

Towards a Green Transport Vision

LTA Sustainability Report 2022/23



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ABOUT THIS REPORT

SCOPE AND BOUNDARY

This inaugural LTA Sustainability Report lays out our ambition for sustainable land transport, with the governance and performance measures that will get us there. We will continue to publish our Sustainability Report on an annual reporting cycle.

The identified Economic, Environment, Social and Governance (EESG) material topics are tracked from 1 April 2022 to 31 March 2023 (FY2022), unless otherwise stated. Information in this report covers sustainability performances and practices across the entire LTA organisation¹ unless otherwise stated.

This Sustainability Report should be read together with financial information detailed in our Annual Report 2022/23 [here](#).

REPORTING FRAMEWORK

This report has been prepared with reference to the Global Reporting Initiative (GRI) Standards 2021, which are the most widely adopted standards for reporting on environmental, social and governance topics.

External assurance has not been sought for LTA's FY2022 Sustainability Report.

We welcome questions and feedback from all our stakeholders as integral partners in LTA's sustainability journey. Please send your questions or comments via the contact form [here](#).

¹ This excludes LTA subsidiaries.

NAVIGATING THIS REPORT

Sections	Relevant Topics ²	Alignment with UN SDGs ³
GREENING OUR LAND TRANSPORT		
Green Commutes	Inclusivity and Accessibility (Accessibility)	      
Green Vehicles	NA	
Green Infrastructure	Asset Management	
Green Operations		
Green Opportunities	Financial Stewardship	
	<i>Technology and Innovation</i>	
Green Communities	<i>Stakeholder Outreach and Consultation</i>	
MANAGING OUR ORGANISATIONAL ENVIRONMENTAL IMPACTS		
Resource Conservation within Our Operations	Climate Change and Environmental Impact Management	     
Preserving Biodiversity	<i>Biodiversity</i>	
PROMOTING CARE AND EXCELLENCE IN OUR WORK		
Safety of Commuters and Our People	Safety of Commuters and Our People	  
Care and Inclusivity on Our Public Transport	Inclusivity and Accessibility (Inclusivity)	
Employee Engagement and Development	<i>Employee Engagement and Development</i>	
Financial Stewardship	Financial Stewardship	
Integrity, Ethics and Compliance	Integrity, Ethics and Compliance	

² **Bold** – Material Topic

Italic – Additional Topic of Interest

³ Reported topics are aligned with 10 United Nations Sustainable Development Goals (UN SDGs).

INTRODUCTION TO LTA

LTA is the statutory board under the Ministry of Transport responsible for the development and function of land transport.

We plan, design, build, operate, and maintain Singapore's land transport infrastructure and assets, to meet the connectivity needs of citizens and the economy.

LTA oversees the following areas⁴:

Public transport (Bus, Rail)

260

bus and rail premises

>250km

rail network length

>300

bus services

Point-to-Point travel options (Taxis, Private Hire Cars)

>13,500

taxis

>50,000

valid Private Hire Car Driver's Vocational License Holders

Road infrastructure

>9,500

lane-km of roads and expressways

12%

Singapore's total land area

Nationwide electric vehicle (EV) charging infrastructure

>4,900

charging points island-wide

Active mobility infrastructure

>200km

sheltered walkways connected to public transport nodes

580km

cycling paths

Land transport workforce

>100,000

workers in rail, bus, Point-to-Point, and other land transport segments



VISION

A People-Centred Land Transport System

MISSION

Connecting people & places, enhancing travel experience

⁴ Figures are based on latest available ones at time of report publication.

MESSAGE FROM OUR CHAIRMAN

At LTA, we are conscious of our critical role in shaping the sustainable future of our nation's transport landscape. In a world grappling with the effects of climate change, we need to signal our commitment to sustainability. It is no longer a good to do; it is the right thing to do.

With the publication of our inaugural sustainability report, we are laying the foundation for a transparent and accountable approach to sustainable development within Singapore's land transport. Economic, environmental, and social challenges compel us to lead and build a relevant transportation system for the next generation.

GREENING OUR LAND TRANSPORT: A CALL TO ACTION

Land transport is the third largest carbon emitter, following the energy and industry sectors. Moving people and goods at ever increasingly volumes is energy intensive. The good news is that land transport emissions have peaked in 2016 with concerted moves to limit our vehicle population and encourage greater use of public transport. Nevertheless, robust actions will be needed to support Singapore's net zero ambitions for 2050, in particular increasing Walk-Cycle-Ride (WCR) and vehicle electrification.

As we navigate the path towards sustainable land transport, we remain vigilant to the increasing threats of climate change and energy security and continue to assess these impacts.



MANAGING OUR ORGANISATIONAL ENVIRONMENTAL IMPACTS: A BALANCED APPROACH

We have conscientiously embedded environmental protection in our strategies and recognise the need to balance environmental and economic needs of the communities we serve. This consideration forms the cornerstone of our sustained collaboration with partners.

Together, we aim to operate in an environmentally responsible manner, mindful of the far-reaching impacts of our actions. We continually monitor, evaluate, and improve our environmental management practices, focusing our efforts on reducing resource consumption and supporting Singapore’s green efforts.

We are aware of the challenges involved in this journey, and meeting some commitments will involve difficult trade-offs and changes to our operating paradigm. It is such uncomfortable situations that compel us to change the way we think and work, and become powerful drivers of innovation for the way ahead.

PROMOTING CARE AND EXCELLENCE IN OUR WORK: A HOLISTIC COMMITMENT

Safety is not just a priority; it is our responsibility. This commitment encompasses the health and safety of our employees, contractors, and commuters. Our aspiration is "Vision Zero," where journeys in Singapore are accident free for all. Beyond safety, we strive to shape a more inclusive land transport for our commuters.

As a public agency, we are bound by principles of integrity and robust corporate governance. Honesty and transparency define our interactions with stakeholders, and a zero-tolerance policy for corruption. We uphold proper governance and responsible fund management in our strive towards delivering a well-connected land transport.

CONCLUDING REMARKS

This first report reflects our dedication to transparency and accountability in our sustainability journey. We will continue to measure and report progress in sustainability performance, and remain responsive to the evolving needs of our stakeholders.

Thank you for your continued trust and partnership in keeping our world moving. We invite you to join us on this path of responsible, sustainable, and ethical growth, and look forward to sharing our progress and impact in the pages that follow.

Chan Heng Loon Alan
Chairman, Land Transport Authority



OUR SUSTAINABILITY APPROACH

SUSTAINABILITY GOVERNANCE

Our Board of Directors (Board) plays a pivotal role in sustainability governance by ensuring that we incorporate sustainability in our strategic decisions, focusing on sustainable transport policies and infrastructure development that balances environmental stewardship, economic growth, and social responsibility.

LTA Board Chairman and members serve on various committees based on their areas of expertise, such as the Senior Tender Board, Risk and Safety Governance Committee and Asset Management Governance Committee.

Our board members bring with them esteemed professional backgrounds and experiences in engineering, urban planning, financial, legal, media and labour relations to guide EESG matters and make recommendations aligned with our sustainable transport goals.

At the management level, LTA's Environmental Sustainability Steering Committee (ESSC) drives and aligns organisational workstreams towards sustainability targets. The ESSC meets on a quarterly basis and is chaired by LTA Chief Executive (CE) and comprises LTA senior management.



Board

The Board provides oversight on the management of LTA's EESG material matters and strategies.



ESSC

The ESSC provides guidance and direction in the implementation of policies and practices, and monitors the performance progress of EESG material matters.



ES Secretariat

The Secretariat coordinates and collects performance data for the reporting of identified material EESG topics.

STAKEHOLDER ENGAGEMENT

We regularly seek out stakeholders' concerns and views through engagements and strong relationships built over the years.

These dialogues and interactions also allow us to share information on LTA's work in a responsive and transparent manner. More information can be found in the *Green Communities* section in this report.

Stakeholder Group	Purpose of Stakeholder Engagement	Engagement Method	Frequency of Engagement
Members of the public	<p>Encourage the switch to WCR</p> <p>Raise awareness of LTA's EESG impacts and initiatives</p>	<ul style="list-style-type: none"> Public dialogue sessions Newsletters Social media platforms Customer satisfaction surveys Physical posters and banners at public transport nodes 	Regularly
LTA employees	<p>Raise awareness of LTA's EESG impacts and initiatives</p>	<ul style="list-style-type: none"> Electronic Direct Mails (EDMs) Newsletters Town hall meetings Employee engagement surveys Brown bag sessions and learning journeys 	Regularly
Public Transport Operators (PTOs) and partners	<p>Ensure proper operations and maintenance of public transport infrastructure and assets</p> <p>Collaboration efforts to engage commuters and staff on various EESG matters</p>	<ul style="list-style-type: none"> Management level meetings Workgroup meetings Brown bag sessions 	Regularly
Ministries and other government agencies	<p>Alignment of policies and initiatives across Whole-of-Government (WOG)</p>	<ul style="list-style-type: none"> Workgroup meetings EDMs 	Workstream-dependent
Environmental interest groups, grassroots leaders and advisors, local communities	<p>Obtain feedback on impacts of LTA's road and rail projects</p>	<ul style="list-style-type: none"> Dialogue sessions 	As needed for new projects

MATERIALITY ASSESSMENT

Following a benchmarking exercise of relevant peers in the international and local transportation sector, desktop research in current sustainability trends, industry frameworks and best practices, we identified a preliminary list of 15 material topics. A materiality survey was conducted with selected internal and external stakeholders who ranked the material topics by importance.

Interviews with four key stakeholders⁵ elicited further insights on these topics. The ranked EESG topics were further discussed by LTA management and validated by the Board, culminating in a final set of **six material topics and four additional topics**. We will assess our material topics on a regular basis to ensure their continued relevance to our organisation.

FINAL LIST OF MATERIAL TOPICS

Material Topics	Why Topic Is Material to LTA
Asset Management	LTA embraces the use of green features in infrastructure and sustainable materials within our supply chain.
Climate Change and Environmental Impact Management	LTA minimises the environmental impacts of our operations by reducing greenhouse gas (GHG) emissions, energy consumption, waste and water usage, in line with the GreenGov.SG initiative.
Financial Stewardship	LTA prioritises the proper governance and use of funds to deliver financially sustainable land transport.
Inclusivity and Accessibility	LTA provides a well-connected transport network that is inclusive and accessible to all.
Integrity, Ethics and Compliance	LTA is guided by the highest standards of ethical conduct, with zero tolerance to unscrupulous practices.
Safety of Commuters and Our People	LTA cultivates a safe work environment for our employees and workers, and a safe travel experience for our road users and public transport commuters.

