

AHEAD





GREEN

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1.1 INTRODUCTION TO LTA GRI 2-1, 2-6

The Land Transport Authority (LTA) is a statutory board under the Ministry of Transport (MOT) responsible for the development and function of land transport.

We plan, design and build Singapore's land transport infrastructure and assets, to meet the connectivity needs of citizens and the economy.¹

VISION:

A PEOPLE-CENTRED LAND TRANSPORT SYSTEM

MISSION:

CONNECTING PEOPLE & PLACES, ENHANCING TRAVEL EXPERIENCE

¹LTA is headquartered in Singapore.

LTA OVERSEES THE FOLLOWING AREAS:



1.2 ABOUT THIS REPORT GRI 2-2, 2-3, 2-5

1.2.1 SCOPE AND BOUNDARY

1.2.2 REPORTING FRAMEWORK

This sustainability report covers our sustainability approach, performance, accordance with the Global Reporting initiatives, and practices for identified Economic. Environment. Social and Governance (EESG) material topics between the period of 1 April 2023 to 31 March 2024 (FY2023), unless otherwise stated. We will continue to publish our Sustainability Report on an annual reporting cycle.

information covered in this The sustainability report covers sustainability performances and practices across the wider land transport sector and the entire LTA organisation² unless otherwise stated. The Sustainability Report should be read together with financial information detailed in our Annual Report 2023/24 here.

This report has been prepared in Initiative (GRI) standards 2021. The GRI standards are selected as it is the most widely adopted standards for reporting on EESG material matters.

External assurance has not been sought for LTA's FY2023 sustainability report.

We welcome any questions and feedback from all our stakeholders as they are integral to LTA's sustainability journey. Please send your questions or comments via the contact form here.



1.3 MESSAGE FROM OUR CHAIRMAN GRI 2-22



Chan Heng Loon Alan *Chairman, Land Transport Authority*

"LTA is committed to shaping a sustainable future for Singapore's land transport system.

Our second Sustainability Report reinforces our dedication to making sustainability a priority."

We are currently working towards an efficient and sustainable land transport system to support Singapore's goal of net zero emissions by 2050. As the third-largest source of carbon emissions, decarbonising the land transport sector requires bold action. LTA has long been regulating car ownership, expanding the public transport network and promoting greener transport modes. We are reaping results, with land transport emissions peaking in 2016 at 8.52 MtCO₂e and falling steadily since.

We can do more. In support of the Singapore Green Plan, we are working towards 75% mass public transport peak mode share and procuring electric buses to make up half of the public bus fleet by 2030. The Land Transport Master Plan (LTMP) 2040 outlines our long-term vision towards a well-connected, safe and inclusive transport system.

DECARBONISING OUR LAND TRANSPORT

Decarbonising land transport remains a priority as we intensify vehicle electrification and promote greener commuting options.

To support electric vehicle (EV) adoption, we will make all Housing & Development Board (HDB) towns EV-ready by 2025 and commence electrical infrastructure upgrades in carparks, targeting to deploy 60,000 EV charging points by 2030. These efforts are yielding results, with adoption rates doubling and EVs currently comprising over a third of new car registrations. Promoting public transport, cycling, and walking is a key lever to reducing land transport emissions. Compared to internal combustion engine (ICE) cars, electric public buses lower carbon footprints by up to 70%, and rail by nearly 90%. Replacing short trips with cycling or walking reduces direct emissions to zero.

MOVING LITE ON PUBLIC TRANSPORT

Expanding the public transport network is vital for promoting greener commutes. By the 2030s, the rail network will grow to 360 km, and we will continue enhancing public transport to meet evolving commuter needs.

The electrification of our public buses is a key initiative to achieve net zero emissions. LTA aims to electrify half the bus fleet by 2030 and transition to a fully cleaner energy fleet by 2040. To date, 60 electric buses are in service, with another 420 procured for deployment from December



increasing solar panel usage on new and upgraded land transport infrastructure, MRT stations, train, and bus depots.

BUILDING A GREENER FUTURE

We adopt a sustainable approach to reduce carbon emissions across the lifecycle of our land transport infrastructure. To reduce embodied carbon, we are exploring the use of green materials like Carbon Mineralised Concrete (CMC) and Steel Fibre Reinforced Concrete (SFRC).

Safety remains paramount as we build and operate greener road infrastructure. With "Vision Zero" as our goal, we aim for accident-free journeys by enhancing inclusivity with more Friendly Streets, creating safer, more accessible roads for all.

GOVERNING AN EXCELLENT ORGANISATION

Sustainability is deeply embedded in LTA's values. We are aligned with the 2030 GreenGov.SG targets, to reduce the Energy Utilisation Index (EUI) and Water Efficiency Index (WEI) by 10% and the Waste Disposal Index (WDI) by 30%. From 2024, we have tied annual corporate bonuses to the achievement of these goals to encourage sustainability among our staff.

In green financing, we launched a Green Bond Framework in July 2024 to fund projects with environmental benefits. Additionally, LTA is proud to be the first statutory board certified under ISO 37001:2016 for our Anti-Bribery Management System, reflecting our commitment to operating with integrity and transparency.

LOOKING FORWARD

Our first steps have been promising, but we must keep up, and accelerate our efforts toward a greener and more inclusive land transport for all.

Chan Heng Loon Alan

Chairman, Land Transport Authority

1.4 OUR SUSTAINABILITY APPROACH GRI 2-9, 2-12, 2-13, 2-14, 2-17, 2-29, 3-1, 3-2

1.4.1 SUSTAINABILITY GOVERNANCE

vital role in guiding our sustainability efforts by ensuring that sustainability law, media, and labour relations to is a key consideration in our strategic oversee EESG matters and make decisions, focusing on sustainable recommendations aligned with our transport policies and infrastructure development that balances environmental stewardship, economic growth, and social responsibility.

engineering, urban planning, finance, sustainability objectives. The Board meets every two months, with EESG matters reviewed at least annually or as needed.

At LTA, our Board of Directors plays a Our Board members bring expertise in Leading the charge on our sustainability initiatives are our senior executives, including our Chief Executive and Chief Sustainability Officer. They oversee the development, approval, and tracking of our EESG efforts, ensuring we stay true to our green commitments.

. . . .

BOARD OF DIRECTORS	The Board of Directors provides the oversight of the management of LTA's EESG material topics and strategies
ENVIRONMENTAL SUSTAINABILITY STEERING COMMITTEE (ESSC)	The ESSC provides guidance and direction on the implementation of policies and practices, and monitors the performance of EESG material topics
ENVIRONMENTAL SUSTAINABILITY SECRETARIAT (ES SECRETARIAT)	The ES Secretariat at LTA coordinates and collects performance data for reporting on material EESG topics identified by the Board and Senior Management



1.4.2 STAKEHOLDER ENGAGEMENT

LTA builds strong relationships with stakeholders through various engagement platforms, enabling us to address their concerns quickly. These interactions also allow us to share our efforts in developing a land transport system that prioritises community needs. More details can be found in the **Community Engagement** section of this report.

Stakeholder Group	Purpose of Engagement	Engagement Method	Frequency of Engagement
Members of the public	 Encourage the switch to greener transport modes; Raise awareness of EESG initiatives and impacts by LTA and Public Transport Operators (PTOs) 	 Public dialogue sessions Newsletters Social media platforms Customer satisfaction and public engagement surveys Physical posters and banners at public transport nodes 	Regularly
LTA employees	 Raise awareness of LTA's EESG initiatives and impacts; Open dialogue and feedback 	 Electronic Direct Mails (EDMs) Newsletters Town hall meetings Employee engagement surveys Brown bag sessions and learning journeys 	Regularly
PTOs and partners	 Proper operations and maintenance of public transport infrastructure and assets; Raise awareness of various sustainability themes 	 Management-level meetings Workgroup meetings Brown bag sessions 	Regularly
Ministries and other government agencies	Alignment of policies and initiatives across Whole-of-Government (WOG)	Workgroup meetingsEDMs	Workstream- dependent
Environmental interest groups, grassroots leaders and advisors, local communities	Obtain feedback on impacts of LTA's road and rail projects	Dialogue sessions	As needed for new projects

1.4.3 MATERIALITY ASSESSMENT

In our FY2022 sustainability report, we conducted a materiality assessment to understand what matters most. Benchmarking against industry peers and reviewing sustainability trends allowed us to identify 15 preliminary material topics, which were ranked by importance through surveys and interviews with stakeholders. The results highlighted six material and four additional topics, which were reviewed and confirmed by LTA management and the Board. These topics align with 10 United Nations Sustainable Development Goals (UN SDGs).

For FY2023, we determined these topics remain relevant and have retained them, updating our disclosures with new information and insights.

Material Topics	Why topic is material to LTA	UN SDGs
Asset Management	LTA embraces the use of green features in infrastructure and sustainable materials within our supply chain.	9 MOUSTRY, NORMATINE MOI INFACTINGUE 12 RESOUNCED AD PRODUCTION AD PRODUCTION
Climate Change and Environmental Impact Management	LTA minimises the environmental impacts of our operations by reducing greenhouse gas (GHG) emissions, energy and water consumption, and waste generation, in line with the GreenGov.SG initiative.	6 CLEAN WATER Image: Additional and the state of the st
Financial Stewardship	LTA prioritises the proper governance and use of funds to deliver a financially sustainable land transport system.	8 DECEM WORK AND ECOMUME GROWTH STITUTING
Inclusivity and Accessibility	LTA provides a well-connected transport network that is inclusive and accessible to all.	3 GOOD HEALTH AND WELLERIC
Integrity, Ethics and Compliance	LTA is guided by the highest standards of ethical conduct, with zero tolerance to unscrupulous practices.	16 reader and the second and the sec
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.	3 GOOD HEALTH AND WELL-BONG

Additional Non-Material Topics

Our sustainability reporting also touches on the following additional non-material topics³:

Additional Topic	Consideration to Report
Biodiversity	Environmental impact to biodiversity is a significant consideration when building new land transport infrastructure.
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.



1.5 HIGHLIGHTS FROM 2023



will be upcycled by adopting plastic-asphalt mix



green steel

Up to 1,700 tonnes

of carbon emissions saved by adopting Carbon Mineralised Concrete

⁴ CY refers to Calendar Year (January to December of the reporting year).

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Rate (AFR) at LTA Project Sites

Accident Frequency

Achieved target of

< 0.44



Land transport is the third largest carbon emitter in Singapore, accounting for about 15% of national GHG emissions. Aware of this impact, our sustainability efforts align with national goals to reduce emissions to around 60 $MtCO_2e$ by 2030 after peaking emissions earlier, and achieve net zero emissions by 2050.

