in decades.

Community Chest Awards 2024

For sustained giving and inclusive practices, SP received the highest-tier Pinnacle award for the second year running at the annual Community Chest Awards. This was among a record four awards that SP received last year, with the Charity Platinum Award, Enabler Award, and Volunteer Partner Award as part of the honours. We were also conferred as a Champion of Good by the National Volunteer and Philanthropy Centre for demonstrating positive impact across the People, Society, Governance, Environment and Economic dimensions. SP has been conferred in every edition of this award, showing our steadfast support and growth in our community support.

These accolades are made possible through the collective efforts of our employees, customers, corporate and social service partners.


Caring for our community

DISCLOSURES

TCFD Disclosures

As a leading energy utilities company in Asia Pacific, SP owns and operates electricity and gas transmission and distribution businesses as well as a market-support services business in Singapore. SP holds a 40 per cent interest in SGSP (Australia) Assets Pty Ltd ("SGSPAA"), an Australian company engaged in the transmission and distribution of electricity and gas in Australia. Additionally, SP deploys sustainable energy solutions regionally, including but not limited to energy efficiency projects, renewable projects and provision of Energy as a Service ("EaaS") via a suite of energy solutions to enable different customer segments achieve their sustainability objectives.

Given the varied context of our operations in Singapore and the Asia Pacific region, SP recognises the potential impact climate-related risks and opportunities that can arise. Since 2021, SP has adopted the Taskforce for Climate-related Financial Disclosures (TCFD) recommendations as part of our climate action journey. We have since gained visibility on potential climate-related risks and opportunities and are working to further embed them in our risk management process and business strategy considerations for ongoing monitoring and management, building climate resilience and tap on opportunities that arises. Moving forward, we will gradually move towards the adoption of ISSB IFRS S2 and relevant S1 reporting framework.

Risk Management

SP utilises both 'Top-Down' and 'Bottom-Up' approaches to encourage communication and participation from management and employees. Effective risk management entails the consideration of all aspects of the business to enable the Board and Management to identify and assess risks properly and promptly. The 'Top-Down' approach provides oversight and guidance on material risks from both the Board Risk Management Committee (BRMC) and Management, conducting thorough analysis to mitigate strategic risks. The 'Bottom-Up' approach empowers employees to identify and escalate risks in their daily operations to Management, ensuring that major risks are communicated, and necessary actions are approved. This approach enables every employee in SP to proactively participate in highlighting the risks they encounter in the course of their work. Similarly, opportunities are identified and tapped upon.

Climate-related Risks and Opportunities

In 2021, we commissioned a study to assess our climate change resilience and to identify the climate-related risks and opportunities material to our business.

SP conducted the analysis based on the following climate-scenarios which were mapped to the Representative Concentration Pathway (RCP) scenarios adopted by the Intergovernmental Panel on Climate Change (IPCC) for physical risks and the Network for Greening the Financial System (NGFS) for transition risks.

Physical Risks

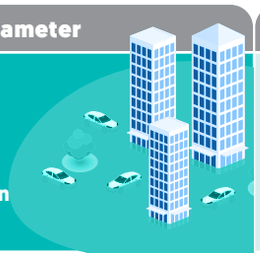
For the physical risk climate scenario analysis, SP selected two contrasting Representative Concentration Pathways (RCP) scenarios adopted by the IPCC which are widely used. The 2021 physical risk model for the analysis takes on data from the IPCC 5th Assessment Report and will look to update our scenario modelling with data from subsequent assessment report for future analysis.

Exposure of our assets to climate-related risks were assessed across three time horizons: short term (2020 - 2050), medium term (2040 - 2070) and long term (2070 - 2100).

Climate Scenarios for Physical Risk	IPCC Climate Scenarios	Climate scenario definition
Net Zero	RCP 2.6 (likely below 2°C)	A stringent mitigation scenario, this pathway assumes a global ambition on keeping global temperature rise likely between 0.3°C to 1.7°C above pre-industrial temperatures, by the end of the 21st century. Substantial emissions reductions are put in place over the next few decades, where near zero emissions are achieved by 2100
Business-as-usual	RCP 8.5 (likely 2.6°C – 4.8°C)	A scenario which implies very high GHG emissions, this pathway assumes a likely global surface temperature change of 2.6°C to 4.8°C above pre-industrial temperatures by the end of the 21st century. No additional efforts are put in place to reduce GHG emissions beyond those in place today.