Our sustainability report also covers the following additional topics of interest⁶:

Additional Topics	Consideration to Report
Biodiversity	Biodiversity preservation is a significant consideration when we build new land transport infrastructure in vulnerable areas.
Employee Engagement and Development	An engaged workforce is essential to the sustainability of our organisation. We take a robust approach towards our employees' career development and provide continuous learning opportunities.
Stakeholder Outreach and Consultation	Regular engagements and two-way communication with our stakeholders help us understand their key concerns and address them in a timely manner.
Technology and Innovation	Research and development in collaboration with our ecosystem partners spurs new areas of opportunity.

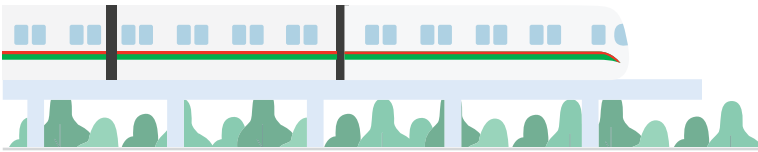
⁵ Then-Minister of Transport (Mr S Iswaran), Board Chairman (Mr Alan Chan), LTA-CE (Mr Ng Lang) and a Board Member (Ms Deborah Ho) were interviewed.

⁶ While these topics are of interest to LTA, they are not subject to disclosures requirements on practices, performances, and targets as would the material topics.

HIGHLIGHTS FROM 2022

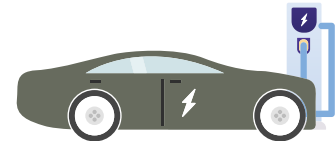
01 Greening Our Land Transport

Opening of TEL Phase 3, adding **13.2km to Singapore's rail network**

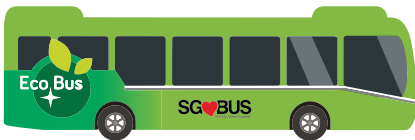


\$0.7 billion allocated to finance Jurong Region Line and Cross Island Line under Singapore Green Board Framework

11.8% of new car registrations are EVs (as of Dec 2022), compared to 0.2% in 2020



Launched tender to procure **up to 420 electric buses**



Expansion of cycling path network by around **30km**



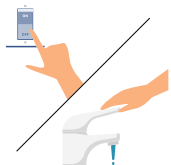
Engaged more than 23,000 students across 21 primary schools on adopting greener commutes



02 Managing Our Organisational Environmental Impacts



30 million kWh of annual energy savings from full conversion to light-emitting diode (LED) street lighting



Exceeded Energy Use Index and Water Efficiency Index reduction targets, achieving **>10% reduction**

03 Promoting Care and Excellence in Our Work

Achieved Accident Frequency Rate of **0.36** for Project Sites



Expanded pool of Caring Commuter Champions to 1,124 with **808 new recruits**



Received **Community Chest Charity Platinum Award**



01

GREENING OUR LAND TRANSPORT

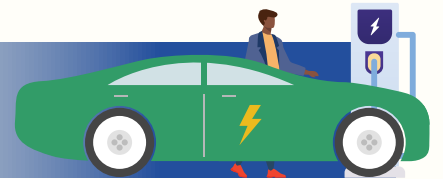
As the third largest carbon emitter in Singapore after the energy and industry sectors, LTA's strategies and policies on land transport have a substantial impact on reducing our nation's carbon footprint. We have mapped our sectoral efforts along key strategies to minimise environmental impacts while ensuring that our land transport remains efficient, accessible, and sustainable for future generations.

Sections in this chapter:

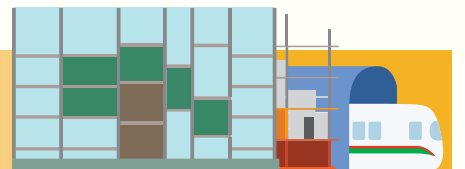
Green Commutes



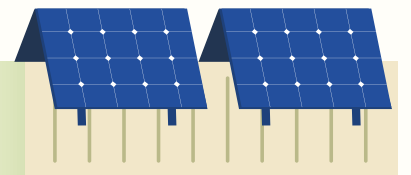
Green Vehicles



Green Infrastructure



Green Operations



Green Opportunities



Green Communities



GREEN COMMUTES

Accessibility to a reliable public transport network is essential in a city-state like Singapore.

We strive to make public transport accessible to all, regardless of demographics or locality. This supports our vision and mission of a people-centred land transport system, connecting people and places.

Our rail system, which moves millions of passengers daily, is complemented by a public bus network that covers almost every part of Singapore. This extensive and integrated network helps commuters get around with ease and keeps Singapore moving as a convenient business hub to live and work in.

Aligning with the Singapore Green Plan and our Land Transport Master Plan (LTMP) 2040 vision of “20-minute towns and a 45-minute city”, we are expanding our rail network, improving rail reliability, and building more accessible commuter infrastructure to support growing neighbourhoods and increase connectivity towards a car-lite nation.

Beyond this, we are also piloting new technologies and innovations to make commuting more convenient and streamlined. The overall increase in route and commute-mode options also strengthens the connectivity and resilience of our land transport.

75%

mass public transport peak period modal share by 2030

8/10

households within a 10-minute walking distance from a train station by 2030

9/10

peak journeys via WCR by 2040

20 min

for all WCR journeys to the nearest neighbourhood centre by 2040

<45 min



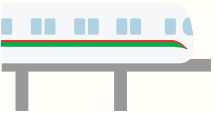

travel for 90% of peak period journeys via WCR by 2040




TARGET	2022 PERFORMANCE
90% WCR peak mode share by 2040	74%

I We are encouraging the switch to greener transport modes.


1 By switching from private Internal Combustion Engine (ICE) cars to the following transport modes, commuters can expect to reduce their carbon footprint by:

	Electric Car ▼ About 50%
	Electric Public Bus ▼ Up to 70%
	Mass Rapid Transit (MRT) ▼ Up to 90%
	Walk / Cycle ▼ 100%

2 We are expanding Singapore's transport infrastructure in line with our push for greater adoption of WCR.



360km
Rail network by 2030s



~1,300km
Cycling network by 2030

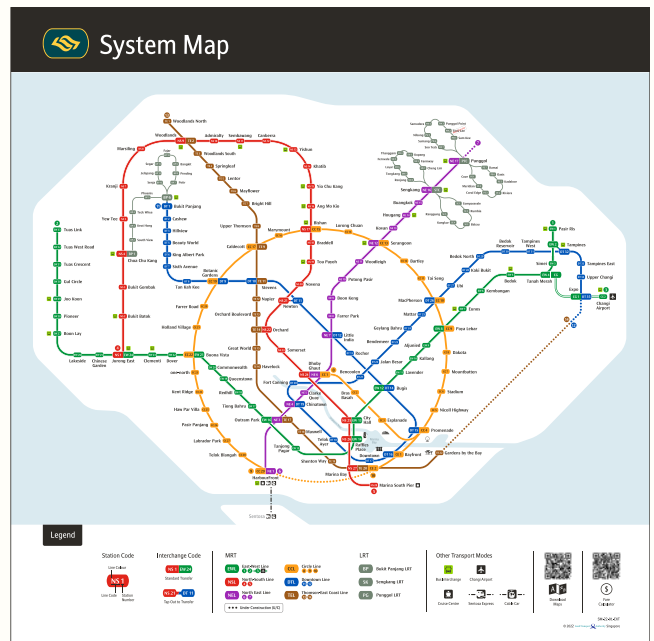


~150km
Increase in sheltered walkways by 2040

Key Strategies Encouraging Commuters to Shift to WCR

Expand Rail Network

In November 2022, LTA opened TEL Phase 3 as part of our rail expansion plans to provide better rail accessibility and encourage higher uptake of WCR. This is part of our long-term strategy to make rail the backbone of land transport as it is one of the most efficient and green modes of transport, with up to 90% reduction in carbon footprint compared to an ICE car.



Singapore's rail network

Maintain Zero Growth Rate for Cars and Motorcycles

We have been reducing the vehicle growth rate for cars and motorcycles over the years. Since 2018, vehicle growth rate for these segments has been zero and will be maintained until 31 January 2025.

Expand Cycling Paths

LTA is progressively expanding the cycling path network under the Island-wide Cycling Network Programme, with the aim to reach about 1,300km by 2030 from 580km today, with around 30km added in 2022. This would improve connectivity, allowing active mobility users to travel safely and seamlessly to their destinations.



Expansion of cycling paths under Island-wide Cycling Network Programme

Introduce Friendly Streets

LTA has initiated “Friendly Streets” to enhance the safety and convenience of making daily trips to neighbourhood amenities via walking and cycling. Friendly Streets will have features and traffic measures such as raised pedestrian crossings, wider and more accessible footpaths, and signalised crossings with pedestrian priority. Street signage and markings will also be implemented to remind drivers to slow down as they enter the area.

The initiative will be piloted in five neighbourhoods in Ang Mo Kio, Bukit Batok West, Tampines, Toa Payoh and West Coast, with plans to expand it to cover all towns eventually. Friendly Streets will build on existing efforts such as Silver Zones, School Zones, Transit Priority Corridors, and road repurposing.



Signs, 3D road markings and coloured road surfaces to signal entry into Friendly Streets

GREEN VEHICLES

Transforming our light vehicle population⁷ to EVs is estimated to cut annual emissions by 1.5 to 2 million tonnes.

To drive our vision of 100% cleaner energy vehicles by 2040, all new car and taxi registrations will be of cleaner energy models⁸ from 2030. We will also stop new diesel car and taxi registrations from 2025.