2.1 LAND TRANSPORT EMISSIONS PROFILE GRI 3-3

LAND TRANSPORT EMISSIONS (MtCO,e)

Land transport emissions peaked in 2016 and have been on a decline since, driven by efforts to manage vehicle population, promote cleaner vehicles, and expand the public transport network with the opening of the Downtown Line (DTL) and Thomson-East Coast Line (TEL).

2022 EMISSIONS PROFILE



LTA is rolling out a comprehensive strategy to reduce vehicular emissions and transition Singapore into a car-lite city, encouraging greater use of public transport, cycling, and walking. Light vehicles, such as taxis and private cars, remain a key focus due to the availability of cleaner energy alternatives. These efforts support our vision of 100% cleaner energy vehicles by 2040 and put us on track to more than halve our emissions from the peak in 2016 by 2040. More details can be found in the *Adoption of Greener Commutes* and *Shifts towards Cleaner Energy Vehicles* sections.

2.2 LTA'S SIX GREEN STRATEGIES

At LTA, there are six key green strategies that outline our sectoral decarbonisation efforts while ensuring that our land transport remains efficient, accessible, and sustainable for future generations.



Strategy	Focus Area	Sections Covered within this Report
Green Commutes	 Expanding rail and cycling networks Encouraging take up of active mobility modes Repurposing roads for pedestrianisation Building Friendly Streets 	Decarbonising our Land Transport
Green Vehicles	 Phasing out of ICE cars Deploying EV charging points in tandem with EV adoption Incentivising early EV adoption through various schemes and tax frameworks 	Decarbonising our Land Transport
	 Procuring cleaner-energy buses Deploying charging systems in bus depots in tandem with electric bus buys 	Moving Lite on Public Transport
Green Infrastructure	 Using greener materials for roads and public transport infrastructure 	Building a Greener Future
Green Operations	 Raising solar deployment Implementing energy saving initiatives 	Moving Lite on Public Transport
		Governing an Excellent Organisation
Green Opportunities	 Raising green bonds to finance sustainable projects Cultivating an innovation ecosystem 	Governing an Excellent Organisation
Green Communities	 Co-creating ideas and solutions together to amplify green efforts 	Governing an Excellent Organisation

2.2.1 ADOPTION OF GREENER COMMUTES

20-minute towns and a 45-minute city

<20 mins for all Walk-Cycle-Ride (WCR) journeys to the nearest neighbourhood centre by 2040

<45 mins travel for 90% of peak period journeys via WCR by 2040

75% mass

90% WCR

public transport

peak period modal share by 2030

peak period modal share by 2040

Our rail system, which moves millions of passengers daily, is complemented by a public bus network that reaches nearly every corner of Singapore. We are also promoting active mobility by expanding cycling paths and covered linkways across the city.

TARGET	FY2023 PERFORMANCE
75% mass public transport peak period modal share by 2030	65% mass public transport peak period modal share
Expand rail network to 360 km by 2030s	270 km with TEL4 opening
Expand cycling network to 1,300 km by 2030	Over 600 km



Underground bicycle parking lots at Bayshore MRT Station

Expanding Rail Network

Thomson-East Coast Line Stage 4 (TEL4) opened on 23 June 2024, adding seven new stations from Tanjong Rhu to Bayshore. This extension brings approximately 235,000 households within a 10-minute walk of an existing TEL station. Three new stations (Marine Parade, Marine Terrace, and Bayshore) feature Singapore's first underground bicycle parking facilities, making it a breeze for commuters to easily cycle to and from the stations.





Expanding Cycling Network



Expansion of cycling paths under island-wide Cycling Network Programme

As part of Singapore's Cycling Network Programme, LTA is on track to extend the network of cycling paths to around 1,300 km by 2030.

With over 600 km of cycling paths already completed island-wide, all HDB towns and estates will have some cycling paths by the end of 2024. These cycling paths improve connectivity, enabling active mobility users to travel safely and efficiently. They promote a healthier, more active lifestyle for residents and help reduce the carbon footprint of Singapore's land transport system.

Repurposing Roads

LTA has been studying how to improve road infrastructure in neighbourhood centres to better support walking and cycling, creating a more livable and inclusive environment. Initiatives include pedestrianisation and converting road spaces into wider footpaths or cycling paths. In August 2023, LTA completed the pedestrianisation of Eng Hoon Street and widened footpaths along Seng Poh Road and Lim Liak Street in Tiong Bahru.



Road Repurposing Project at Tiong Bahru

Ongoing works include pedestrianising an 80 m stretch along Choa Chu Kang Terrace and an 18 m stretch at Yung Seng Road, set for completion by the end of 2024. Two more road repurposing projects at Zion Road and Sims Place will begin in 2025, with completion slated for 2026.



Friendly Streets in Tampines Town

Building Friendly Streets

In 2023, LTA launched the Friendly Streets initiative. The initiative aims to encourage active mobility by making walking and cycling in our neighbourhoods safer, more convenient and comfortable. It builds on existing initiatives such as Silver Zones, School Zones and road repurposing to enhance the overall WCR experience and foster more inclusive and gracious communities.

Features include wider footpaths with dedicated cycling paths, more barrier-free crossings with pedestrian priority, and traffic-calming measures like reduced speed limits and road markings. Following positive feedback from the pilot towns, LTA plans to expand the initiative to all towns by 2030. As of today, construction is complete in 3 of the 5 pilot towns, and engagements for 10 new locations are ongoing.

2.2.2 SHIFTS TOWARDS **CLEANER ENERGY VEHICLES**

TARGET	FY2023 PERFORMANCE
100% public residential towns to be EV-ready by 2025	>1 in 3 HDB carparks are equipped with EV chargers
~60,000 EV charging points by 2030, in tandem with EV adoption	>6,100 charging points island-wide ⁵

The Singapore Green Plan 2030 includes a strong push to electrify our vehicle population, supporting the vision of 100% cleaner energy vehicles by 2040, backed by a greener national grid. To support the expansion of Singapore's EV population, LTA has implemented strategies beyond regulatory compliance, including various incentives and support mechanisms.

Since 1 January 2021, the road tax schedule for electric cars was revised to lower the variable tax component. Additionally, incentives like the EV Early Adoption Incentive (EEAI) and Vehicular Emissions Scheme (VES) help close the upfront cost gap between EVs and ICE cars. These measures can reduce the

cost of owning an electric car by up to S\$40.000.

Expanding the EV **Charging Network**

LTA has made significant progress in expanding Singapore's EV charging infrastructure, with charging points now installed in more than one in three of all HDB carparks. Additionally, LTA has co-funded over 900 chargers in condominiums (non-landed private residential, NLPR) through the EV Common Charger Grant (ECCG). By the end of 2024, it is estimated that one in five NLPRs will have EV charging points.

LTA will also begin deploying fast chargers model. This model aggregates demand at HDB town centres and JTC premises for high-mileage vehicles like taxis, private hires, and commercial vehicles. These chargers will be strategically located near amenities such as hawker centres and coffeeshops to support fleet drivers during breaks.

To drive electrification across WOG. LTA and our subsidiary, EV-Electric (EVe), developed a WOG EV charger deployment for charger installation across WOG carparks, enabling agencies to benefit from EVe's expertise and economies of scale. The first tender was launched May 2024, covering charger in deployment across 20 carparks, with more tenders scheduled for the end of 2024 and beyond.



Launch of fast chargers at HDB Hub

Encouraging Gracious Charging Behaviours

As EV adoption picks up, shaping positive charging habits early is important before habits become ingrained. To raise awareness and address misconceptions, LTA hosted a Citizen Engagement Workshop on Charging Etiquette on 30 January 2024. The session brought together EV drivers, EV Charging Operators (EVCOs), carpark owners and mobility service providers, who provided insightful recommendations to promote responsible charging practices and encourage the switch to EVs. In response, LTA collaborated with these participants to launch a <u>digital guide</u> in November 2024 covering EV basics and charging practices.



Citizen Engagement Workshop on Charging Etiquette



Industry briefing on EVCA

Ensuring Safe and Reliable EV Charging Services

The Electric Vehicles Charging Act 2022 (EVCA), which came into effect on 8 December 2023, establishes a comprehensive regulatory framework to ensure the safe charging of electric vehicles and reliable EV charging services in Singapore.

This act is a critical step in expanding our EV charging infrastructure to support

the growing number of EV users. The EVCA includes various regulatory measures that charger suppliers and EVCOs must comply with to enhance the safety, reliability, and accessibility of EV charging island-wide. We also held mass industry briefings and engaged stakeholders regularly to facilitate a smooth transition for industry players.



Co-creating Innovative Solutions

LTA is exploring collaborations with potential partners to support the adoption of EVs across all vehicle segments. In particular, the charging needs of electric heavy goods vehicles (e-HGVs) differ from light vehicles due to their larger batteries and demanding operational conditions. Traditional plug-in charging methods may not adequately meet the needs of high mileage vehicles or vehicles that operate 24/7.

LTA has launched a call for a sandbox of Battery Charging and Swapping System to support e-HGV adoption. The sandbox has been awarded to PSA Corporation Ltd and a consortium comprising Strides Frontier Pte Ltd and Ecoswift Pte Ltd in June 2024. These companies will operate and maintain the system, with LTA providing support to ensure compliance with prevailing regulatory requirements.



Sandbox of Battery Charging and Swapping System (BCSS), with battery marked out in red



Encouraging Cleaner Energy Point-to-Point Fleet



Electric taxi fleet

LTA has been encouraging our point-to-point (P2P) transport operators to adopt cleaner energy vehicles in their fleets to reduce emissions. Measures taken include extending the statutory lifespan of all electric taxis from eight years to 10 years in 2022 to give taxi operators more time to optimise their electric taxi investments, and actively tracking the transition of P2P fleets to cleaner energy vehicles.

From January 2025, we will revise the taxi licences to formalise taxi operators' commitments to convert 100% of their fleet to cleaner energy taxi models by 31 December 2040.



ON PUBLIC TRANSPORT

Public transport is key to Singapore's sustainable urban development and carbon reduction efforts. LTA aligns our environmental targets with GreenGov.SG to minimise the environmental impact of government operations. While expanding the public transport network for greater accessibility, we remain committed to safer and more inclusive journeys for all commuters.

3.1 PUBLIC TRANSPORT EMISSIONS AND ENVIRONMENTAL DATA

Singapore's public transport system contributes around 15% of land transport emissions⁶ from the operations of bus and train premises and our bus and rolling stock assets.

Recognising that public transport is more carbon-efficient than private vehicles, LTA prioritises expanding public transport infrastructure to encourage a modal shift. Our Move Lite Campaign complements this by highlighting the environmental benefits of walking, cycling, and taking the public transport as eco-friendly lifestyle choices.

PUBLIC TRANSPORT SYSTEM 2022 EMISSIONS PROFILE Emissions from public transport operations are expected to increase over the next decade as we continue to grow the public transport network, to encourage more people to take public transport which are more carbon-efficient transport modes.