Physical risks assessment results

As climate risk is an evolving topic, we will be monitoring the changes to climate projections to accurately evaluate the scale of impact to identify the mitigation actions accordingly. In 2022, we conducted a localised study for Singapore on the flooding risk on the electrical transmission and distribution assets and the findings were largely in line with our original assessment in 2021.

Physical risk parameter	Impact	SP's strategic response
Riverine Flooding **Coastal Flooding** **Heavy Precipitation** 	Flooding may lead to erosion of our aboveground infrastructure and underground cables may become susceptible to deterioration if there is moisture ingress.	Our above ground infrastructures are located above the nationally mandated Minimum Platform Level (MPL). Maximum flood levels are below the MPL. We will monitor updates for future Singapore flood maps
Air Surface Temperature Change 	An increase in air surface temperature will reduce the efficiency of the T&D network and accelerate the rate of insulation degradation of equipment.	Currently, maximum air surface temperatures are within the equipment specifications.
	Air surface temperature rise can result in a larger district cooling load and result in efficiency losses.	
	Increased temperatures cause a decrease in the conversion efficiency of solar PV cells, affecting the maximum possible power output.	

Transition Risks

For transition risks, the parameters were selected from Network for Greening the Financial System (NGFS) to understand how climate change would affect transition risks such as policy and technology trends in the future. One scenario was the NGFS Net Zero 2050 (1.5°C). In this ambitious scenario, the global community agrees on the need to decarbonise to limit warming to 1.5°C through stringent and immediate climate policies. The other scenario was NGFS Nationally Determined Contributions (NDCs) which represents a future where all NDCs, including pledged but not yet implemented policies, are in place. This path assumes that the moderate climate ambition reflected in the NDCs in early 2021 continues over the 21st century and presents relatively low transition risks. With the NDCs, emissions demonstrate decline but still result in approximately 2.5°C of warming. Given that transition risks and opportunities are tied to international shifts towards lower carbon emissions by the middle of this century, the assessment was conducted across three shorter time horizons: short term (2025), medium term (2030) and long term (2050).

Transition Risks Assessment Results

Material risk parameter	Impact	SP's strategic response
Policy and Legal	Increased expectations from regulatory bodies for organisations to track and publicly report on GHG emissions or climate risks. ACRA requires large non-listed companies to report climate related disclosure from FY2027 onwards.	Since FY21/22, climate risks disclosure has been included in the annual Sustainability Report. SP also reports our GHG emissions (Scope 1 – 3) yearly.
Market	A shift in investor preference and emergence of responsible investment mandates. In striving to achieve net zero, failure to incorporate climate risks into the company's strategy may diminish investor confidence and reduce access to capital.	With International Financial Reporting Standards (IFRS) climate risk disclosure becoming mandatory by 2027 for large non-listed companies, we are building internal capacity for climate risk and opportunities and its impact to our value chains.
Technology	Changing the energy mix due to the adoption of distributed renewable energy resources may impact overall grid stability and flexibility. This is especially so since capacity additions in solar and storage capacity are expected to increase in both scenarios.	SP will actively invest in the upgrading of our grid network infrastructure and adopt new technologies to make our grid network "smarter". For more details, please refer to the Future of Grid section.
	Investments in energy-efficient technologies will be required to meet national energy efficiency targets.	

Transition Opportunities

As Singapore aims to transition to a net zero future by 2050, SP, as the grid operator, plays an important role to interconnect low-carbon electricity imports, domestic distributed renewables and hydrogen-ready combined cycle power plants. We anticipate this to be a significant opportunity for the energy transition.

Another opportunity identified is the increased adoption of sustainable and low-carbon solutions by corporations that are looking to reduce their emissions and overall environmental footprint. As a sustainable energy solutions provider, we have started leveraging these opportunities to enable our customers to achieve their climate ambitions.