Our key goals to support the reduction of vehicular emissions are as follows:

100%

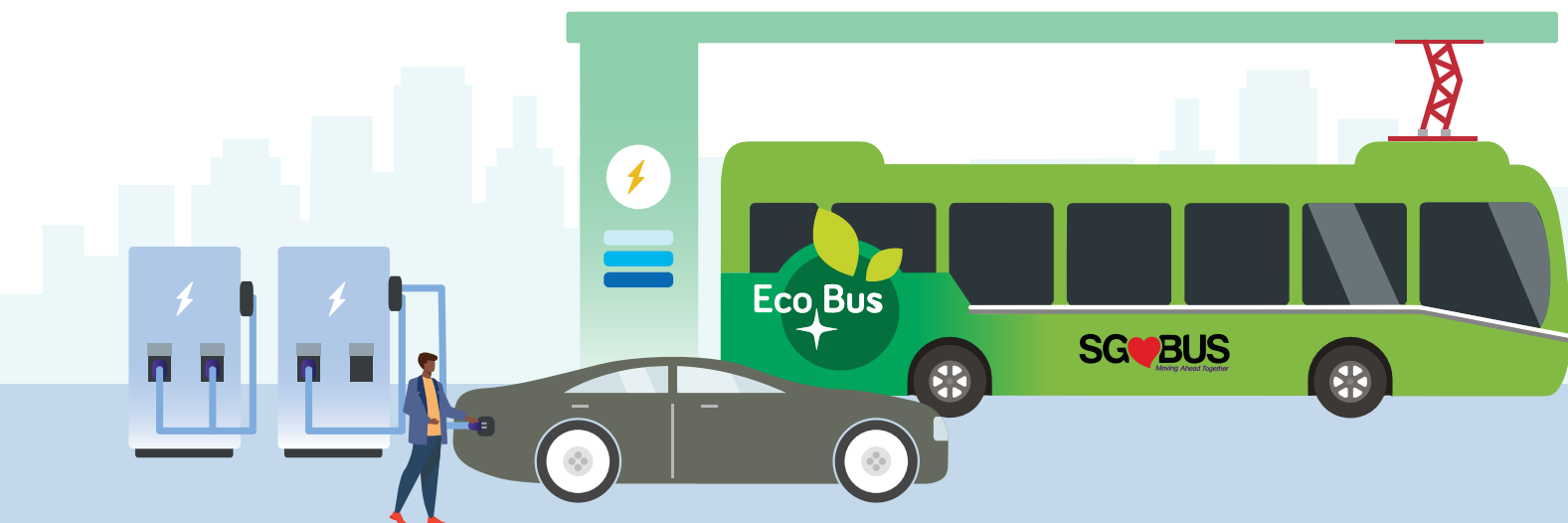
Public residential towns to be EV-ready by 2025

~60,000

EV charging points by 2030⁹

100%

Vehicles to run on cleaner energy by 2040



⁷ This includes cars, motorcycles, vans and minibuses.

⁸ These include electric, hybrid or other cleaner alternative energy or fuel.

⁹ This will be implemented in tandem with EV adoption rate.

Key Initiatives to Support Transition to Green Vehicles

Deploy EV Charging Infrastructure

To prepare our public residential towns to be EV-ready by 2025, a tender was awarded in November 2022 to deploy up to 12,000 EV charging points across nearly 2,000 public residential carparks. Since February 2023, the first batch of EV charging points became operational in public residential carparks located in Telok Blangah and Boon Lay.

To help oversee the deployment of EV charging points across public carparks, LTA set up a wholly-owned subsidiary, EV-Electric Charging Pte Ltd (EVe). EVe will work closely with successful tenderers and government agencies to deploy EV charging points and coordinate the upgrading of supporting electrical infrastructure.

Established Electric Vehicle Charging Bill

In November 2022, the Electric Vehicle Charging Bill was passed to establish the rules and regulations that govern the charging of EVs and empower LTA with statutory powers for enforcement. The Bill will require all chargers in Singapore to be installed, certified and used in accordance with prescribed standards, which reference standards such as Technical Reference 25 (TR25) for EV Charging Systems. LTA has completed the review of TR25 in March 2022 with our industry stakeholders and recommended new standards to better regulate and standardise the EV charging systems.

Introduced Incentive Schemes for EV Adoption

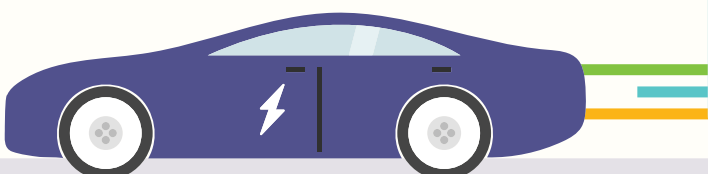
Various incentive schemes have been introduced to encourage early EV adoption, including EV Early Adoption Incentive (EEAI), Enhanced Vehicular Emissions Scheme (VES), Commercial Vehicle Emissions Scheme (CVES), and Enhanced Early Turnover Scheme (ETS).

Raise Awareness of EVs

LTA launched the ‘Power EVery Move’ campaign to raise awareness on the benefits of EVs and how individuals can collectively contribute towards responsible and gracious sharing of charging infrastructure.



Launch of EV chargers at carparks under Power EVery Move Campaign



Through these key initiatives,

11.8% of new car registrations are EVs

as of Dec 2022, compared to 0.2% in 2020. We will continue our efforts to boost the uptake of EVs.



Electrification of Public Bus Fleet



Electric public buses that first hit the roads in April 2020

Aim

100%
cleaner energy
public bus fleet
by 2040

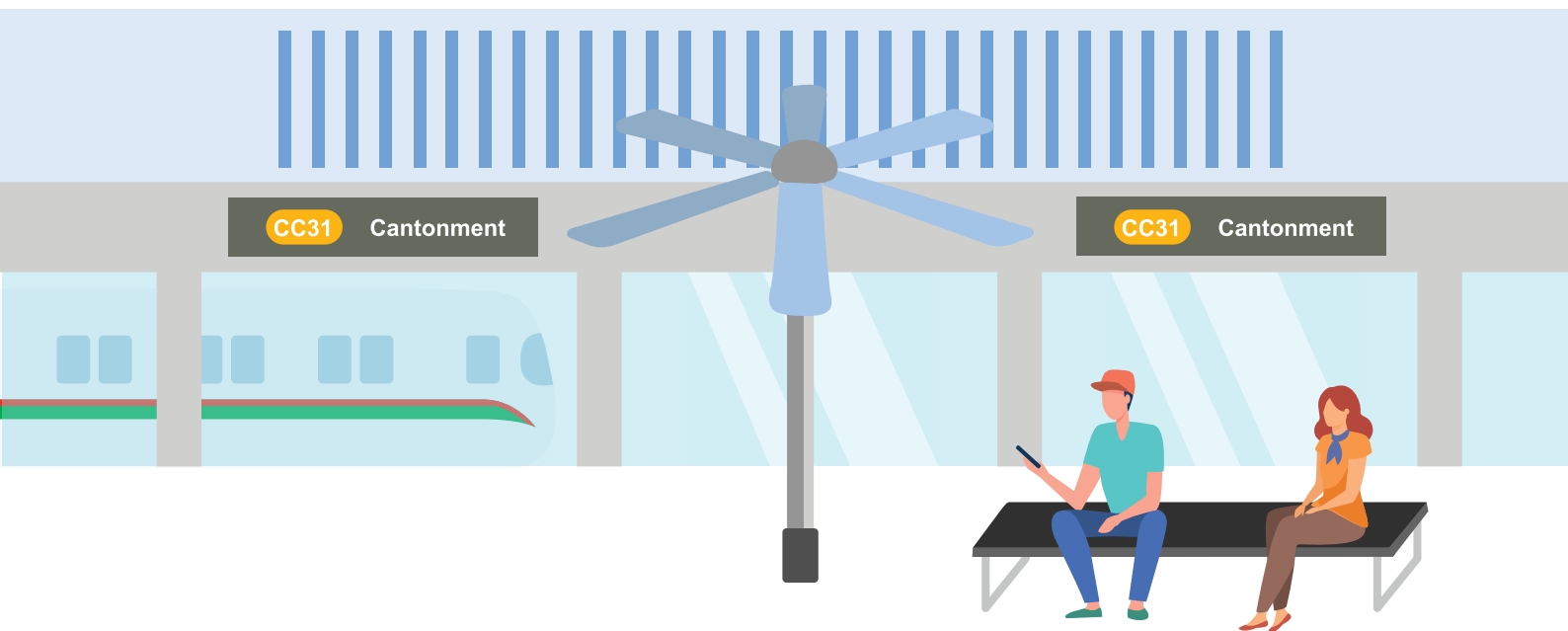
LTA is committed to achieving a 100% cleaner energy public bus fleet by 2040, with electric buses making up half of the fleet by 2030. A tender was launched in March 2023 to procure up to 420 electric buses in support of this target.

In March 2023, we also launched the first major tender to procure electric chargers for upcoming bus depots at Sengkang West, Gali Batu, Kim Chuan, and East Coast to support the deployment of electric buses. Chargers will also be installed at the upcoming Punggol Coast and Pasir Ris Integrated Transport Hubs (ITHs) to provide range extension when required.

GREEN INFRASTRUCTURE

We adopt a sustainable approach in the planning, design, and building of our infrastructure and assets.

LTA's Asset Management Governance Committee (AMGC) was set up to obtain board-level and other industries' advice on the inculcation of good principles in asset management stewardship, asset condition assurance, new processes and technologies, and possible threats and weaknesses in LTA's asset management system that may undermine our long-term interests and public interests.





Reducing Architectural Materials

To lower the embodied carbon of our buildings, LTA is reviewing the designs of upcoming MRT stations and reducing the amount of architectural materials used.



Artist impression of reduction in external cladding

Aim

Jurong Region Line (JRL)

▼ **10%** amount of architectural finishes, such as cladding and ceilings

Cross Island Line Stage 2 & Stage 3 (CRL2 & CRL3)

▼ **10%** conventional material use or increase adoption of alternative greener materials

▼ **25%** reduction in the quantity of station ceiling panels



Using Low-Carbon Concrete

Low-carbon concrete substitutes cement with recycled or waste materials, such as Ground Granulated Blast Furnace Slag (GGBS), a by-product of steelmaking. This significantly lowers the carbon footprint of concrete, as the production of Ordinary Portland Cement (OPC) is a major source of GHG emissions.

Another innovative approach to low-carbon concrete involves carbon mineralisation. This method introduces recycled and purified carbon dioxide into fresh concrete during mixing, where it undergoes a mineralisation process and becomes permanently embedded. Carbon mineralisation also enhances concrete performance and reduces cement usage, further reducing its carbon footprint.



Trial cast of a reinforced concrete bus bay using low-carbon concrete

Aim

▼ **20%** carbon emissions compared to conventional concrete

We have mandated the use of low-carbon concrete in CRL2 projects and in upcoming footpath renewal contracts. We aim to achieve a minimum reduction of 20% in carbon emissions compared to conventional concrete.

Adopting Best Practices at Project Sites

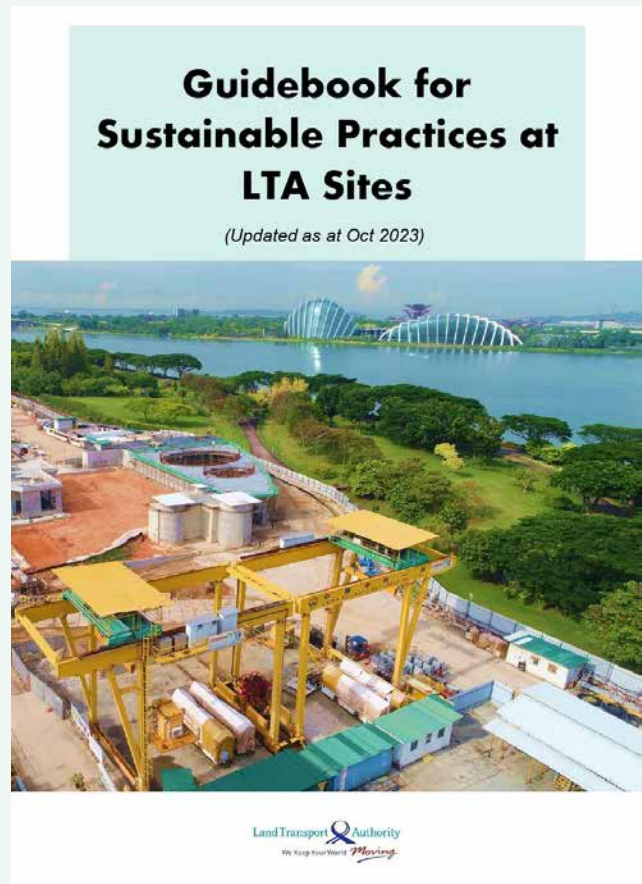
In the development of transport infrastructure, key potential negative impacts include poor waste management practices, inefficient usage of energy, and excessive water consumption.