As the emissions from our public bus fleet contributes more than half of public transport system emissions, LTA aims to reduce this by progressively replacing the primarily diesel-powered buses with cleaner energy ones.





⁶ Based on latest available data as of end 2022

Electrifying Public Buses

In November 2023, the electrification of Singapore's public bus fleet took a stride forward with the first large-scale award of contracts for new electric buses and supporting Electric Vehicles Charging Systems. A total of 420 electric buses were procured for deployment from December 2024 till 2025.

To achieve the electrification target of the public bus fleet, we will deploy Electric Vehicles Charging Systems and Charging Station Management Systems in our upcoming bus infrastructure such as the bus depots at Sengkang West, Gali Batu, and East Coast. They are planned to be completed in tandem with the completion of the bus infrastructure, to tie in seamlessly with the new electric bus deliveries.



Electric buses deployed progressively from December 2024

Environmental Impact from Bus and Train Premises

10% Energy	10% Water	30% Waste Disposal
Utilisation Index	Efficiency Index	Index (WDI)
(EUI) reduction	(WEI) reduction	reduction
by 20307	by 2030 ⁷	by 2030 ⁸

2030 TARGET	FY2023 PERFORMANCE
Achieve EUI of ≤ 182.8 kWh/sqm	202.3 kWh/sqm
Achieve WEI of ≤ 23.1 L/person/day	25.5 L/person/day
Achieve WDI of ≤ 0.071 kg/person/day	0.085 kg/person/day

LTA is actively incorporating environmental protection and sustainability into our operational and maintenance procedures and processes, fulfilling compliance obligations for environmental management while promoting good practices.

Learning through Mutual Sharing amongst PTOs

LTA recognises that fostering a collaborative partnership with the PTOs is key to achieving our resource conservation targets. To encourage the operators to push the envelope in adopting sustainable practices in their daily operations, LTA organises workshops and publishes bulletins to share best practices adopted by various bus and rail operators for mutual learning.



Workshop participants from various PTOs discussing and exchanging learning points



Fire simulation study for the installation of PV panels on metal roofs at above ground stations

Accelerating Solar Deployment through Innovation

LTA has installed solar panels at the station entrance roofs of TEL stations and the rooftop of Bulim Bus Depot to offset energy consumption by the facilities, as part of LTA's push for more solar deployment at our public transport facilities.

We are also assessing the feasibility of installing solar panels at upcoming train stations, such as those along the Jurong Region Line (JRL). To avoid an extensive redesign to meet the Singapore Civil Defence Force (SCDF) Fire

Code requirements, which would have incurred heavy costs and impacted JRL's project timeline, LTA performed in-house fire engineering analysis to show that solar photovoltaic (PV) panels on metal roofs will not ignite in the event of a train fire at the trainway. This is the first use of such analysis for the installation of PV panels on metal roofs at above ground stations in Singapore. With the approval of waivers from SCDF, we were able to retain our current design while achieving a cost-effective and safe solution.

Energy Saving Moves for Rail Stations

LTA recently introduced hybrid cooling systems in TEL4 stations, using fans to enhance air circulation and allow higher air-conditioner temperatures without sacrificing comfort. We plan to install this in future underground stations, rail and bus depots, and air-conditioned bus interchanges, with plans to extend hybrid cooling to existing underground stations on the North-South and East-West Lines (NSEWL).

We are also exploring the use of Artificial Intelligence (AI) to optimise air-conditioning systems. Completed proof-ofvalue trials demonstrated an estimated 7% energy savings, leading to the inclusion of AI in tender specifications for upcoming projects.



Hybrid Cooling at Katong Park Station

We monitor the schedule for asset replacement closely to replace aging mechanical and electrical systems as newer equipment in the market offers improved efficiency with technological advancements. Ongoing asset replacement projects include the NSEWL Environmental Control System asset and lighting replacement, and North-East Line (NEL) chiller replacement.

3.2 **SAFETY OF COMMUTERS AND PUBLIC** TRANSPORT WORKERS **GRI 3-3**

Commuter safety is our top priority. Rigorous checks, tests, and adherence international safety standards to ensure new trains and buses are safe for passenger service. This aligns with our LTMP 2040 vision of a transport system promoting healthy lives and safer journeys.

The PTOs are primarily responsible for the safety of public transport workers and commuters, with LTA overseeing measures and enforcing penalties when necessary. PTOs' safety performance is closely monitored with regular reviews to identify and address areas for improvement.



Safety features on train

LTA conducts audits and inspections on PTOs to ensure compliance and identify focus areas for improvement. Lagging indicators, such as injury rate and safety incidents, are tracked for trend analysis. Incident investigations identify root causes, with mitigation measures implemented to prevent recurrence.

To foster a collaborative safety culture, facilitates safety engagement LTA

platforms, with the National Transport Workers' Union (NTWU) and PTOs, to encourage cross sharing of best safety practices. The Public Transport Safety and Security Awards (PTSSA), launched in August 2022, recognise outstanding safety practices and initiatives by operators and public transport workers.

Safety Design Provisions for Rail Systems

LTA ensures commuter safety by designing our driverless metro systems in adherence with international standards. Key safety provisions include robust signalling systems with fail-safe operations, interlocks, automatic train ventilation, provide effective smoke protection, and redundancy.

Train speeds are controlled through designated driving modes, with emergency communication facilitated via CCTV, public announcement systems, and direct links to the control centre.

Fire safety is enhanced with smoke detectors. fire-resistant materials.

extinguishers, and emergency lighting. A resilient backup power network maintains critical system operations, while smoke purge and fire detection systems in stations, along with tunnel management.

Emergency provisions, like passenger information displays, emergency stop plungers, evacuation signage, and tunnel lighting ensure safe and reliable travel.



SMRT BPLRT receiving the Operational and Workplace Safety Award (Rail Operator) Excellence Award

Improving Safety with Technology

Technological advancements have improved bus safety with features like Collision Warning Systems (CWS), Surround View Cameras, and Camera Mirror Systems (CMS). CWS alert Bus Captains to potential collisions, Surround View Cameras minimise blind spots with a 360-degree view, and CMS enhance visibility in low light and adverse weather.

Anti-Fatigue and Telematics systems provide real-time alerts to Bus Captains via audio, visual, or vibration feedback. These systems also generate reports, enabling operators to monitor and coach driving behaviours as needed.

Trains are equipped with advanced safety features like the Signal Warning System (SWS), which provides visual and auditory alerts to help Train Captains detect abnormal track conditions. Project Overwatch was introduced to enhance Operations Control Centre (OCC) awareness on train route setting and manual train movement. Additionally, trackside intrusion detection systems at LRT station platforms alert OCC officers to intrusions, enabling rapid responses.



Anti-Fatigue and Collision Warning Camera Mirroring Systems on buses Systems on buses



Signal Warning System for Rail

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3.3 INCLUSIVITY FEATURES OF PUBLIC TRANSPORT GRI 3-3

LTA promotes inclusivity in our public transport network, making it accessible for all. This includes training a growing pool of Caring Commuter Champions who foster kindness and support among commuters through small gestures like offering assistance or giving up their seats.

Seven bus interchanges across Singapore will be upgraded with family-friendly facilities, including priority queue zones, commuter care rooms, and baby care and family washrooms. Accessibility improvements will feature wheelchairaccessible toilets, tactile paths, and braille signs on handrails. Enhanced lighting and air-conditioning systems will further improve the overall commuter experience.

TARGET	FY2023 PERFORMANCE
Pool of 20,000 Caring Commuter Champions by end of 2024	14,000 Caring Commuter Champions ⁹
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.	Opening of Jurong Town Hall bus interchange with commuter-friendly and inclusive facilities, seven bus interchanges are currently undergoing upgrades to enhance family-friendly facilities.



Family-friendly features at Jurong Town Hall Bus Interchange

Expansion of Helping Hand Scheme

The Helping Hand scheme, launched by the Caring SG Commuters Committee, promotes a more caring and inclusive public transport system. Following a successful trial with Go-Ahead Singapore's "May I have a seat please" identifier, the scheme was expanded in 2023 to cater to the needs of other commuters and adopted by all PTOs.

New identifiers include "This is a wheelchair" for paediatric wheelchair users and "Please alert me when I am approaching

my stop" for commuters with low vision or dementia. These identifiers are available for free at MRT stations, bus interchanges or terminals, and selected SimplyGo Ticket Offices.



New identifiers provided under the Helping Hand scheme

⁹ Accurate as of September 2024



Sustainability is at the core of land transport infrastructure planning, design, and construction. Efforts focus on reducing utilities consumption, using greener construction materials, and integrating new developments with Singapore's natural habitats with minimal impact.

LTA also prioritises road safety and inclusivity as we build road infrastructure, creating safe and welcoming journeys for all.

4.1 ROAD INFRASTRUCTURE EMISSIONS AND ENVIRONMENTAL DATA GRI 2-4, 302-1

Electricity Consumption for Road Tunnel, Traffic and Street Lighting



into smart ones under a remote control and monitoring system (RCMS), resulting in annual energy savings of **8.75 million kWh**

(equivalent to the energy consumed by 1,900 4-room



HDB apartments annually!)

~60%
 achieved for the Tunnel Ventilation System of Kallang-Paya Lebar Expressway
 (KPE) and Marina Coastal Expressway (MCE) tunnels through optimised
 Savings

Electricity consumption for road operations primarily comes from road tunnel systems, traffic lights, and street lighting across the island. To promote energy and cost sustainability, several initiatives have been launched, including converting street lighting to Light Emitting Diode (LED) lighting and the "SWITCHOFF" programme, which turns off lights at selected bus stops, covered linkways, and travel time display electronic signboards between 1 am and 5 am.

Additionally, new technologies like the RCMS optimise street lighting operations, and a study was conducted using a smart energy management system for a selected section of our MCE tunnel's ventilation system.



Remote Control and Monitoring System (RCMS) for Street Lighting

Singapore is the first country to implement smart street lighting with the adoption of RCMS. This system enables remote activation of lights, improving visibility and safety for road users while adjusting to daily sunset and sunrise timings based on meteorological data, resulting in cost and energy savings.

The RCMS can also detect faults and alert maintenance staff for quicker repairs, leading to an 80% reduction in public feedback on maintenance issues and eliminating the need for night patrols, saving about 4,200 manhours annually.

By mid-2025, the RCMS will be expanded to cover 350 km of covered linkways, over 600 km of cycling paths, 560 pedestrian overhead bridges, and 4,400 bus stops and taxi stands.



Smart Energy Management System for Tunnel Ventilation System (TVS)



Smart energy management system for real-time monitoring of TVS energy consumption data

LTA collaborated with the Advanced Remanufacturing and Technology Centre (ARTC) to conduct a study using a smart energy management system for real-time monitoring of energy consumption from the TVS of MCE tunnel. The system analyses operational data to develop innovative solutions for optimising energy use.