The initiatives are further elaborated in the respective sections for each business area under Future of Grid – Innovating our Grid and Transition Enablers – Bringing Innovation to Others.

To manage our climate-related risks and opportunities, and ensure we are enabling a low-carbon and smart energy future, we have established metrics to track our performance and drive improvement. A primary focus is the reduction of GHG emissions from our direct business activities, which contributes to Singapore's net-zero emissions ambition.

TCFD's Core Element	TCFD recommendations	SP Group's Approach	Addressed in this Report
Governance	Describe the board's oversight of climate-related risks and opportunities.	The Board is committed to integrating sustainability into SP Group's strategic directions and plans. The Board Executive Committee (ExCo) assists the Board and provides advisory supervision on SP Group's sustainable strategy, material ESG topics and targets.	Board's role, pg [6]
	Describe management's role in assessing and managing climate-related risks and opportunities.	The Executive Leadership Team (ELT) reports to the ExCo and is headed by the Group Chief Executive Officer (GCEO). The ELT's role is to oversee and manage material sustainability initiatives The Strategy and Sustainability team monitors climate change issues and gives regular updates to the ELT.	Management's role and internal controls, pg [7]
Risk Management	Describe the organisation's processes for identifying and assessing climate-related risks.	The Strategy and Sustainability team and. Risk Management team had jointly conducted a climate risk assessment to identify material climate risks under different climate scenarios. The risks identified were then integrated into the Enterprise Risk Management (ERM) Framework.	Risk Management, pg [67]
	Describe the organisation's processes for managing climate-related risks.	The Board Risk Management Committee is supported by the Group Risk Management (GRM) and provides oversight of the business risks that the Group faces. The implementation and management of the ERM Framework are undertaken by the GRM and ERM workshops on material risks are held across business units. Both "Top-Down" and "Bottom-Up" approaches are adopted across the entire Group so that management and employees communicate and participate in effective risk management. The Group Risk Management then reports to the Board Risk Management Committee and provides updates on the risk management activities of the Group's operations.	Risk Management, pg [67]
	Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organisation's overall risk management.	All risks that are considered material to operations and are considered as strategic business risks and managed under the Enterprise Risk Management (ERM) Framework, including risks that arise from climate change. Physical and transitional risks are closely monitored by the related business units and escalated to the Risk Management Committee when necessary.	Climate risk assessment and scenario planning, pg [67-69]

TCFD's Core Element	TCFD recommendations	SP Group's Approach	Addressed in this Report
Strategy	Describe the climate-related risks and opportunities the organisation has identified over the short, medium, and long term.	The adoption of two United Nations Sustainable Development Goals (SDG) shows the Group's support of the global call to action that all would enjoy peace and prosperity by 2030. SP Group had conducted our first climate risk assessment in FY 21/22 based on a net-zero and business-as-usual scenario, where short to long term horizons were considered. The adoption of TCFD's reporting framework was done in FY21/22, focusing on the physical and transition risks and opportunities that occur with climate change.	Climate risk assessment and scenario planning, pg [67-69]
	Describe the impact of climate-related risks and opportunities on the organisation's businesses, strategy, and financial planning.	Strategy 2030 aims to create a low-carbon, smart energy Singapore and be a regional leader in sustainable energy solutions. SP provides a full suite of solutions to customers and businesses to assist them in their sustainability journey.	Our Impact, pg [8]
	Describe the resilience of the organisation's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	To strengthen the sustainability resiliency of our strategies, SP Group has done a detailed study on two climate change scenarios. Of which, one scenario is considered a net-zero scenario, where warming temperatures are kept below 2°C. To demonstrate our commitment to sustainability, SP Group is committed to reducing our own emissions and also helping our customers achieve their green goals through digital solutions, energy-efficient technologies and accelerating the transition to renewable energy.	Climate risk assessment and scenario planning, pg [67-69] Our Carbon Footprint, pg [9-10] Transition Enablers, pg [40-55]
Matrices and Targets	Disclose the metrics used by the organisation to assess climate-related risks and opportunities in line with its strategy and risk management process.	The TCFD reporting framework was adopted in FY21/22 to address the increasing demand for clear, comprehensive and high-quality information on climate-related risks and opportunities. To track the progress of our goals, metrics have been provided over past years for comparisons.	Our Carbon Footprint, pg [9-10]
	Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	SP Group has been reporting our Scope 1 and 2 GHG emissions since FY19/20, in accordance with the GHG Protocol Corporate Accounting and Reporting Standard. In FY22/23, we have also started reporting our Scope 3 GHG emissions	Our Carbon Footprint, pg [9-10]
	Describe the targets used by the organisation to manage climate-related risks and opportunities and performance against targets	Aim to be net zero by 2050	Our Carbon Footprint, pg [9-10]