LTA launched the “Guidebook of Sustainable Practices at LTA Sites” in September 2022 to guide our contractors in designing and operating a more sustainable work site.

We are monitoring the carbon footprint of our construction projects by requiring contractors to submit embodied carbon reports accounting for materials used. Alongside, we are embarking on a study to develop embodied carbon reference values for underground MRT stations. This will provide a baseline for LTA’s reduction efforts in future projects.

The Guidebook features green practices and innovative efforts such as:

- Procuring electrical appliances from registered suppliers supplying registrable goods under NEA’s Mandatory Energy Labelling Scheme that meet the tick requirements as specified;
- Installing water-efficient products based on the Mandatory Water Efficiency Labelling Scheme and Voluntary Water Efficiency Labelling Scheme implemented by PUB, and;
- Carrying out effective on-site sorting of construction and demolition waste to recover inert, reusable and/or recyclable materials.



Guidebook for Sustainable Practices at LTA Sites

Material Usage at Project Sites

Our construction materials are non-renewable and purchased from external suppliers. Contractors are required to self-declare their resource usage data.



	2021	2022
Type of non-renewable materials¹⁰	Total weight (kt)	Total weight (kt)
Total OPC concrete (consists of Grade < 20, 20, 25, 30, 35, 40, 50 and > 50)	2,799.66	1,886.76
Total GGBS concrete (consists of Grade < 20, 20, 25, 30, 35, 40, 50 and > 50)	1,096.79	656.51
Total steel	324.52	349.79
Total mortar (consists of Grade MM 0.5, 0.7, 1.5, 3, 5, 7.5)	1.32	3.16
Total asphalt	86.44	208.67
Total diesel	21.68	30.09

¹⁰ Weight of materials are provided from Jan to Dec of each reporting year.

Incorporating Sustainability Attributes in Tender Evaluation

To encourage our contractors to adopt best practices and incorporate green design and technologies, LTA has reviewed our tender evaluation criteria to include an assessment of each tenderer’s sustainability efforts in their corporate initiatives as well as past projects.

TARGET
Incorporate sustainability criteria in tender evaluation framework to set aside at least 5% for sustainability in the tender evaluation criteria for new construction and consultancy tenders with Estimated Procurement Value (EPV) exceeding \$50 million by 2025.
2022 PERFORMANCE
Incorporation of sustainability attributes in tender evaluation at 4% in recent CRL2 tenders and for future tenders.

GREEN OPERATIONS

We are actively reducing our utilities consumption by optimising operational electricity and water usage and raising solar deployment.

We work closely with our PTOs to improve the energy efficiencies of fittings and systems for air-conditioning, electrical services, lifts, and escalators. Through regenerative braking, our trains can recuperate about 30% of the energy consumed. Regenerative braking also helps to extend the useful life of the braking components as the mechanical parts are worn at a slower pace.

We also strive to reuse and recycle our materials, components, and equipment at the end-of-life stage. LTA has added a new requirement in rolling stock procurement contracts for our trains to be designed for at least 92% recyclability. Our future train suppliers would also need to provide an Environmental Product Declaration stating the construction materials used, and the potential recovery and recyclability of these materials.





Increasing Solar Deployment

LTA will deploy solar photovoltaic (PV) systems on the roofs of upcoming and newly upgraded land transport infrastructure, including rail and bus depots, offices, and facility buildings. We are committed to deploy 16 MWp by 2025 and 25 MWp by 2030.

A solar leasing tender was launched in March 2022 to explore additional areas for solar PV installation, including existing bus and rail infrastructure. Through this tender, LTA awarded about 7.9 MWp in March 2023 to deploy at locations such as MRT stations and rail and bus depots/terminals.



Solar PV systems installed at Gali Batu Integrated Depot



Optimising Energy Consumption in Rail Stations and Depots

LTA has adopted a variety of measures over the years to optimise energy consumption in our rail premises, such as Platform Screen Doors to reduce energy consumption of air-conditioning system, LED lighting and Dual Speed Escalator with automatic speed changeover. In our efforts to further optimise energy consumption, we will be installing Hybrid Cooling, Artificial Intelligence (AI) for air-conditioning system and solar PVs in upcoming rail premises where feasible.



Artist impression of hybrid cooling at TEL stations

Hybrid Cooling Features

Hybrid Cooling uses fans to enhance air movement, allowing for higher air-conditioner temperatures while maintaining thermal comfort. Implementation is in progress for TEL Stages 4 and 5, Circle Line (CCL) Stage 6, and more. AI can learn the station air-conditioning profile through machine learning, allowing the air-conditioning system to match demands through predictive control, thereby minimising under- or over-cooling. We are conducting proof-of-value trials to verify the system’s effectiveness in a real-world setting.



Upcycling Train-cars and Train-parts



Launch of upcycled MRT seats at Nee Soon Town Council Building

LTA has upcycled decommissioned train-cars through partnerships with interested agencies and organisations to find novel uses for them. Train-cars have been donated to the Institute of Technical Education (ITE) as a training aid for students, as well as to a local production company for the filming of a television series. Discussions with other potential partners to convert them into educational pods for the public are also in the works.

LTA has also worked with organisations such as the Action for Green Towns Taskforce (AGT), Skool4Kidz and the Rainbow Centre, as well as non-governmental organisations (NGOs) such as SG Enable, to donate train-parts such as seats, grab poles and straphangers to be repurposed into useful additions for the community.

Aim

Through this initiative, we reduce waste generated to landfills, retain some of our Public Transport heritage, and give our old trains and parts a new lease of life to serve the public in other meaningful ways.

GREEN OPPORTUNITIES

Technology and Innovation

LTA cultivates an innovation ecosystem with our partners to yield better outcomes for our commuters and operations via three key categories in our Innovation, Research and Development portfolio to:

- (i) implement innovative solutions to solve operational issues,**
- (ii) generate research data to guide system or policy changes, and**
- (iii) discover or build capabilities in areas of emerging technology and concept.**

We aim to boost technology uptake and innovation through good governance of innovation grants and open sharing of data via DataMall¹¹.

We have set aside S\$25 million since 2018 for the Land Transport Innovation Fund (LTIF) to spur innovation and collaborative projects with industry partners, and are also the implementing agency for the Urban Mobility Grand Challenge funding initiative. Since 2021, 15 completed projects have led to either actual deployment or outcomes for further development work, knowledge sharing on technology development and recommendations for design guidelines.



¹¹ Land transport-related datasets are published on the DataMall site [here](#) for enterprises, third-party developers, researchers, and other members of the public.

Our Innovation Framework is driven by 3 key approaches:



The Land Transport Innovation Portal (LTIP), a one-stop platform that facilitates the development of innovative solutions for our needs, was launched in September 2022.

Features on the portal include:

- 1 **Regular releases** of the latest information and updates on LTA innovation events and problem statements
- 2 **Links to LTA's data resources** on DataMall, such as on-request datasets
- 3 **Channels for partners to reach out** to us with their innovative solutions and seek more information on funding support if necessary
- 4 **Application for sandboxes** to facilitate the development of new technologies not covered under the scope of current standards and regulations



Viaduct Bearing Inspection Using Drones and AI

LTA collaborated with the Singapore University of Technology and Design to develop a tethered mini-drone system, equipped with an AI and photogrammetry software suite. It can enter small cavity spaces of viaduct bearings to inspect general conditions and extract critical measurements with consistency and high accuracy.

This reduces the manpower needed from a 4-men team to set up suitable platforms, such as scaffolds, to access the viaduct bearings located at height to a 2-men team by using the mini-drone. Inspection operation time was also reduced from 1 hour per viaduct bearing to 15 mins including set up time.

Outcome

86% potential manpower cost savings over a 5-year inspection cycle

The system also provides a safer work environment for our inspectors, who no longer need to work at height.



Viaduct bearing inspection using drone and AI



Plastic Waste for Road Surfaces



Plastic pavement mixes being field-tested along West Coast Highway

LTA used a two-prong approach to study the feasibility of using waste plastics in flexible pavement.

The first study involved Singapore Polytechnic and Samwoh Innovation Centre conducting laboratory studies on recycled waste plastic as additives in asphalt mix.

Outcome

30% enhancement in road durability

From the field evaluation phase, it was established that recycled waste plastic additives enhanced road durability by 30%, offering potential for its application on industrial roads plied by heavy-goods vehicles.

LTA also has an ongoing study with the National University of Singapore in developing and evaluating the use of plastic-bituminous composite asphalt mixes. Having passed lab evaluations, the mixtures are currently being field-tested more extensively on stretches of the West Coast Highway and Pan Island Expressway.

Green Financing

LTA supported the Ministry of Finance (MOF) in developing the Singapore Green Bond Framework for the issuance of Green Singapore Government Securities. As of 31 March 2023, S\$0.7 billion have been allocated to finance the capital expenditure of the Jurong Region Line (JRL) and Cross Island Line (CRL). We contributed to MOF's Singapore Green Bond Report, which accounts for the allocation of the green proceeds and the expected environmental impact.

We will also be developing and publishing our own Green Bond Framework to finance green projects, such as electrical infrastructure upgrades to support EV charger deployment. We will adhere to internationally recognised market principles, standards, and best practices when embarking on our own Green Financing initiatives.

GREEN COMMUNITIES

LTA brings multiple communities onboard our greening efforts through outreach programmes, such as the Green Plan Conversations, public dialogues, and school programmes.

We work with our stakeholders to co-create ideas and solutions for topics such as encouraging greener commutes, inculcating WCR habits, and shaping future EV charging behaviour.



Virtual Green Plan Conversation on EVs on 9 April 2022





Make the Switch Exhibition

LTA launched the "Make the Switch: The Quest for Greener Land Transport" exhibition at the Singapore Mobility Gallery in May 2022. Aimed at school students aged between 10 to 14, visitors learn about the urgency to green our land transport and how they can contribute.