As a result of this study and the implementation of the proposed solution, TVS operations in the KPE and MCE tunnels have been optimised, leading to approximately 60% energy savings, or around 30 million kWh of electricity saved annually.



Fuel Consumption from Road Tunnel Cleaning Vehicles and Tow Trucks¹⁰



In FY2023, there was a slight increase in fuel consumption due to LTA responding to assist in approximately 4,500 more incidents. To mitigate this, LTA is working with towing service providers to adopt cleaner energy vehicles with extended battery life.

¹⁰ Restatements were made to previous year's data to reflect higher data accuracy after reviewing data tracking and reporting processes



4.2 ASSET MANAGEMENT FOR ENVIRONMENTAL IMPACT CONTROL GRI 3-3

Guided by our <u>Environmental Policy</u> <u>Statement</u>, sustainability is embedded in infrastructure planning, design, and construction. The Asset Management Governance Committee (AMGC) oversees and guides the incorporation of robust principles in asset management. This includes ensuring asset condition assurance, adopting new processes and technologies, and addressing potential vulnerabilities to safeguard long-term and public interests.



In line with the advisory issued by the Building and Construction Authority (BCA) on 30 October 2024, sustainability criteria will be incorporated into the tender evaluation framework for new construction tenders with an Estimated Procurement Value (EPV) exceeding S\$50 million under BCA Construction Workheads (CW01 and CW02), effective from 31 January 2025. Up to 5% of the overall Price Quality Method (PQM) score will be allocated to sustainability.

FY2023 PERFORMANCE

For the tender evaluation of civil contracts, 4% of the overall PQM score (under the Q-score) has been allocated to sustainability attributes. This ensures that contractors commit to incorporating sustainability initiatives and considerations into their projects.



Proper segregation of construction waste at project sites

Asset Management at our Project Sites

We are committed to:

Working with our partners to operate in an environmentally responsible manner

This includes procuring energy-efficient electrical appliances, installation of water-efficient products per regulations, and on-site sorting of construction waste.

Creating a cleaner and greener environment

Contractors are required to submit waste management plans, with LTA conducting regular inspections to ensure proper implementation on site.

LTA monitors energy and water consumption on project sites to ensure efficient usage. Contractors are required to self-declare the usage of key construction materials, such as concrete, steel, mortar, asphalt, and diesel, in their projects on an annual basis.

Monitoring, evaluating, and continually improving our environmental management practices

In addition to regular site meetings between LTA project teams and contractors, monthly safety and environmental committee meetings, chaired by LTA project directors, address key Safety, Health and Environmental (SHE) issues. Biannual dialogues between contractors' and LTA's senior management further evaluate and discuss critical SHE matters.

Best practices and lessons learned from incidents are shared across SHE meetings and integrated into contractual specifications, continually improving environmental and sustainability standards on-site. In CY2023, the total weight of nonrenewable materials used increased due to the ramping up of CRL and JRL project activities. Consequently, the percentage of recycled input materials decreased, as most of the concrete and steel were used for constructing permanent structures. More information can be found in the Appendices section.

Green Designs, Materials and Technologies

As a key developer of land transport infrastructure, we are responsible for the carbon footprint of our building materials. We aim to fully understand the environmental impact of our projects and leverage proven technologies to responsibly reduce embodied carbon. while ensuring structural robustness and durability.

Proliferating Green Construction Materials

The production of concrete and steel, further lower embodied carbon in our key materials in our infrastructure, has mandated the use of sustainable materials for permanent reinforced concrete works in CRL2, requiring at least 66% of cement to be replaced with Ground Granulated Blast Furnace Slag (GGBS) and at least 50% of reinforcement steel to be green steel produced in Electric Arc Furnaces with 90% recycled steel. These measures are projected to reduce the embodied carbon of each CRL2 station by 25,000 to 50,000 tCO₂e, depending on station size.

Additionally, we have adopted Carbon Mineralised Concrete (CMC) and Steel Fibre Reinforced Concrete (SFRC) to

projects. CMC sequesters carbon by contributes a significant amount of injecting carbon dioxide into concrete carbon emission. Since 2024, LTA during mixing, enabling a reduction in cement usage. It has been adopted in several civil contracts for the North South Corridor (NSC) to construct drains. precast viaduct segments and footpaths, saving over 1,700 tons of CO₂. During NSC's reinstatement stage, LTA plans to extend the use of low-carbon concrete. including CMC, to footpaths and cycling paths.

> SFRC improves crack resistance of concrete, enhancing the durability of structures. It is used in precast tunnel segments and can also be applied to cast in-situ concrete structures, reducing the overall steel reinforcement required for crack control.



Precast viaduct segment with CMC



Precast tunnel segments with SFRC

Adopting Plastic-Asphalt Road Pavements



Laying of plastic asphalt

Incorporating clean plastic waste into conventional premix creates a plasticasphalt mix that is up to 30% more durable than traditional asphalt. This results in a longer service lifespan, leaner road maintenance regime, and over 15% longterm cost savings.

Starting in 2025, plastic-asphalt mix will be used in the construction of traffic diversions along NSC. The use of plastic-asphalt mix for upcoming NSC tunnel and viaducts and road maintenance contracts will divert up to 575 tonnes of plastic waste from the landfill.

Application of Fluorocarbon Coating

Polyurethane is commonly used as a protective coating for concrete parapets but requires frequent cleaning due to dirt and algae buildup caused by road traffic pollution, making maintenance labour-intensive and disruptive to traffic.

To address this, LTA has adopted fluorocarbon (FL) coatings, which offer superior self-cleansing properties, effectively deterring soot and algae deposits. This reduces washing frequency from once a year to once every three years, resulting in lower water consumption and reduced lifecycle costs. In the past year, we have increased the volume of parapets coated with FL by 160%.



Concrete parapet with FL coating

End-of-life Considerations for Train Assets

To reduce landfill waste and preserve Singapore's public transport heritage, LTA has been upcycling decommissioned train-cars and parts through partnerships with various agencies and organisations. To date, LTA has found alternative uses for 20 train-cars.

Giving Decommissioned Trains a Second Life

In March 2023, LTA donated a decommissioned train-car to ITE College West, serving as the centerpiece of their Rail Engineering Hub for hands-on training. LTA also donated a train-car to Tiny Pod in June 2024, a startup that transformed it into a container hotel for paying customers. Other train-car donations have been made to government agencies and organisations for training and heritage preservation.

Since late 2021, LTA has been upcycling train parts such as seats and strap hangers. Collaborating with 15 Town Councils through Action for Green Towns (AGT), schools, non-governmental organisations, and commercial entities, we have donated around 1,000 different train parts. These repurposed parts are now used in public spaces, including schools and HDB areas, serving as rest stops and community exhibitions.

Donated train-car at the Rail Engineering Hub of ITE College West

35





4.3 BIODIVERSITY CONSIDERATIONS

LTA adopts a science-based approach to greenery and wildlife management, balancing nature conservation with Singapore's transportation needs. Before infrastructure development, thorough Environmental Impact Assessments (EIAs) are conducted with conservation groups and technical experts to minimise ecological disruption and protect natural linkages in vulnerable areas.

To mitigate environmental impacts during construction and operations, we employ a range of measures supported by an Environmental Management and Monitoring Plan (EMMP), ensuring sustained effectiveness and compliance.

Tree Management for NSC Project



As of July 2024, **6,900 trees** have been planted in dedicated tree banks since the start of the NSC project.

LTA is committed to planting two trees for every tree felled upon project completion. In partnership with the National Parks Board (NParks), we proactively plant reinstatement trees in advance, allowing them time to mature during the permanent reinstatement phase.

Dedicated tree banks across Singapore nurture young trees for future landscaping. To date, close to 1,500 trees have been planted near construction sites, and over 1,900 trees affected by NSC works have been transplanted to mitigate the loss of greenery.



Tree Bank at Straits Boulevard
4.4 SAFETY OF ROAD USERS GRI 3-3

Under the LTMP 2040, LTA remains committed to reducing land transport-related fatalities, working towards a safer "Vision Zero" environment. Our Road Safety Governance Framework is built on 3E's (Engineering, Enforcement, and Education).

We remain dedicated to reducing accidents involving elderly pedestrians and motorcyclists. In 2023, motorcyclists and pillion riders accounted for roughly 50% of traffic fatalities, while around 70% of pedestrian fatalities involved the elderly.

Ongoing Efforts to Reduce Traffic Accidents

Enhancements to traffic light junctions, such as Red-Amber-Green arrows and Green Man+

Reductions in traffic speed in Friendly Streets, School Zones and Silver Zones

Investigations of fatal accident locations

Implementation of localised traffic enhancements

Collaboration with Traffic Police (TP) and Singapore Road Safety Council for various road safety events/campaigns LTA conducts comprehensive internal impact assessments, analysing traffic accident data provided by the TP and gathering road user feedback through engagement surveys conducted before and after implementing initiatives. Additionally, we gain insights into road safety concerns by participating in adviser and grassroots briefings, community events, and other interactive platforms, ensuring a well-rounded understanding of community needs.



Singapore Ride Safe 2024

LTA adopts a proactive and holistic approach to enhance the safety of active mobility users. This includes developing design guidelines, conducting independent safety reviews of active mobility infrastructure, and reviewing regulations to ensure the safety of devices and paths. Public education and enforcement efforts further promote safe and gracious path-sharing among users.

Review of Regulations for Personal Mobility Aids (PMAs)

To ensure paths remain safe and inclusive for all users, particularly those with genuine mobility needs, LTA has engaged stakeholders and accepted recommendations from the Active Mobility Advisory Panel (AMAP). These include requiring certification of medical need for mobility scooter use, reducing the speed limit for motorised PMAs from 10 km/h to 6 km/h, and aligning dimension restrictions for PMAs on public paths.

These recommendations will be implemented by the end of 2025, following the necessary legislative amendments.



Engagement session with PMA users

4.5 INCLUSIVITY FOR ROAD USERS GRI 3-3

We are dedicated to integrating inclusive features into our transport infrastructure, ensuring that road users of all mobility levels can move safely and conveniently.

Barrier-Free Features for More Inclusive Journeys

Pedestrian Overhead Bridges

Since 2018, LTA has equipped all new pedestrian bridges with lifts to ensure barrier-free access. Lifts are also being retrofitted on older bridges near transport hubs, healthcare facilities, and areas with higher populations of elderly residents.

As of November 2024, 89 pedestrian bridges have been retrofitted, with plans to retrofit 130 more by 2028.



Provision of lifts at pedestrian overhead bridges

Silver Zones



Silver Zone gateway

Residential areas with a high proportion of seniors are designated as Silver Zones with a reduced speed limit of 30 km/h to 40 km/h and trafficcalming features like additional crossings and narrower lanes. As at end-2023, 36 zones are in place, with a total of 50 planned for completion by 2025.