SASB Metrics Disclosures (FY24/25)

SASB Electric Utilities & Power Generators

Sustainability Accounting Standard

Code	SASB Accounting Metric	SP Group Disclosure
Greenhouse Gas Emissions & Energy Resource Planning		
IF-EU-110a.1	1. Gross global Scope 1 emissions, percentage covered under 2. emissions-limiting regulations, and 3. emissions-reporting regulations	1. 69,513 tCO_2e 2. 0% 3. 0% Currently SP is not subjected to any emission-limiting regulation. The local climate-related disclosure requirements mandates emission reporting from FY2027.
IF-EU-110a.2	Greenhouse gas (GHG) emissions associated with power deliveries	350,946 tCO_2e
IF-EU-110a.3	Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Through Strategy 2030, SP is committed to shaping a low-carbon, smart electricity grip, paving the way for a sustainable future while establishing ourselves as a regional leader in innovative energy solutions. Anchored by our goal to achieve net zero emissions by 2050, we will continue to leverage cutting-edge technology, strategic collaborations, and forward-thinking policies to drive impactful change. For details, please refer to **SP group's Sustainability Report**
Air Quality		
IF-EU-120a.1	Air emissions of the following pollutants: 1. NOx (excluding N_2O), 2. SOx, 3. particulate matter (PM^{10}), 4. lead (Pb), and 5. mercury (Hg); percentage of each in or near areas of dense population	SP is not a conventional power generation company using fossil fuel, and only exclusively generates renewable energy; there are no significant pollutants that degrade air quality. 1. 14.10 t from the fossil fuel usage within the group. 2. 0 3. 0 4. 0 5. 0 Based on Diesel EF of 0.0562 t/1000L & Petrol EF of 0.0199 t/1000L
Water Management		
IF-EU-140a.1	Total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	915,882.90 m^3, 0.40% Water consumption is for district cooling business, and we refer to the WRI.org tool "aqueduct water risk atlas" for regions of water stress
IF-EU-140a.2	Number of incidents of non-compliance associated with water quality permits, standards, and regulations	0
IF-EU-140a.3	Description of water management risks and discussion of strategies and practices to mitigate those risks	SP district cooling plants are required to comply Public Utilities (Water Supply) Regulations in Singapore. SDC submits Water Efficiency Management Plan annually. It allows SDC to 1. Methodologically understand the breakdown of water usage in their premises and develop a Water Balance Chart. 2. Identify areas to further reduce consumption and raise efficiency. 3. Establish an action plan which identifies measures in water savings, priorities and implementation timelines.