Outcome

>22,000 visitors hosted since launch

The exhibition has also been travelling to primary schools island-wide, and together with the curated "Sustainability: I have the Ability" assembly programme, we have engaged more than 23,000 students across 21 primary schools on the importance of going car-lite and adopting greener commutes.



Make the Switch: The Quest for Greener Land Transport exhibition at the Singapore Mobility Gallery

We integrate media, marketing, branding and digital content to amplify the reach of our communication efforts to all stakeholders to build positive perception, greater buy-in and appreciation for Singapore's land transport.

Through our Move Lite Campaign, we encourage Singaporeans to choose walking, cycling, and taking public transport as greener commuting options. We also crowdsourced a series of "OTWstories" highlighting how WCR journeys can help one

discover new places around their neighbourhoods and reconnect with family and friends. Our latest "Lite Hacks" initiative encouraged Singaporeans to move lite by showcasing the hidden gems that they found through WCR.

LTA develops partnerships and implements programmes to engage and collaborate with different stakeholders to build greater affinity to land transport. We work closely with schools to inculcate the adoption of green commutes from young.



School assembly programme on "Sustainability: I have the Ability"





Green Action for Communities (GAC) Movement



GAC Deep Dive led by LTA on 11 February 2023

To encourage co-creation of green initiatives, LTA supported the GAC movement jointly led by MSE, MOT, MOE, MTI and MND to partner grassroots leaders and advocates to implement sustainable initiatives in their neighbourhoods.

The series of engagements held between April 2022 and June 2023 included five capacity building workshops at district levels and 17 deep dive sessions across all Group Representation Constituencies (GRCs). LTA led and organised two of the Deep Dives, guiding the GAC groups to build upon and refine their green ideas, action plans and projects for their respective constituencies.

Outcome

>800 Singaporeans engaged through GAC movement

From the year-long deep dive sessions and capacity building workshops, LTA was able to reach out to more than 800 GAC participants for greater awareness of LTA's sustainability efforts.

02

MANAGING OUR ORGANISATIONAL ENVIRONMENTAL IMPACTS

LTA is committed to reducing our environmental footprint, recognising the importance of conserving natural resources and biodiversity for the sustainability of future generations. As outlined in our Environmental Policy Statement¹², we pledge to conduct our operations in an eco-conscious way and refine our management practices to better conserve scarce resources.

Sections in this chapter:

Resource Conservation within Our Operations



Preserving Biodiversity



¹² LTA's Environmental Policy Statement can be found [here](#).

RESOURCE CONSERVATION WITHIN OUR OPERATIONS

LTA is committed to manage and reduce the environmental impacts of energy, water and waste consumption within the operations and premises that are under our direct control¹³.

We have set GreenGov.SG-aligned targets to improve our:

- ▼ **10%** Energy Use Index (EUI) and Water Efficiency Index (WEI) by 2030
- ▼ **30%** Waste Disposal Index (WDI) by 2030

Through the implementation of energy and water saving measures within our premises, we have reduced our overall consumption since 2018, allowing us to exceed our EUI and WEI targets in 2022. We track and report consumption trends to the ESSC to compare performance across premises and discuss potential initiatives and measures that may be implemented to improve performance.



2030 TARGET ¹⁴	2022 PERFORMANCE
Achieve EUI of ≤ 181.9 kWh/sqm	170.7 kWh/sqm
Achieve WEI of ≤ 55.5 L/person/day	38.2 L/person/day
Achieve WDI of ≤ 0.127 kg/person/day	As the baseline year for WDI is 2022, LTA will begin to assess performance from 2023 onwards

¹³ These refer to the operations of our road infrastructure and LTA offices.

¹⁴ Baseline for EUI and WEI is the average of 2018 to 2020 figures, while the baseline year for WDI is 2022.

Reducing Energy Consumption and Emissions

Over the last few years, LTA has carried out the conversion of street lighting from the old high pressure sodium vapour lamps to LED. International standards were referenced to ensure that LED streetlights are safe for road users.

Local trials also showed that LED streetlamps are safe for use and more energy efficient. Conversion to LED street lighting was completed in Q4 2022 with a 25% reduction in energy usage. We also plan to replace the current tunnel lighting system with LED.



SWITCHOFF

LTA implemented SWITCHOFF, an island-wide energy conservation initiative, in November 2022. Lighting at selected bus stops, covered linkways, and travel time display electronic signboards were switched off between 1am and 5am when footfall and traffic volume are low.

LTA worked with Advisers and Grassroots Leaders to implement this initiative in their constituencies.

Outcome

To date, we have received support from 67 constituencies and SWITCHOFF has been implemented in 45 constituencies between November 2022 and July 2023.



LTA strives to weave sustainability into the fabric of our organisation culture by nudging employees to make greener choices in their daily work lives. It starts with simple steps, like setting the air conditioners in our offices to 25 degrees Celsius.

This small change alone can cut down our energy consumption. To bring everyone on board, we share quarterly updates on our collective energy usage with all staff, prompting them to switch off lights and equipment when not in use.

Electricity Consumption

Electricity Consumption for LTA Premises

	Baseline (Average of 2018 to 2020)	2021	2022
EUI (kWh/sqm)	202.1	181.5	170.7
Electricity Consumption		2021	2022
Total electricity consumption (kWh)		16,819,914.1	15,812,335.3
Energy intensity (kWh/sqm)		181.5	170.7
GHG Emissions			
Scope 2 emissions (tCO ₂ e)		6,693.8	6,281.7
Total emissions intensity (tCO ₂ e/sqm)		0.072	0.068

Electricity Consumption for Tunnel, Traffic and Street Lighting

Electricity Consumption	2021	2022
Total electricity consumption (kWh)	108,538,907	99,934,895
Road tunnels lighting – energy intensity (kWh/km)	32,401.4	32,228.2
Island-wide traffic lights – energy intensity (kWh/traffic light)	1,145.4	1,126.9
Island-wide street lights – energy intensity (kWh/street light)	582.7	505.4
GHG Emissions		
Total Scope 2 emissions (tCO₂e)	44,262.2	40,753.5

Fuel Consumption

Fuel Consumption from Corporate Vehicles

Fuel Consumption	2021	2022
Fuel consumption from corporate vehicles (GJ)	2,250.2	2,547.0 ¹⁵
Fuel consumption from corporate vehicles – energy intensity (GJ/km)	0.00368	0.00389
GHG Emissions		
Total Scope 1 emissions (tCO₂e)	162.2	184.1

¹⁵ Increase in fuel consumption in 2022 as site activities (e.g. inspections and enforcement) increased post-COVID.

Fuel Consumption from Tunnel and Cleaning Vehicles and Tow Trucks

Fuel Consumption	2021 ¹⁶	2022
Total fuel consumption (TJ)	-	15.8
Energy intensity (TJ/km)	-	0.014
GHG Emissions		
Scope 1 emissions (tCO ₂ e)	-	1,161.8
Total emissions intensity (tCO ₂ e/km)	-	1.036

¹⁶ The data for 2021 is not available as tracking only commenced in 2022.

Conserving Water Resources

LTA interfaces with water resources primarily through our operational activities, which include water withdrawal for staff consumption, maintenance and upkeep of premises, and landscaping. Water is drawn from the local supply system managed by Singapore's National Water Agency, PUB.

While LTA's core operations are not inherently water-intensive, ensuring proper water management practices minimises potential negative impacts on our water resources and the environment. LTA has a robust inspection and maintenance regime to ensure minimal wastage of water.

WATER CONSUMPTION WITHIN LTA'S PREMISES			
		2021	2022
Water consumed (L)		39,544,000	53,289,000 ¹⁷
		2021	2022
Baseline (Average of 2018 to 2020)			
WEI (L/person/day)	61.6	29.1	38.2

¹⁷ Increase in water consumption in 2022 as more employees returned to the workplace post-COVID.

Reducing Waste Consumption

We are committed to minimising waste consumption and promoting recycling efforts. Paper-based processes have been digitised to reduce paper use. We have also installed dedicated recycling bins to encourage recycling and food waste segregation bins for bio-digestors to convert trash into compost. Horticulture waste is collected and recycled by our landscapers.

Waste-related data is primarily tracked and monitored through tonnage reports from our waste collectors. In LTA's premises, no hazardous waste is generated; non-hazardous waste collected from offices are either incinerated or recycled.

TOTAL NON-HAZARDOUS WASTE GENERATED WITHIN LTA'S PREMISES			
		2021	2022
Total waste (kg)		102,098.3	257,795.0 ¹⁸
Waste directed to incineration (kg)		99,078.3	254,834.0
Waste recycled (kg)		3,020.0	2,961.0
		Baseline (2022)	
WDI (kg/person/day)		0.182	

¹⁸ Increase in waste generation in 2022 as more employees returned to the workplace post-COVID.

PRESERVING BIODIVERSITY

As a builder of land transport infrastructure, LTA strives to preserve biodiversity to ensure a sustainable and harmonious coexistence between urban development and natural habitats.

Before building new infrastructure, LTA conducts rigorous Environmental Impact Assessments (EIAs) for relevant areas. These assessments are conducted in collaboration with nature groups and technical agencies. By conducting such assessments, the design of worksites is optimised to minimise environmental impact and safeguard ecological connectivity in sensitive areas.

A range of strategic mitigation measures is typically implemented to reduce the impact of construction and operational activities on biodiversity. Further reinforcing this approach is the implementation of an Environmental Management and Monitoring Plan (EMMP) to ensure ongoing compliance and effectiveness of mitigation efforts.

LTA works closely with the National Parks Board (NParks) to identify trees that can be successfully transplanted. This collaborative effort aims to mitigate any adverse environmental effects and maintain ecological balance.



PROJECTS FOR WHICH EIAs WERE CONDUCTED	EIA REPORT PUBLICATION DATES
CRL2	October 2022
Tengah Vehicular Interchange at Kranji Expressway	April 2023
Road Improvement Works along Loyang Avenue, Telok Paku Road, Nicoll Drive and Changi Coast Road	July 2023



Tree Management for the North-South Corridor (NSC)



Tree bank at Straits Boulevard

~16,000 replacement trees would be planted

A tree management plan was developed in consultation with NParks. For trees that could not be transplanted, an estimated 16,000 replacement trees would be planted during the reinstatement phase.

To ensure optimal growth, replacement trees were planted in advance in tree banks, allowing sufficient time for them to mature and grow. This phased approach ensures that the trees are well-prepared and ready for planting, contributing to the overall sustainability and environmental goals of the NSC project.

03

PROMOTING CARE AND EXCELLENCE IN OUR WORK

Our commitment to sustainability is underpinned by two fundamental themes: care and excellence.