Green Man Plus (GM+)

GM+ is available at over 1,000 road crossings, enabling the elderly and persons with disabilities to extend crossing times with a card tap. An additional 1,500 road crossings will feature GM+ by 2027.



GM+ at road crossing



LTA's commitment to sustainability is guided by care and excellence. We prioritise the safety and well-being of our people while striving to reduce emissions, minimise environmental impacts, uphold integrity and ethics, and foster continuous learning and professional growth.

5.1 LTA PREMISE EMISSIONS AND ENVIRONMENTAL

DATA GRI 2-4, 3-3, 302-1, 302-3, 303-1, 303-5, 306-1, 306-2, 306-3, 306-4, 306-5

At LTA, we are dedicated to minimising the environmental impacts of energy and water consumption, as well as waste generation, across facilities under our direct control. Aligned with GreenGov.SG, we have set clear targets to reinforce our commitment to sustainability. To motivate our staff, an annual corporate bonus tied to these targets was introduced in 2024.

We also foster an eco-conscious culture among staff, prioritise energy efficiency, and follow the principles of reduce, reuse, and recycle in our daily operations.

2030 TARGET	FY2023 PERFORMANCE
Achieve EUI of ≤ 182.2 kWh/sqm	147.9 kWh/sqm
Achieve WEI of ≤ 54.5 L/person/ day	50.6 L/person/ day
Achieve WDI of ≤ 0.128 kg/person/ day	0.197 kg/person/ day

Electricity Consumption from LTA Premises¹⁰



¹⁰ Restatements were made to previous year's data to reflect higher data accuracy

after reviewing data tracking and reporting processes

⁷ Baseline for EUI and WEI is the average of FY2018 to FY2020 figures.



In recent years, we have observed a downward trend in energy usage, keeping us on track to meet our 2030 EUI target. This progress is driven by initiatives like replacing air-conditioning units with more energyefficient models and installing motion sensors in common areas to automatically switch off lights and air-conditioners when not in use.

We remain committed to identifying and implementing additional energysaving measures, including exploring the use of renewable energy sources.

Installation of energy efficient air-conditioning units



Solar Deployment at LTA Offices

LTA is deploying solar panels at our offices wherever feasible. In October 2023, a tender was awarded to equip the rooftops of our Hampshire Office buildings with solar panels to power LTA's corporate headquarters. This initiative supports national solar targets, reducing annual energy consumption from the grid by approximately 700 MWh.

Solar Deployment at Hampshire Office





Fuel Consumption from Corporate Vehicles¹⁰

Public Utilities Board (PUB). While our operations are not inherently water-intensive, LTA emphasises proper water management to minimise environmental impacts.

Water usage is closely monitored through meter readings to ensure responsible consumption and reduce waste. Additionally, all water is properly discharged to sewage treatment plants for processing, maintaining compliance with environmental standards.

Water Consumption within LTA Premises



Our corporate fleet includes vehicles used for collection and distribution of documents, site inspections and performing enforcement regulatory functions. This year, fuel consumption decreased as we phased out older diesel vehicles and optimised our fleet usage.

To align with GreenGov.SG requirements, LTA will progressively procure and replace corporate cars with EVs from FY2023. For other vehicle types, cleaner hybrid models will be considered if EVs are unavailable.



Replacement of corporate cars with EVs

Water Management

LTA's water usage primarily supports operational needs, such as staff use, facility maintenance, and landscaping, sourced from the local water supply managed by the

While water consumption increased in FY2023 due to more staff returning to the office and new tenants occupying additional spaces, LTA remains committed to achieving our WEI reduction target. Efforts include purchasing water-efficient fixtures and maintaining a rigorous inspection and maintenance regime to minimise water wastage.

¹⁰ Restatements were made to previous year's data to reflect higher data accuracy

⁷ Baseline for EUI and WEI is the average of FY2018 to FY2020 figures.

after reviewing data tracking and reporting processes

Waste Management

At LTA office premises, waste generated is non-hazardous and primarily associated with daily office activities. We closely monitor waste output through tonnage reports from designated waste collectors and ensure environmentally conscious disposal methods, including incineration and recycling.

Non-hazardous Waste Generated within LTA Premises (Incinerated)



Bio-digesters are installed in our cafeteria to convert biodegradable food waste into compost for use in community gardens. Additionally, we provide e-waste bins for the responsible disposal of electronic products, ensuring no hazardous waste is generated within our premises.

Non-hazardous Waste Generated within LTA Premises (Recycled)



LTA is committed to reduce our WDI by 30% by 2030. An increase in waste generation was observed due to more activities, events, and staff returning to the office. Less waste was recycled as the quantity of recyclable paper waste was reduced at source after digitising paper-based processes. Nonetheless, LTA is actively developing initiatives to reduce waste generation and enhance recycling efforts.

LTA's Waste Management Plan



Recycling bins at Hampshire Office

3. Management

INTERNALLY:

- Deploy recycling bins to encourage recycling
- Provide food waste segregation bins for bio-digester to convert organic waste into compost

EXTERNALLY:

- Include food waste segregation & treatment clause (where applicable) in future tenancy agreements
- Recycle horticulture waste from landscaping activities

1. Prevention

- Digitise paper-based processes to reduce paper consumption
- Reduce single-use disposables and eliminate paper cups in meeting rooms



 Track tonnage reports from waste vendors

5.2 FINANCIAL STEWARDSHIP GRI 3-3

Financial stewardship is fundamental to LTA's operations, ensuring that public resources are managed responsibly and transparently.

Each year, LTA prepares a budget that is subject to approval by the Board. To ensure accountability, regular budget utilisation reviews are conducted with various LTA groups, with results reported to senior management. LTA also abides by the WOG Procurement Policy for the procurement of goods and services based on the principles of transparency, open and fair competition and value for money. Financial and procurement policies are continually refined to enhance effectiveness. LTA's financial statements are subjected to annual statutory audits, with internal controls assessed through periodic audits by the Auditor-General's Office and our Internal Audit team.

The Audit Committee and the Finance and Investment Committee, each with its own responsibilities, provide additional governance in areas such as internal controls, risk management, financial, accounting, and investment matters.

Embracing a Value for Money (VFM) and Agile-Lean-Inclusive approach, LTA ensures cost-effectiveness across all expenditures. Staff are encouraged to incorporate lean, innovative, and technological solutions in their work and project evaluations. In FY2023, LTA received two Minister's VFM Achievement Awards (Distinguished), details of which can be found in our Annual Report.

LTA adheres to the Statutory Board Financial Reporting Standards set by the Accountant-General and complies with policies and instructions from the MOT and the Ministry of Finance (MOF). It also abides by legislation such as the Public Sector (Governance) Act 2018 and the Land Transport Authority of Singapore Act 1995.

Please refer to our FY2023 <u>Annual</u> <u>Report</u> and <u>Financial Statements</u> for more information.

ANNUAL TARGET	FY2023 PERFORMANCE
Unqualified opinion from	FY2023 financial statements were
annual external audit of	audited by external auditor and
LTA's financial statement	assessed to be properly drawn up in
	accordance with the required provisions

Green Financing

LTA plays a vital role in WOG green financing efforts. We supported MOF in developing the Singapore Green Bond Framework, laying the foundation for the issuance of the Green Singapore Government Securities (Infrastructure) bond. The Singapore Government has since raised proceeds of S\$5.2 billion across FY2022 and FY2023, which are expected to be fully allocated to CRL and JRL by the end of FY2025.

In July 2024, LTA published our Green Bond Framework, which was affirmed by an external second party opinion provider to be aligned with internationally recognised market principles and standards. This In FY2022, **\$\$2.4 billion** was raised, followed by **\$\$2.8 billion** in FY2023.

framework is designed to finance sustainable land transport infrastructure, such as electrical infrastructure upgrades to support EV charger deployment, through the issuance of green bonds.

Please read our <u>Green Bond Framework</u> and the <u>Second Party Opinion Report</u> for more information.

5.3 TECHNOLOGY AND INNOVATION

LTA fosters an innovation ecosystem with our partners, aiming to enhance outcomes for our commuters and operations. Our innovation portfolio focuses on three key categories which are to:

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

We aim to boost technology uptake and innovation through good governance of innovation grants and open sharing of data via DataMall¹¹ to encourage groundup innovations. LTA's Land Transport Innovation Portal (LTIP) serves as a one-stop platform that facilitates the co-creation of solutions with industry partners.

Features on the portal include:

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

- Since its launch on 2 September 2022, the LTIP has initiated 17 Calls for Solutions, receiving robust participation from ecosystem partners with over 300 proposals.
- Since 2021, 29 projects have been completed that will successfully lead to deployment or contribute to outcomes to solve operation issues, policy research and advocacy, or exploration of new technologies.

Our New 3D Innovation Framework (InnoHub) to drive deployable solutions after successful proof of concept:



Funding support is available through various schemes aimed at fostering innovation and technological advancements within Singapore's land transport ecosystem, promoting collaboration across academia, industry, technology experts, and the public sector to enhance urban mobility.

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

Adaptation of AI/VA System into a mobile application

Transforming Road Inspections for Enhanced Effectiveness

In 2021, LTA initiated a proof-of-concept for an Artificial Intelligence/Video Analytics (AI/VA) system to detect and categorise road defects suited to Singapore's context. The traditional inspection methods were labour intensive and time-consuming, which became particularly challenging during COVID-19 when there was a manpower crunch. Today, the island-wide deployment of the AI/VA technology has transformed and enabled a resilient and robust road maintenance regime.

This technology has been condensed into a mobile application, enhancing the flexibility and convenience of inspections. LTA has also extended reporting of other defects detected during its operation to other agencies such as PUB, the National Environment Agency (NEA), and NParks for defects under their purview, with GPS tagging for quick response.

This project has led to a 60% increase in productivity by digitising and automating the road inspection and reporting process. It has improved the accuracy of defect detection to over 85%, bolstered resilience against potential future manpower shortages, and resulted in significant cost savings. Inspections can now be conducted more efficiently with fewer inspection vehicles deployed, saving up to 30 tonnes of CO_2 annually.

5.4 COMMUNITY ENGAGEMENT

LTA is committed to fostering collaboration with stakeholders through outreach initiatives that emphasise co-creating eco-friendly solutions and promoting sustainable transportation practices.

Our approach includes integrated campaigns, interactive educational programmes, and gamified community engagement activities that encourage greener commutes while generating excitement for new MRT lines and transport developments.

To better understand Singaporeans' travel behaviours and transportation needs, we conduct regular Household Travel Surveys. The data collected informs the design of an inclusive and efficient land transport system, shaping Singapore's transportation future.