Code	SASB Accounting Metric	SP Group Disclosure
Energy Affordability		
IF-EU-240a.1	Average retail electric rate for ($/kWh) 1. residential, 2. commercial, and 3. industrial customers	1. S$0.298 /kWh for regulated tariff 2. <4MW is same as regulated tariff 3. >4MW is USEP price Source: EMA updated data 2023 retrieved on 20/8/2025. The Uniform Singapore Energy Price (USEP) refers to the half-hourly energy price in the Singapore Wholesale Electricity Market (SWEM).
IF-EU-240a.2	Typical monthly electric bill for residential customers for 1. 500 kWh and 2. 1,000 kWh of electricity delivered per month	1. S$149 2. S$298 Based on the regulated tariff of 29.8 cents/kWh as at Jul 2024
Workforce Health & Safety		
IF-EU-320a.1	Lost Time Injury Frequency Rate (LTIFR)	SP tracks and reports the Lost Time Injury Frequency Rate (LTIFR), which is 0.25 SP's LTIFR applies to both SP employees as well as contractor workers and would include any fatality cases.
End-Use Efficiency & Demand		
IF-EU-420a.2	Percentage of total customers served by smart grid technology	Percentage of smart meters customer 1. 66.09% residential customers 2. 94.22% commercial and industrial buildings
Grid Resiliency		
IF-EU-550a.2	System Average Interruption Duration Index (SAIDI)	SAIDI: 0.236 min
Activity Metrics		
IF-EU-000.A	Number of 1. residential, 2. commercial, and 3. industrial customers served	1. 1,579,140 2. 278,070 3. 68,760 Source: EMA 2023 data retrieved on 20/8/2025
IF-EU-000.B	Total electricity delivered to: 1. residential, 2. commercial, 3. industrial, 4. all other retail customers, and 5. wholesale customers	1. 8,002.9 GWh 2. 22,092.70 GWh 3. 22,103 GWh 4. 3188.3 GWh 5. NA Source: EMA 2023 data retrieved on 20/8/2025
IF-EU-000.C	Length of transmission and distribution lines	More than 22,500 km of cable circuits Source: SP Offering Circular Sep 2024 retrieved on 20/8/2025
IF-EU-000.D	Total electricity generated, percentage by major energy source	766,703 MWh 100% Solar
IF-EU-000.E	Total wholesale electricity purchased	55,386.9 GWh Source: EMA 2023 data retrieved on 20/8/2025

SASB Gas Utility & Distributions Standards

Code	SASB Accounting Metric	SP Group Disclosure
Energy Affordability		
IF-GU-240a.1	Average retail gas rate for 1. residential, 2. commercial, 3. industrial customers, and 4. transportation services only	1. S$0.2272/kWh (Towngas) 2. & 3. S$0.2144/kWh for minimum consumption of 1,000kWh/month & $0.2080/kWh for minimum consumption of 50,000kWh/month (Towngas) 4. S$2.5965/MMBtu (Natural Gas) Source: 1. City Energy 1 Apr - 30 Jun 2025 data retrieved on 20/8/2025 2.Gas Transportation Tariffs 2024, retrieved on 20/8/2025
IF-GU-240a.2	Typical monthly gas bill for residential customers for 1. 50 MMBtu and 2. 100 MMBtu of gas delivered per year	1. S$22.72 2. S$45.44 Based on the regulated tariff of 22.72 cents/kWh
Integrity of Gas Delivery Infrastructure		
IF-GU-540a.1	Number of reportable pipeline incidents	0
IF-GU-540a.2	Percentage of distribution pipeline that is 1. cast and/or wrought iron and 2. unprotected steel	0% Only ductile iron pipes are used in PGas' distribution network
IF-GU-540a.3	Percentage of gas 1. transmission and 2. distribution pipelines inspected	1. 100% 2. 100%
IF-GU-540a.4	Description of efforts to manage the integrity of gas delivery infrastructure, including risks related to safety and emissions	SP focuses on regular inspections, advanced leak detection technologies, and proactive pipeline replacement programs to minimise risks. It also emphasizes reducing emissions through initiatives like enhancing energy efficiency and adopting cleaner technologies. SP collaborates with stakeholders and adheres to stringent regulatory standards to ensure the safety and reliability of its gas network. More details can be found from **our sustainability report**
Activity Metrics		
IF-GU-000.B	Amount of natural gas delivered to 1. residential customers 2. commercial customers 3. industrial customers	1. 2612.2 TJ 2. 3822.5 TJ 3. 55681.9 TJ Source: EMA 2023 data retrieved on 20/8/2025
IF-GU-000.C	Length of gas 1. transmission and 2. distribution pipelines	1. About 300 km high pressure transmission pipelines 2. About 3,500 km Source: SP Offering Circular Sep 2024 retrieved on 20/8/2025