We care for our people and those we serve by ensuring their safety and well-being and championing inclusivity on our public transport network, making it accessible for all.

Pursuing excellence, LTA fosters a culture of continuous learning and professional growth in our employees. We ensure the proper governance and use of funds to deliver our services, and commit to conduct our business in a lawful, honest, and ethical manner.

Sections in this chapter:

Care

Safety of Commuters and Our People



Care and Inclusivity on Our Public Transport



Excellence

Employee Engagement and Development



Financial Stewardship



Integrity, Ethics and Compliance



SAFETY OF COMMUTERS AND OUR PEOPLE

LTA cultivates a safe work environment for our employees and workers, and a safe travel experience for road users and public transport commuters.

LTA's Safety Governance Advisory Committee¹⁹ (SGAC) provides oversight on LTA's total Safety Management System (SMS) which covers the whole lifecycle of development projects, operations, and asset management. The Committee recommends measures to inculcate and sustain a safety culture and provides direction on strategic decisions to enhance safety governance.



¹⁹ This has been reconstituted as Risk and Safety Governance Committee (RSGC) in September 2023.

Employees and Contractors

TARGET	CY2022 PERFORMANCE
Accident Frequency Rate (AFR) ²⁰ of < 0.48 at LTA Project Sites	AFR of 0.36

LTA prioritises the well-being and safety of our employees and contractors. We take all necessary steps to ensure a safe work environment and commit to achieve a state of zero incidents in LTA offices. Our SMS, which is in line with SS ISO 45001:2018, adheres to local health and safety regulations.

In 2022, there were zero incidents resulting in fines or penalties for non-compliance with regulations at our offices and project sites.

Despite not being direct employees of LTA, our contractors benefit from the rigorous health and safety management policies and procedures established by LTA. LTA employs our own risk management structure, the Project Safety Review (PSR), to systematically identify, mitigate, and monitor significant civil hazards at every project phase. This approach parallels the Ministry of Manpower's Design for Safety (DfS) and the UK's Construction Design & Management Regulations.



Safety and progress review at Marine Parade Station on TEL Stage 4

LTA is dedicated to establishing and enforcing Safety, Health and Environment (SHE) standards consistent with the best international practices. To ensure compliance with Workplace Safety and Health (WSH) regulations and LTA's SHE Management System requirements, we conduct regular inspections and annual internal audits at our project sites.

LTA tracks the AFR of our project sites. In case of a workplace accident, an investigation is carried out immediately to identify root causes and measures required to prevent recurrences. Upon serious incidents or as needed, we conduct independent investigations by carrying out hazard and risk identification. Corrective actions are implemented based on the hierarchy of controls. Gaps in the SMS are also identified for improvements.

INDICATOR	CY2021	CY2022
AFR of Project Sites	0.38	0.36

Contractors are encouraged to inform their supervisor of any work situations that are hazardous to their well-being. If contractors fear reprisal for voicing out on any safety issues on site, they can inform LTA via our whistle-blowing scheme anonymously and we will launch an investigation. Contractors also conduct checks on the health conditions of their workers during daily tool-box meetings, and those that feel unwell are excused from work.

We work closely with our contractors to cultivate an open culture of reporting all near misses such as work-related hazards or hazardous situations. Timely reporting of near misses ensures that safety measures are implemented to eliminate or control the hazards before any incidents may occur.

²⁰ AFR = No. of Accidents (>3 days MC) / Total No. Manhours Worked x 1,000,000

We inform contractors on the SHE requirements on LTA project sites, by requiring the contractors' site management team, supervisors, and safety team to attend our Construction Safety Management course at the LTA Academy. All contractors must complete and pass their in-house safety induction training before commencing work.

New contractors are only given work assignments upon completing the safety training relevant to their duties and assessed to be competent. Additionally, contractors would need to undergo experiential learning which simulates construction hazards such as falling from height, confined space, and manual handling.



Implementation of Grinder Dust Vacuum System

Problem

Grinding activities generate dust that poses health concerns for workers working in confined spaces, potentially leading to respiratory issues.

Solution

An innovative solution to attach a dust vacuum system to the grinder was implemented to mitigate this risk. This system effectively captures and minimises dust accumulation within confined spaces, leading to improved visibility and better breathing conditions for workers during their tasks.



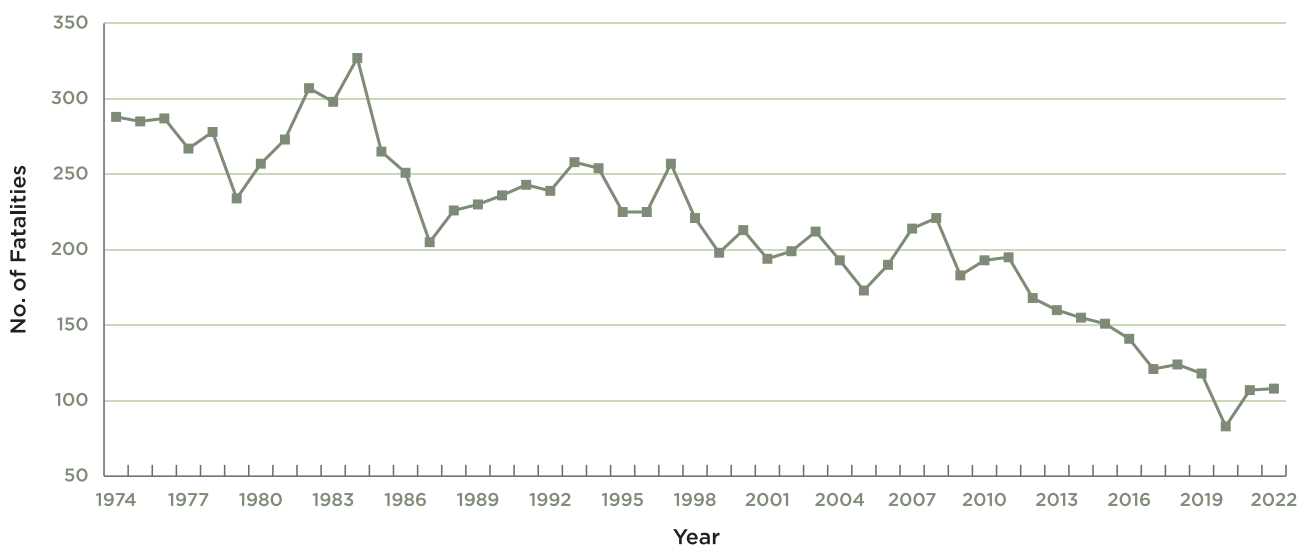
Dust vacuum system implemented at project sites to minimise dust accumulation

Road Users

LTA is committed to reducing land transport-related fatalities towards a safer "Vision Zero" environment. We established the Road Safety Governance Framework centring on the 3E's – Engineering, Enforcement, and Education – for the safety of all road users.

As part of this framework, the PSR Safe-To-Use process for Road Projects has been instituted since 2000 to ensure that road-related projects are designed and constructed with safety considerations. This has resulted in a steady downtrend of road fatalities in Singapore over the years.

Traffic Fatalities from 1974-2022



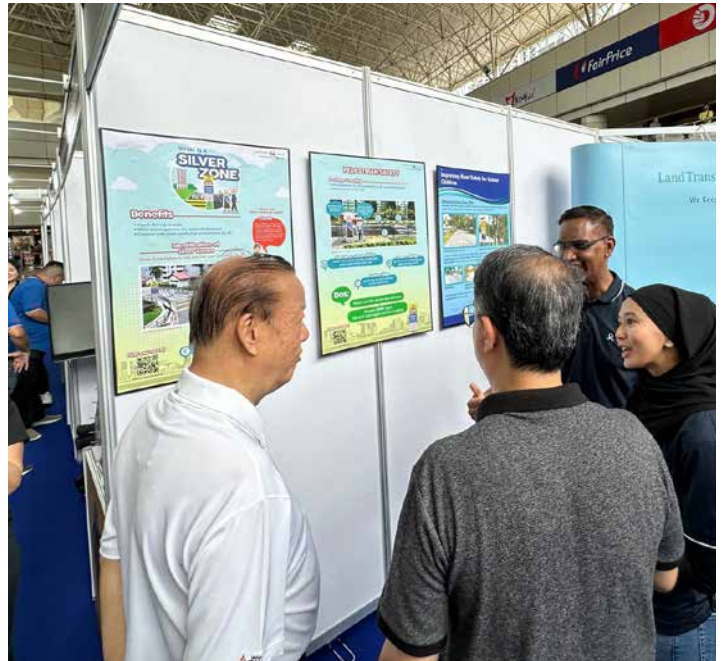
Though overall numbers have been decreasing, motorcyclists and elderly pedestrians remain the main groups of concern.

In 2022,

43.5% of traffic fatalities are made up of motorcyclists and pillion riders

70% of all fatal accidents involving pedestrians involved elderly pedestrians

To address this, LTA collaborates closely with the Singapore Road Safety Council (SRSC) and Traffic Police (TP) to promote good safety practices among road users. This is done through various regular campaigns, events, and dialogues to raise road safety awareness.



LTA's booth at Singapore Road Safety Month 2023



"Gear Up, Ride Safe" message on EMAS display

Road safety messages are spread through lamp post banners and standees, as well as via the Expressway Monitoring Advisory System (EMAS) displays.

LTA engages and educates the community and stakeholders before implementing new road safety measures. We also gather feedback via surveys, face-to-face engagements, and feedback channels to understand road safety concerns and identify areas for improvement.



Ensuring Safety of Active Mobility Users

LTA has developed the Active Mobility Design Guide and the Walking and Cycling Design Guide, outlining designs and guidelines such as the geometric design of paths and access to enhance the safety of active mobility users.

LTA reviews the design plans for active mobility infrastructure projects and works closely with industry professionals to minimise and address conflicts amongst pedestrians, cyclists, and motorists early in the design phase. We also conduct formal safety assessments and examinations of cycling paths to identify and address safety deficiencies.



LTA's Active Mobility Design Guide and Walking and Cycling Design Guide



Public Transport Workers and Commuters

While PTOs bear the primary responsibility for the safety of public transport workers and commuters within the public transport network, LTA intervenes and directs the implementation of measures or impose penalties²¹ when necessary.

Safety performance is tracked and monitored through leading and lagging indicators. LTA conducts regular audits and inspections on PTOs to identify focus areas for enhancement. Lagging indicators such as injury rates and safety incidents, including serious at-fault bus incidents, are tracked and analysed to spot any trends of concern.

Investigations are conducted to determine the root cause of incidents that occur. Mitigation measures are implemented to prevent the recurrence of incidents.

Safety time-outs may also be called when there is a near miss or a rail incident, and if bus packages did not meet a stipulated incident threshold. This allows the PTOs to review their practices and take timely corrective actions.