"Take a Ride on the East Side Vibe" Campaign for TEL4 Opening



TEL4 Opening

For each new rail line opening, we set out to create an integrated and wide-reaching campaign to highlight the improved connectivity of the public transport network, promoting a car-lite lifestyle and encouraging greener commutes.

In April 2024, LTA launched a nationwide campaign comprising media, marketing, events and digital engagement to create excitement for the public to explore the new TEL4 stations. The campaign "Take a Ride on the East Side Vibe" positions taking the train as a stress-free journey, in alignment with the 'chill' and relaxed vibes synonymous with the East Coast area.

To encourage the public to visit and be familiar with the stations, we also collaborated with local companies to roll out two gamification activities spanning across all seven stations. This initiative boosted public awareness and excitement for the new stations, encouraging them to enjoy the added convenience in their daily commutes.



'OneEarth' Challenge

LTA collaborated with Living Theories, a gamification consultant, to organise the OneEarth Challenge at 15 schools, engaging nearly 6,700 students in adopting car-lite commutes through a two-week programme. The initiative educated students on sustainability and the benefits of greener commutes through interactive on-site and virtual challenges.

To celebrate the collective emission reduction efforts, a tree-planting ceremony was held in May 2024 at East Coast Park. 32 trees were planted, supporting Singapore's OneMillionTrees movement and reinforcing our commitment to a greener future.



Students engaging in the OneEarth virtual world

Tree Planting Ceremony in support of Singapore's OneMillionTrees movement

"Friendlier Roads, Happier Commutes" Exhibition



Interactive "Friendlier Roads, Happier Commutes" exhibition

To raise awareness of LTA's efforts in promoting greener commutes, the "Friendlier Roads, Happier Commutes" exhibition was launched at the Singapore Mobility Gallery in August 2023. Targeted at students aged 10 to 14, visitors learn about the evolving needs of commuters and understand how various road planning efforts are geared towards making greener commuting more accessible and inclusive, supporting the shift towards a car-lite future. Since its launch, it has welcomed over 13.000 visitors.

Complementing this initiative, LTA continues to bring the "Make the Switch: The Quest for Greener Land Transport" roving exhibit and the "Sustainability: I Have the Ability" assembly programme to primary schools. These programmes engaged over 44,000 students across 30 primary schools in 2023, fostering greater understanding of LTA's sustainability initiatives.

Car-Free Sunday 2024

After a hiatus of over four years, Car-Free Sunday returned on 17 March 2024, organised by LTA in collaboration with the Health Promotion Board (HPB), HDB, NParks, Sport Singapore (SportSG), and the Urban Redevelopment Authority (URA).

Held in the Civic District and Central Business District, the event supports Singapore's car-lite vision by closing designated roads, allowing the public to enjoy activities on the streets without vehicular traffic, raising awareness of the benefits of walking, cycling, and taking public transport as sustainable and enjoyable ways to travel.



Closure of designated roads for Car-Free Sunday

5.5 SAFETY OF OUR PEOPLE GRI 3-3, 403-1, 403-2, 403-3, 403-5, 403-6, 403-7, 403-8, 403-9

LTA prioritises the safety and well-being of our employees and contractors, recognising that a safe workplace fosters engagement, commitment, and a motivated workforce, leading to higher retention and productivity. This commitment also strengthens stakeholders' confidence in LTA's operations.

The Risk and Safety Governance Committee (RSGC) oversees the Safety Management System (SMS), ensuring its application across the full lifecycle of development projects, operations, and asset management. The RSGC reviews and approves safety performance indicators, which are tracked and reported in the Annual SHE Performance Report. This report highlights corrective and preventive measures aimed at continuously improving safety, health, and environmental performance.

TARGET	FY2023 PERFORMANCE
Accident Frequency Rate (AFR)	AFR of 0.40
of <0.44 at LTA Project Sites	

Our Safety, Health, and Environmental Management System (SHEMS)

The SHEMS covers all LTA construction worksites, including workers, project management teams and Qualified Persons. The Construction Safety & Health (CSH) and Environmental Protection & Sustainability (EP&S) divisions, staffed by registered Workplace Safety & Health Officers (WSHO) and environmental engineers, oversee SHEMS implementation.

We comply with local legislation, Enterprise Singapore Standards and Codes of Practices, SS ISO 45001:2018 (Occupational Health & Safety Management Systems), and SS ISO 14001:2015 (Environmental Management Systems). Our Project Safety Review (PSR) framework ensures the identification and mitigation of major civil hazards at every project stage. Annual internal audits at selected worksites reinforce compliance and support continuous improvement.



Our Safety Management Systems, Processes and Procedures

Identification and Assessment Refraining from Work in of Work-Related Hazards

Contractors are required to conduct and submit Risk Assessments (RAs). incorporating the hierarchv of controls, for LTA's review and approval.

RAs are reviewed every three years or fit for duty. after significant changes or incidents. Hazards and mitigation measures are communicated to workers during daily toolbox meetings to ensure awareness and compliance.

Reporting of Hazards and Hazardous Situations

Workers are encouraged to report Near Miss (NM) situations to their supervisors to support proactive safety management. A no-blame policy and whistle-blowing scheme are in place to ensure open and transparent reporting. To further promote this culture, monthly safety events are held to reward and recognise NM reporting efforts.

Dangerous Situations

Workers are empowered to refuse hazardous work without fear of reprisals for voicing safety concerns. Additionally, daily health checks are conducted during toolbox meetings to ensure workers are

Investigation of Work-Related Incidents

Incident investigations are conducted by the CSH and EP&S Divisions, and project teams to identify root causes and implement suitable corrective and preventive actions.

Work-related Injuries and Fatalities



Participants of 6th LTA Safety Retreat pledging their support for ZAP 2.0

In FY2023, three fatalities occurred at LTA worksites from failures to follow established safe work procedures. The first involved a rigger who failed to maintain a safe distance during a lifting operation, resulting in an oxygen gas cylinder toppling onto him. The second involved a new worker falling from height from an unsecured work platform. The last accident involved a concrete pump operator being crushed by a retracting outrigger of a concrete pump truck.

In response to the high number of highconsequence work-related injuries and fatalities, LTA held our 6th Safety Retreat on 22 April 2024, attended by over 340 participants, including senior

management from key contractors. The retreat emphasised the importance of contractors' responsibilities in safeguarding workers, particularly amid increased worksite activity and the growing number of new workers.

Leading up to the retreat, workgroups comprising LTA and contractor representatives were formed to address challenges such as poor supervision and insufficient safety knowledge among new workers. Their proposed initiatives, accepted during the retreat, will be incorporated into the Zero-Accident Action Plan 2.0 (ZAP 2.0) to further strengthen LTA's worksite safety management.

Leveraging Innovative Technologies to Enhance Safety

Digital Twin Technology to Eliminate Risk of Falling from Height

Conventional ceiling surveys in rail stations often require scaffolding for high void areas, exposing workers to risks of falling from height. To eliminate these hazards, LTA worked with our contractors to adopt the Digital Twin technology and replicate ceiling designs in computer-aided design (CAD) drawings with accurate dimensions to ease design planning.

This innovation removes the need for scaffolding, eliminating risks associated with working at height. This has also enhanced productivity, reducing survey manhours by 80% compared to the conventional approach.



Use of Digital Twin technology to replicate ceiling designs in CAD drawings



Installation of Fatigue Management System on Tower Cranes

Use of Fatigue Management System for Tower Cranes

To mitigate the hazards of fatigue, which can impair reactions and increase the risks of accidents such as load drops and crane toppling, LTA implemented a Fatigue Management System for tower crane operators.

This system has significantly improved operators' alertness and focus, reducing the likelihood of incidents. It has also enhanced morale and job satisfaction while improving overall productivity. By minimising the need to rush tasks, the system ensures that safety remains a priority.

Raising Safety Awareness

All workers must complete and pass the contractor's in-house safety induction training before starting work onsite. Tasks are assigned to new workers only after they have completed safety training specific to their duties. At the end of the training, workers are assessed to demonstrate their competency in the assigned work activities.

Annual Safety, Health and Environmental Awards Convention (ASAC)



Winners at the 25th ASAC in 2023

The ASAC, inaugurated in 1999, recognises contractors who excel in promoting Workplace Safety and Health management practices, maintaining high safety standards for workers, and giving due consideration to protect the public and the environment. At the 25th ASAC in 2023, LTA recognised 42 organisations for their outstanding workplace safety, health, and environmental management practices.

Promotion of Employee Health

LTA prioritises the health and wellbeing of our staff by addressing both occupational and non-occupational health needs.

Voluntary health promotion services to address major non-work-related health risks:

- Key programmes to enhance employees' health:
- Healthy Food Options: Providing nutritious meal choices in our cafeteria
- Stress Reduction Programmes: Implementing initiatives to minimise workplace stress and support mental health
- Gym and Fitness Programmes: Offering access to fitness facilities and programmes

- Sports and Recreational Interest Groups: Activities such as dragon boat racing and badminton promote physical activity and strengthen staff connections
- Fitness Classes: Regular sessions like Zumba, yoga, and kickboxing cater to diverse fitness interests and encourage participation
- Holistic Development: Classes on topics like Korean language, violin, and guitar playing support personal growth, social interaction, and overall well-being

Access to Medical and Healthcare Services

LTA facilitates access to essential medical services through various initiatives:

- Annual Health Screenings: Conducted at all LTA offices, these screenings enable early identification of potential health issues
- Flu Vaccination Programme: Offered to all staff to minimise influenza risks and promote a healthier workplace
- Well-being@Gov Programme: Launched in May 2024, this initiative provides self-help resources, wellness screening tools, and coaching support across areas such as behavioural health, nutrition, fitness, and financial management

These services are accessible to all LTA employees, including permanent staff, local contract staff, re-employed staff, temporary contract staff, seconded officers, and interns.



Well-being@Gov event at Hampshire Office

5.6 INTEGRITY, ETHICS AND COMPLIANCE GRI 3-3, 2-16, 2-23, 2-24, 2-26, 2-27, 205-1

S PERFORMANCE
employees have received ation on anti-corruption es and procedures
6

As a government agency, LTA is committed to maintaining public trust through integrity, transparency, and accountability. We uphold a zerotolerance policy towards fraud and rigorously investigate allegations with fairness and objectivity. In FY2023, LTA recorded zero confirmed incidents of corruption and no significant instances of non-compliance with laws or regulations resulting in fines or sanctions.

Our operations are guided by policies that reflect our commitment to ethical conduct, including LTA's Code of Conduct, Whistle-Blowing Policy, AntiHarassment Policy, Anti-Bribery Policy, and Due Diligence Policy, all of which are accessible by employees via the intranet.

The Whistle-Blowing Committee oversees reporting channels and investigations of fraudulent activity or improper conduct, ensuring adherence to the principles of the Whistle-Blowing Policy. To further reinforce our values, an annual declaration exercise requires employees to affirm their understanding and compliance with LTA's Code of Conduct. Non-compliance or false declarations result in disciplinary action.