To foster a collaborative safety culture, LTA conducts and facilitates safety workshops and discussions with the PTOs. Safety engagement platforms, such as the Rail/Bus Industry Safety & Health Community of Practice, are set up together with the National Transport Workers' Union (NTWU) and PTOs to encourage cross sharing of safety practices. LTA also works closely with the PTOs to conduct safety road shows and campaigns, with the aim to encourage responsible behaviour amongst commuters while using public transport.

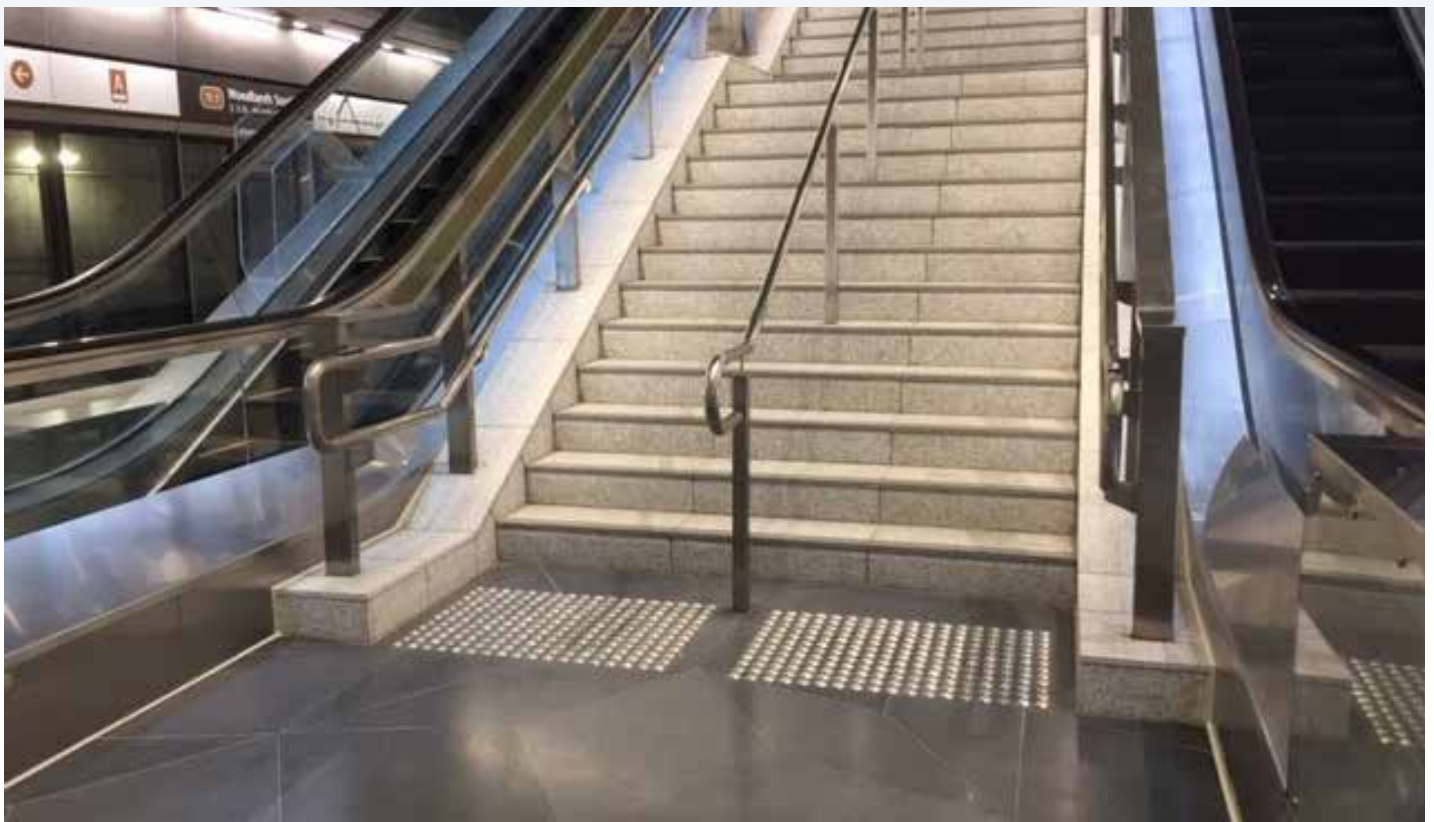
²¹ For bus, penalties up to \$100,000 per bus package per month may be imposed on the bus operators for a breach of Quality of Service (QOS) Standard 2.1.

For rail, penalties up to \$1 million or 10% of licensee's annual fare revenue, whichever is higher, may be imposed on the rail operators for a breach of license requirement.

CARE AND INCLUSIVITY ON OUR PUBLIC TRANSPORT

Our public transport infrastructure is designed to be commuter-friendly and inclusive by providing facilities such as accessible changing rooms and toilets, baby care rooms, and commuter care rooms for those with sensory needs who might need a quiet and calming space; and barrier-free access for commuters with mobility challenges.

LTA has adopted design features such as installing more platform seats, Hearing Enhancement Systems, Braille signs on railings, lifts along barrier-free routes, warning tactile at staircases, and Priority Use signs, to enable commuters with different needs to travel independently.



Warning tactile at staircases

TARGET	2022 PERFORMANCE
Pool of 20,000 Caring Commuter Champions by end of 2024	Expanded pool of Caring Commuter Champions to 1,124 with 808 new recruits
Incorporate family-friendly and inclusive facilities in public transport infrastructure. Future JRL & CRL stations will have dedicated baby care rooms, family toilets and accessible toilets	Incorporated family-friendly and inclusive facilities in TEL Stage 3 MRT stations and Tampines North Bus Interchange



Enhanced Wayfinding System at TEL Stations



New wayfinding signage system

We have launched a new wayfinding signage system at TEL MRT stations which uses universal design principles by adopting more graphical symbols, numbers, bigger fonts, colours, and contrasts in its design.

This new system will enable people from various age groups, backgrounds and needs, to navigate our station environment more easily and independently.

As part of LTA’s inclusive design methodology, we engage various stakeholders such as PTOs, members of the public, advocacy groups and Social Service Agencies (SSAs) to understand their concerns and incorporate their feedback into our infrastructure design.

LTA developed the Caring Commuter Champion e-Learning course, in partnership with SG Enable and other SSAs, to equip participants with skills to assist commuters with different special needs. Participants will learn about the various disabilities and conditions, and how assistance can be rendered appropriately on public transport using mobility aids and assistive tools.



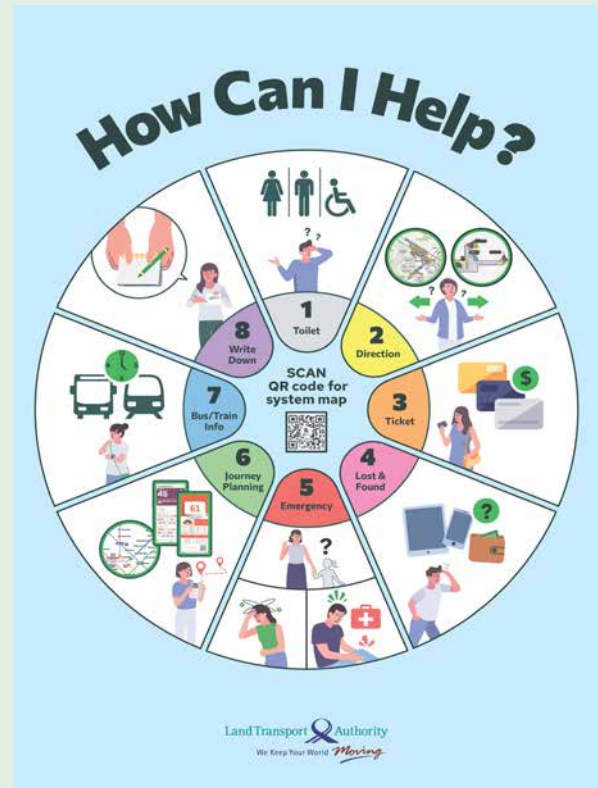
Caring Commuter Champion assisting commuters with wayfinding



Communication Card

The idea for a visual communication aid came about from an engagement session organised with the SSAs. With further inputs from stakeholders such as PTOs and SG Enable, the Communication Card was developed to help frontline staff improve communications and service delivery for commuters with special needs.

The card is now available at all Passenger Service Centres.



Communication Card for commuters with special needs

EMPLOYEE ENGAGEMENT AND DEVELOPMENT

Our employees are integral to the continued success of our organisation.

Employee engagement and development are our key enablers to build a motivated workforce with higher productivity and quality of work. We provide continual opportunities for career development that leads to long-term employee retention.



Profile of Employees and Workers

BREAKDOWN OF LTA EMPLOYEES BY EMPLOYMENT TYPE	2021		2022	
	Male	Female	Male	Female
Permanent and fixed-term contract employees	4,115 (60.9%)	2,595 (38.4%)	4,057 (61.2%)	2,542 (38.4%)
Temporary employees	20 (0.3%)	24 (0.4%)	13 (0.2%)	13 (0.2%)
	100%		100%	

BREAKDOWN OF LTA EMPLOYEES BY EMPLOYMENT TYPE	2021		2022	
	Male	Female	Male	Female
Full-time employees	4,127 (61.1%)	2,609 (38.6%)	4,055 (61.2%)	2,549 (38.5%)
Part-time employees	8 (0.1%)	10 (0.1%)	15 (0.2%)	6 (0.1%)
	100%		100%	

TOTAL NUMBER OF WORKERS ²²	2021	2022
		28,104

As a statutory board, we take guidance from the Public Service Division (PSD) human resource (HR) philosophy, policies, and core values.

Key elements from PSD's HR framework adopted by LTA include:

- Meritocracy in appointment and selection
- Fairness and objectivity in appraisal
- Performance-driven reward and recognition
- Impartiality and incorruptibility
- Flexible and clean wages
- Transparency in employment benefits

We adopt flexible work arrangements for our employees to cater to different personal commitments and life phases. Annual family/childcare leave is provided for all employees. No-pay leave for employees requiring an extended period of absence for personal/family commitments and part-time work for a short period are also permitted.

Grievance Mechanisms for Employees

In case of grievances, employees may approach their management or their assigned HR business partner. Employees can also email the HR department on sensitive matters via a 'HR Confidential' email. Lastly, employees can also raise any grievances through the Union Committee who would raise them with the HR department to investigate. Employees may also choose to raise their grievances directly to top management if they feel constrained and victimised using the available channels.

²² Workers primarily consist of contractors who perform the following work: Earthworks, piling, diaphragm wall construction, soil improvement works, temporary works, instrumentation and monitoring, roadworks, concrete and reinforcement, structural steel works, above-ground structures, waterproofing for structures, bored tunnels and related works, mined tunnels and sprayed concrete lining and drainage works. There is also a small number of interns that contribute towards this total number.