Strengthening our Anti-Bribery Measures



In 2022, LTA began developing an Anti-Bribery Management System (ABMS) with the aim of attaining ISO 37001:2016 certification by July 2024, making us the first statutory board to achieve this feat. To steer our efforts, we have established a governance structure that includes the formation of an Anti-Bribery Compliance Function within the organisation.

Bribery and Corruption Risk Assessment Workshop

So far, we have conducted foundational training for nominated ABMS champions and are in the process of developing and implementing an ABMS Framework across LTA. Through this Framework, LTA aims to conduct regular bribery risk assessments by reviewing the potential bribery risks faced by each organisational function and the measures to mitigate those risks. This year, as part of our preparation for certification, we assessed and identified ten key touchpoints with higher bribery risks.

5.7 EMPLOYEE ENGAGEMENT AND DEVELOPMENT GRI 2-23, 2-25

Key elements from Public Service Division (PSD)'s Human Resource (HR) Framework adopted by LTA:

- Meritocracy in appointment and selection;
- 4. Impartiality and incorruptibility;
- 5. Flexible and clean wages; and
- 2. Fairness and objectivity in appraisal;
- 3. Performance-driven reward and recognition;
- 6. Transparency in
 - employment benefits.

Membership Associations

LTA collaborates closely with membership associations and unions to enhance employee welfare and stay informed on workforce trends. The Union committee, part of the National Trades Union Congress (NTUC), includes a representative who actively consults with LTA to review and update policies for effective HR management.

Additionally, LTA participates in the PSD monthly forum, which brings together HR leaders across WOG to discuss and advance a broad range of HR matters, ensuring alignment with evolving workforce needs.

Employee Grievance Mechanisms and Policies

LTA provides multiple confidential channels to address employee grievances effectively. Staff can use the HR Confidential email for sensitive issues or approach their HR business partner for direct support. We work closely with our Union Committee to address grievances that require HR's attention.

LTA's no-wrong-door policy ensures that all grievances are routed to the appropriate HR personnel for resolution. Employees also have the option to escalate concerns to senior management, including the Chief Executive. Additionally, we actively gather feedback from staff and the Union to refine processes and enhance grievance handling and management.

5.7.1 EMPLOYEE ENGAGEMENT PROGRAMMES

LTA drives employee engagement through programmes aligned with our employee value proposition, focusing on connecting employees with our corporate direction, core values, and employer brand.

To gauge engagement levels, we conduct employee surveys, analyse the results, and develop targeted strategies to address concerns. Additionally, we organise communication campaigns, programmes, and events to strengthen employee connection and engagement, ensuring alignment with organisational goals.

Employee Feedback

LTA actively seeks employee feedback to understand their needs and address concerns. To gauge employee engagement levels and identify improvement opportunities across key areas such as well-being, teamwork, leadership and career development, LTA conducts:

(a) Biennial Employee Engagement Surveys (EES), which assess employee satisfaction and capture ground sentiments.

(b) Regular Pulse Surveys, which provide a quick assessment of organisational health and collect interim feedback on actions taken following the results of the EES.

These surveys are essential tools for understanding what motivates LTA staff and ensuring they remain engaged and committed to their roles.

Building an Internal Green Culture

LTA actively engages staff on sustainability topics by organising brown bag sessions and learning journeys, aiming to inspire greener habits and behaviours in both daily life and work. In FY2023, LTA hosted five brown bag sessions attended by over 700 public officers, covering topics such as the link between waste generation and climate change. Additionally, more than 500 LTA staff participated in learning journeys to locations like e-waste recycling facilities, floating solar farms, and community gardens.

To further promote sustainability, LTA incorporates visible nudges in our workplace environment. At the Hampshire Office, vibrant art murals encourage environmentally friendly habits and greener commuting choices with lower carbon footprints. Floor markings were also added to create a green trail around the office premise, guiding staff through various gardens and enhancing their appreciation for nature.

To encourage season parking holders to reduce car use and opt for public transport, LTA triples the season parking rates at office premises on designated 'car-lite days' held twice a month. Since 2022, this initiative has led to a significant decrease of up to 90% in the number of cars in our carparks on these car-lite days, highlighting its effectiveness in promoting sustainable commuting habits.



Launch of wall mural in Hampshire Office

5.7.2 EMPLOYEE DEVELOPMENT OPPORTUNITIES

We are committed to building staff competencies, reinforcing staff career development, and nurturing leadership. We implement targeted interventions to support employee development initiatives effectively. Employees have continuous learning opportunities at work as we aim to enhance access to career training, development information, and resources to support their growth.

Deepening Knowledge and Curiosity with Learning FriYAY

In April 2023, LTA's Learning Office launched Learning FriYAY, an event held on the first Friday of every month for our staff to dedicate time from their work schedules for learning and empower staff to take ownership of their learning.

This initiative consists of two components: a 2-hour protected time slot for self-directed learning, and webinar-style

sharing sessions on topics curated to meet the diverse learning needs of staff across LTA. The webinars have drawn significant interest, with close to 4,000 sign-ups in FY2023.



Chit-Chat@Learning FriYAY in May 2023

5.7.3 EMPLOYEE VOLUNTEERISM

At LTA, we actively promote a culture of volunteerism and corporate social responsibility (CSR), encouraging staff to participate in initiatives that support inclusive mobility and address the diverse needs of our communities.

Our CSR efforts are encapsulated in the LTA Cares programme

LTA Cares: Moving People, Enabling Communities

- Utilise our organisational strengths to create positive societal impact and foster an active internal community
- Improve our ability to attract, engage, and retain a committed and skilled workforce
- Provide our staff with opportunities to give back and develop their skills through volunteering
- Encourage employees to take ownership and lead in areas that they are passionate about

LTA's commitment to CSR is exemplified by our annual contributions exceeding \$\$300,000 to the SHARE Auto-Inclusion Scheme since 2017. This ongoing support earned us the Charity Platinum Award at the Community Chest Awards 2023. The SHARE programme, funded by monthly contributions from our staff, provides vital support for vulnerable groups, including children with special needs and the elderly.

We have also sustained and strengthened our partnership with SPD, a local charity supporting individuals with disabilities, since 2014. In 2023, LTA participated in the Corporate Volunteering Pilot (Project V), supporting SPD's Day Activity Centre Without Walls programme, with 140 staff volunteering as Outing Facilitators. Today, our volunteer network has grown to roughly 300 regular volunteers, reflecting our commitment to volunteerism and meaningful community engagement.



SPD Outing to Clementi Sports Hall in October 2023



6.1 REPOSITORY OF LINKS GRI 2-23

6.1.1 LTA LINKS

6.1.2 LTA POLICIES

- LTA Annual Report 2023/24
- LTA Financial Statement 2023/24
- Land Transport Master Plan 2040
- <u>Whistle Blowing Policy</u>
- <u>Anti-Bribery Policy</u>
- Environmental Policy Statement
- <u>Safety and Health Policy Statement</u>
- <u>Service Charter</u>
- <u>Code of Conduct for LTA's</u>
 <u>Procurements Suppliers' Guide</u>

6.2 DATA TABLES

BUILDING A GREENER FUTURE

Road Infrastructure Emissions and Environmental Data (GRI 2-4, 302-1, 302-3, 305-1, 305-2, 305-4)

Electricity Consumption from Tunnel, Traffic and Street Lighting						
	FY2021	FY2022	FY2023			
Total electricity consumption (kWh)	108,538,907.0	99,934,895.0	95,942,822.0			
Road tunnels lighting - energy intensity (kWh/km)	32,401.4	32,228.2	32,228.2			
Island-wide traffic lighting - energy intensity (kWh/traffic light)	1,145.4	1,126.9	1,095.6			
Island-wide street lighting - energy intensity (kWh/street light)	582.7	505.4	465.0			
GHG Emissions from Tunnel, Traffic and Street Lighting						
Scope 2 emissions (tCO₂e)	44,262.2	40,753.5	39,989.0			
Fuel Consumption from Road Tunnel Cleaning Vehicles and Tow Trucks						
Total fuel consumption (TJ)	-	16.9 ¹⁰	17.6			
Energy intensity (TJ/km)	-	0.01510	0.016			
GHG Emissions from Road Tunnel Cleaning Vehicles and Tow Trucks						
Scope 1 emissions (tCO ₂ e)	-	1,268.810	1,321.3			
Scope 1 emissions intensity (tCO ₂ e/km)	-	1.1310	1.18			

¹⁰ Restatements were made to previous year's data to reflect higher data accuracy after reviewing data tracking and reporting processes

Asset management for Environmental Impact Control (GRI 301-1, 301-2)					
Type of non-renewable materials					
	CY2021	CY2022	CY2023		
Total OPC concrete (consists of Grade < 20, 20, 25, 30, 35, 40, 50 and > 50) - Total weight (kt)	2,799.7	1,886.8	3,883.3		
Total GGBS concrete (consists of Grade < 20, 20, 25, 30, 35, 40, 50 and > 50) - Total weight (kt)	1,096.8	656.5	1,672.3		
Total steel - Total weight (kt)	324.5	349.8	4,103.7		
Total mortar (consists of Grade MM 0.5, 0.7, 1.5, 3, 5, 7.5) - Total weight (kt)	1.3	3.2	26.7		
Total asphalt - Total weight (kt)	86.4	208.7	132.7		
Total diesel - Total weight (kt)	21.7	30.1	37.3		
Recycled input materials used					
Percentage of recycled input materials used (%)	-	0.53	0.31		

GOVERNING AN EXCELLENT ORGANISATION					
Emissions and Environmental Data at LTA Premises (GRI 2-4, 302-1, 302-3, 305-1, 305-2, 305-4)					
	Baseline	FY2021	FY2022	FY2023	
Energy Utilisation Index (EUI) (kWh/sqm)	202.5 ¹⁰	181.9 ¹⁰	171.0 ¹⁰	147.9	
Electricity Consumption from LTA Premises					
Electricity consumption (kWh)	18,729,503.0	16,819,914.1	15,812,335.3	13,676,583.9	
Energy intensity (kWh/sqm)	202.510	181.9 ¹⁰	171.O ¹⁰	147.9	

¹⁰ Restatements were made to previous year's data to reflect higher data accuracy after reviewing data tracking and reporting processes