Collective Bargaining Agreement

Currently, 65% of LTA’s total employees are covered by our Collective Bargaining Agreement. Staff benefits and welfare are negotiated and mutually agreed with our Union, Amalgamated Union of Statutory Board Employees (AUSBE), under the Collective Agreement and will benefit all employees altogether as a whole.

Employee Engagement Programmes

Our employee engagement programmes focus on aligning, engaging, and connecting with our employees on our corporate direction, core values and employer brand.

We seek feedback from our employees through surveys such as our biennial Employee Engagement Surveys, where we measure employee satisfaction rate and areas of engagement to understand what drives our employees and to keep them engaged. This provides us with an understanding on how we can formulate engagement strategies to improve employee experience. Where relevant, we also run interim Pulse Surveys to keep tabs on ground sentiments or deep dive into specific topics of interest.


JOY@LTA

LTA has developed “JOY@LTA”, a strategy divided into three key pillars forming the basis of our Employee Value Proposition and employee engagement initiatives.



- **Job** — Fulfilling careers in service of a greater cause
- **Organisation** — A progressive, family-like, and people-centred organisation
- **You** — Varied careers and whole-of-person development

Employee Development Opportunities

Opportunities are available for employees to continuously learn at work. We offer our employees access to career training and development information and resources. Through our brown bag sessions on career development, we provide guidelines on identifying training opportunities for our employees to broaden their exposure.

To support internal job mobility, career outreach sessions are conducted for employees to learn about other job roles within LTA. This also supports staff who are interested to explore internal opportunities within LTA. Career Conversations workshops are conducted for staff with supervisory roles to equip them with skills on how to conduct meaningful career planning and conversations with their staff.

Employee Volunteerism

Within LTA, we provide opportunities for staff to be involved in voluntary work. We encourage employees to participate in various Corporate Social Responsibility programmes and initiatives that promote inclusive mobility and support communities’ needs. Since 2014, we have partnered with the Society for the Physically Disabled (SPD) to organise activities such as packing of welfare packs and bringing beneficiaries on outings via public transport.

We have also been supporting the Singapore Community Chest (ComChest) through the SHARE Auto-Inclusion Scheme since 2017, where our employees contribute over S\$300,000 annually. For this, we received the ComChest Charity Platinum Award and SHARE Achiever Award in 2022.



SPD outing with LTA staff

FINANCIAL STEWARDSHIP

Each year, LTA prepares our budget for approval by the Board.

To ensure accountability and good governance, regular budget utilisation reviews are conducted with various LTA groups, and the results are reported at management meetings.

We adopt a Value for Money (VFM) approach to maximise value for every dollar spent. LTA staff are encouraged to adopt lean practices, innovation, and technology as we perform our work and review our work plans and key initiatives/projects. In managing our procurements, LTA adheres to the Singapore Government’s Procurement Policy based on the principles of transparency, fairness, and VFM. Suppliers are engaged through an open and transparent tendering system, which ensures optimal procurement outcomes for LTA in delivering public transport services. In 2022, LTA achieved two Minister’s VFM Achievement Distinguished Awards.

LTA has established prudent financial policies and procedures, which are regularly reviewed to ensure their effectiveness. These are published on the intranet to provide clear guidance on financial matters and to promote consistency in financial practices across LTA.

Economic Performance

TARGET	2022 PERFORMANCE
Unqualified opinion from annual external audit of LTA’s financial statement	FY2022 financial statements were audited by external auditor and assessed to be properly drawn up in accordance with the required provisions

Please refer to our Annual Report [here](#) for the Financial Highlights of this financial year. The full Financial Statements are available [here](#).



INTEGRITY, ETHICS AND COMPLIANCE

LTA upholds the highest standards of ethical conduct and integrity with a commitment to conduct our work in a fair, honest, and transparent manner.

We exercise integrity, honesty, and transparency in our interactions with partners, suppliers and other stakeholders and do not tolerate any form of corruption.

We have developed key policies including LTA's Code of Conduct, a Whistle-blowing Policy and an Anti-Harassment Policy.

These are communicated and available for our employees' access on our intranet. A Whistle-Blowing Committee provides guidance on the development and maintenance of LTA's Whistle-blowing Policy and its reporting channels, and the investigation of alleged fraudulent activity and/or improper conduct within LTA.

An annual declaration exercise is conducted for all employees to remind them of LTA's Code of Conduct, our principles, and values. Failure to do so or false declaration will lead to disciplinary actions.

LTA's operations are regularly assessed for any risks related to corruption. Seven operational areas and processes with financial implications, such as procurement, payment, contract management and enforcement, have been identified to be more susceptible to fraud risk.

TARGET	2022 PERFORMANCE
100% of employees are informed of LTA's anti-corruption policies and procedures	100% of employees received communication on anti-corruption policies and procedures

COMMUNICATION AND TRAINING ON ANTI-CORRUPTION IN 2022			
Type	Non-Executive (Support)	Executive (Executive to Senior Manager)	Middle Management to Senior Management (VP and above)
Total number of employees	1,387	4,767	359
Total numbers of employees that received communication on anti-corruption policies and procedures	1,387	4,767	359
Total number of employees that received training on anti-corruption ²³	245	624	45

²³ Trainings are targeted at new hires who are performing functions identified to be of high risk, and employees that require refresher training.

GRI CONTENT INDEX

STATEMENT OF USE	LTA has reported the information cited in this GRI content index for the period 1 April 2022 to 31 March 2023 with reference to the GRI Standards.
GRI 1 USED	GRI 1: Foundation 2021

GRI 2021 STANDARDS	DESCRIPTION	SECTION OF REPORT / REASONS FOR OMISSION	PAGE REFERENCES
GRI-2: General Disclosures (2021)			
1. The organization and its reporting practices			
2-1	Organisational details	Introduction to LTA	5
2-2	Entities included in the organisation's sustainability reporting	About this report	3
2-3	Reporting period, frequency and contact point	About this report	3
2-4	Restatements of information	As this is LTA's inaugural sustainability report, LTA does not have any restatements of information to disclose.	N/A
2-5	External assurance	External assurance was not sought for this year's Sustainability Report	
2. Activities and workers			
2-6	Activities, value chain and other business relationships	Introduction to LTA, Message from our Chairman	5 - 7
2-7	Employees	Employee Engagement and Development	50
2-8	Workers who are not employees	Employee Engagement and Development	50
3. Governance			
2-9	Governance structure and composition	Sustainability Governance, Annual Report	8
2-10	Nomination and selection of the highest governance body	Annual Report	
2-11	Chair of the highest governance body	Annual Report	

2-12	Role of the highest governance body in overseeing the management of impacts	Sustainability Governance, Annual Report	8
2-13	Delegation of responsibility for managing impacts	Sustainability Governance, Annual Report	8
2-14	Role of the highest governance body in sustainability reporting	Sustainability Governance, Annual Report	8
2-15	Conflicts of interest	This includes sensitive information of business affairs and are not to be disclosed due to confidentiality reasons.	
2-16	Communication of critical concerns		
2-17	Collective knowledge of the highest governance body	Sustainability Governance, Annual Report	8
2-18	Evaluation of the performance of the highest governance body	This includes sensitive information of business affairs and are not to be disclosed due to confidentiality reasons.	
2-19	Remuneration policies		
2-20	Process to determine remuneration		
2-21	Annual total compensation ratio		
4. Strategy, policies and practices			
2-22	Statement on sustainable development strategy	Message from our Chairman	6 - 7
2-23	Policy commitments	Message from our Chairman and across all material topics	6 - 7
2-24	Embedding policy commitments	Message from our Chairman and across all material topics	6 - 7
2-25	Processes to remediate negative impacts	Integrity, Ethics and Compliance	53
2-26	Mechanisms for seeking advice and raising concerns	Employee Engagement and Development	50
2-27	Compliance with laws and regulations	Integrity, Ethics and Compliance	53
2-28	Membership associations	<ol style="list-style-type: none"> Advanced Remanufacturing and Technology Centre (ARTC) Anchor Member Intelligent Transportation Society (ITS) Singapore Member 	

		3. International Association of Public Transport (UITP) Member 4. Singapore Standards Council (SSC) Member 5. World Road Association (PIARC) Member	
5. Stakeholder engagement			
2-29	Approach to stakeholder engagement	Stakeholder Engagement	9
2-30	Collective bargaining agreements	Employee Engagement and Development	51
GRI 3 (2021): Material Topics			
3-1	Process to determine material topics	Materiality Assessment	10
3-2	List of material topics	Materiality Assessment	10
Material Topic: Climate Change and Operational Environment Impact Management			
3-3	Management approach	Managing Our Organisational Environmental Impacts	33
302-1	Energy consumption within the organisation	Resource Conservation Within Our Operations [Reducing Energy Consumption and Emissions]	35 - 36
302-3	Energy intensity		35 - 36
303-1	Interactions with water as a shared resource	Resource Conservation Within Our Operations [Conserving Water Resources]	37
303-5	Water consumption		37
305-1	Direct (Scope 1) GHG emissions	Resource Conservation Within Our Operations [Reducing Energy Consumption and Emissions]	35 - 36
305-2	Energy indirect (Scope 2) GHG emissions		35 - 36
305-4	GHG emissions intensity		35 - 36
306-1	Waste generation and significant waste-related impacts	Resource Conservation Within Our Operations [Reducing Waste Consumption]	37
306-2	Management of significant waste-related impacts		37
306-3	Waste generated		37

Material Topic: Asset Management			
3-3	Management approach	Green Infrastructure	19
301-1	Materials used by weight or volume		20, 22
Material Topic: Safety of Commuters and Our People			
3-3	Management approach	Safety of Commuters and Our People	40
403-1	Occupational health & safety management system		41
403-2	Hazard identification, risk assessment and incident investigation		42 - 43
403-5	Worker training on occupational health & safety		42 - 43
403-8	Workers covered by an occupational health and safety management system		42 - 43
416-1	Assessment of the health and safety impacts of product and service categories	Safety of Commuters and Our People	43 - 45
416-2	Incidents of non-compliance concerning the health and safety impacts of products and services	Safety of Commuters and Our People	43 - 45
Material Topic: Inclusivity and Accessibility			
3-3	Management approach	Care and Inclusivity on our Public Transport	46
Material Topic: Financial Stewardship			
201-1	Direct economic value generated and distributed	Financial Stewardship	52
Material Topic: Integrity, Ethics and Compliance			
3-3	Management approach	Integrity, Ethics and Compliance	53
205-1	Operations assessed for risks related to corruption		53
205-2	Communication and training about anti-corruption policies and procedures		53
205-3	Confirmed incidents of corruption and actions taken		53



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