GHG Emissions from LTA Premises							
	FY2021			FY2022		FY2023	
Scope 2 emissions (tCO ₂ e)	6,859.2 ¹⁰	6,448.3 ¹⁰		5,700.4			
Scope 2 emissions intensity (tCO ₂ e/sqm)	0.07410		0.	0.070 ¹⁰		0.062	
Fuel Consumption from Corporate Vehicles							
Fuel consumption from corporate vehicles (GJ)	2,248.5 ¹⁰		3,1	IO2.7 ¹⁰		2,753.2	
Fuel consumption from corporate vehicles - energy intensity (GJ/km)	0.002710		0.0	0034 ¹⁰		0.0033	
GHG Emissions from Corporate Vehicles							
Scope 1 emissions (tCO ₂ e)	164.710			226.4 ¹⁰		199.2	
Scope 1 emissions intensity (tCO ₂ e/km)	0.0002010		0.0002510		c	0.00024	
Water Management (GRI 303-5)							
	Baseline FY2021 FY2022				FY2023		
Water consumption (L)	84,368,170.0 39,54		39,544,000.0 53,289,000		0	71,031,520.0	
Water Efficiency Index (WEI) (L/person/day)	61.6	2	29.1 38.2			50.6	
Waste Management (GRI 306-3, 306-4, 306-5)							
	FY2021 FY		FY2022		Y2023		
Total waste (kg)	102,098.3		257,795.0		2	84,410.0	
Waste directed to incineration (kg)	99,078.3		254,834.0		2	82,188.0	
Waste recycled (kg)	3,020.0 2		2,961.0			2,222.0	
	Base	line			FY202	3	
Waste Disposal Index (WDI) (kg/person/day)	0.18 0.20				0.20		

¹⁰ Restatements were made to previous year's data to reflect higher data accuracy after reviewing data tracking and reporting processes

Safety of Our People (GRI 403-9)		
Accident Frequency Rate at Project Sites		
	FY2022	FY2023
Accident Frequency Rate (AFR)	0.41	0.40
Number and Rate of Recordable Injuries		
Recordable Injuries of Employees at LTA Premises		
	FY2	2023
	Number	Rate
High-consequence work-related injuries	4	0.30
Fatalities	0	0.00
Hours worked	13,206	,025
Main type of injuries	Bruises a	nd cuts
Recordable Injuries of Workers at Project Sites		
	Number	Rate
Recordable work-related injuries	118	0.90
High-consequence work-related injuries	50	0.38
Fatalities	3	0.02
Hours worked	130,88	30,324
Main type of injuries	Abrasions, cuts, bruise	s, sprains, and fractures

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Integrity, Ethics and Compliance (GRI 205-2, 205-3)			
Employees who received communication about anti-corruption policies and p	rocedures		
	FY2021	FY2022	FY2023
Non-Executive (Support) - Number and %	-	1,387 (100%)	1,289 (100%)
Executive (Executive to Senior Manager) - Number and %	-	4,767 (100%)	5,063 (100%)
Middle Management to Senior Management (VP and above) - Number and %	-	359 (100%)	398 (100%)
Employees that received training anti-corruption			
Non-Executive (Support) - Number and %	-	245 (17.66%)	187 (14.51%)
Executive (Executive to Senior Manager) - Number and %	-	624 (13.09%)	741 (14.64%)
Middle Management to Senior Management (VP and above) - Number and %	-	45 (12.53%)	59 (14.82%)
Confirmed incidents of corruption and actions taken			
Total number of confirmed incidents of corruption	0	0	0
Total number of confirmed incidents in which employees were dismissed or disciplined for corruption	0	0	0
Total number of confirmed incidents when contracts with business partners were terminated or not renewed due to violations related to corruption	0	0	0
Public legal cases regarding corruption brought against the organisation or its employees	0	0	0

Employee Engagement and Development (GRI 2-7, 2-8)						
Profile of Employees and Workers						
	FY	2021	FY2	022	FY2	2023
	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
Breakdown of LTA Employees by Employment Type		-				
Permanent and fixed-term contract employees	4,115 (60.9%)	2,595 (38.4%)	4,057 (61.2%)	2,542 (38.4%)	4,115 (61.0%)	2,600 (38.5%)
Temporary employees	20 (0.3%)	24 (0.4%)	13 (0.2%)	13 (0.2%)	15 (0.2%)	20 (0.3%)
Total	6,754 (100%)		6,625 (100%)		6,750 (100%)	
Breakdown of LTA Employees by Employment Type			•			
Full-time employees	4,127 (61.1%)	2,609 (38.6%)	4,055 (61.2%)	2,549 (38.5%)	4,116 (61.0%)	2,612 (38.7%)
Part-time employees	8 (0.1%)	10 (0.1%)	15 (0.2%)	6 (0.1%)	14 (0.2%)	8 (0.1%)
Total	6,754	6,754 (100%)		6,625 (100%)		(100%)
Number of Workers						
Total Number of Workers	28	28,104		34,903		392
Total Manhours worked	88,8	72,324	110,2	2,682	130,88	80,324

6.3 DEFINITIONS AND METHODOLOGIES GRI 2-7, 2-8, 302-3, 303-5, 305-1, 305-2, 305-4, 306-3, 306-4, 306-5, 403-9

ENVIRONMENTAL

Greenhouse Gas (GHG) Emissions

GHG definition and boundary: GHG emissions refer to gases that contribute to the greenhouse effect by absorbing infrared radiation. LTA adopts the use of the GHG Protocol Corporate Accounting and Reporting Standard and accounts for our direct (Scope 1) and indirect (Scope 2) GHG emissions using the operational control approach. Global Warming Potential (GWP) values are sourced from the 2014 IPCC Fifth Assessment Report (AR5). GHG included in the calculations are CO_2 , CH_4 and N_2O .

- **Direct (Scope 1) GHG emissions:** GHG emissions from combustion of fuel used for vehicles and equipment owned by LTA or under LTA's operational control.
- Indirect (Scope 2) GHG emissions: GHG emissions that result from the generation of purchased electricity used for leased spaces. A location-based method is adopted to reflect the average emissions intensity of the national grid on which energy consumption occurs. For consistency, the grid emission factor (GEF) used for the reporting year is sourced from the latest published factor at the time of publication, from the Singapore Energy Statistics (SES), the Energy Market Authority's (EMA) annual publication on energy statistics in Singapore: The GEF utilised for FY2021 and FY2022 was 0.4078 kgCO₂/kWh. For FY2023, we have updated this value to 0.4168 kgCO₂/kWh based on the latest available data from EMA.

Energy

• EUI is calculated using the following formula:

Total electricity used in Year X

Total gross floor area in Year X

Water

• WEI is calculated using the following formula:

Total water used in Year X

No. of operational days in Year X × (Avg. no. of employees per day + 0.25 (Avg. no. of visitors per day)) in Year X

Waste

• WDI is calculated using the following formula:

Total waste disposed in Year X

No. of operational days in Year X × (Avg. no. of employees per day + 0.25 (Avg. no. of visitors per day)) in Year X

Intensity Ratios

• Definition: intensity ratios define resource consumption or emissions in the context of a specific metric.

Energy Intensity Ratios

- Electricity consumption from LTA premises (kWh/sqm): square meters of total gross floor area is used as the denominator
- Road tunnels lighting (kWh/km): road lane of expressways is used as the denominator
- Island-wide traffic lighting (kWh/traffic light): number of traffic lights is used as the denominator
- Island-wide street lighting (kWh/street light): number of street lights is used as the denominator
- Fuel consumption from corporate vehicles (GJ/km): total distance travelled by corporate vehicles is used as the denominator (same denominator is used for emission intensity)
- Fuel consumption from road tunnel cleaning vehicles and tow trucks (GJ/km): road lane of expressways is used as the denominator (same denominator is used for emission intensity)

Materials

- Recycled materials definition: materials being removed from site for off-site recycling. The removed materials include site office waste (paper, plastic, aluminium and glass) as well as site waste (demolished concrete and steel).
- Measurement methodology for weight of recycled materials: estimated by multiplying the number of truck loads taken to remove the materials with the assumed weight of one truck load of materials.
- Measurement methodology for percentage of recycled input materials: calculated by dividing total recycled input materials used with total input materials used, multiplied by 100.

SOCIAL

- Employee definition: employees are individuals who are in an employment relationship with LTA.
- Worker definition: 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.
- The total number of employees and workers are compiled as of the end of the reporting period (i.e., 31 March 2024).

Safety Performance

- Accident Frequency Rate (AFR) definition: the rate of accidents with >3 days MC normalised over the total manhours worked annually.
- AFR is calculated using the following formula:

No. of accidents (>3 days MC) x 1,000,000

Total no. of manhours worked

- Recordable work-related injuries are any work-related injuries that results in injury or ill health
- Rate of recordable work-related injuries is based on the following formula:

No. of recordable work-related injuries x 1,000,000

Total no. of manhours worked

- High-consequence work-related injuries are reportable injuries with >3 days MC but exclude fatalities
- Rate of high-consequence work-related injuries is based on the following formula:

No. of high-consequence work-related injuries x 1,000,000

Total no. of manhours worked

• Rate of fatalities is based on the following formula:

No. of fatalities x 1,000,000

Total no. of manhours worked

6.4 GRI CONTENT INDEX

LTA has reported in accordance with the GRI Standards for the period 1 April 2023 to 31 March 2024.					
GRI 1 used	GRI 1: Foundation 2021				
GRI 2021 STANDARDS	DESCRIPTION	SECTION OF REPORT / REASONS FOR OMISSION	PAGE REFERENCES		
GRI-2: Gene	ral Disclosures (2021)				
1. The organ	isation and its reporting practices				
2-1	Organisational details	Introduction to LTA	3		
2-2	Entities included in the organisation's sustainability reporting	About this Report	5		
2-3	Reporting period, frequency and contact point	About this Report	5		
2-4	Restatements of information	Road Infrastructure Emissions and Environmental Data, LTA Premise Emissions and Environmental Data, Data Tables	31, 40, 42, 61-63		
2-5	External assurance	About this Report	5		
2. Activities	and workers				
2-6	Activities, value chain and other business relationships	Introduction to LTA LTA's supply chain includes consultancy (civil and E&M), rail (civil), roads and commuter infrastructure, E&M rail systems, E&M traffic systems, and E&M services. LTA's downstream entities include bike share operators, rail operators, public bus operators, private bus operators, private hire car and other operators, and taxi operators. LTA has no other relevant business relationships.	3		
2-7	Employees	Data Tables, Definitions and Methodologies	66, 69		
2-8	Workers who are not employees	Data Tables, Definitions and Methodologies	66, 69		

GRI 2021 STANDARDS	DESCRIPTION	SECTION OF REPORT / REASONS FOR OMISSION	PAGE REFERENCES	
3. Governance				
2-9	Governance structure and composition	Our Sustainability Approach Composition of the highest governance body and its committees includes sensitive information of business affairs and are not to be disclosed due to confidentiality reasons.	8	
2-10	Nomination and selection of the highest governance body	The LTA Board consists of members who collectively offer essential skills in areas such as engineering, urban planning, finance, law, media, and union representation. Endorsed by the Singapore Cabinet, the Board follows LTA's Code of Board Governance, ensuring they perform their responsibilities with expertise and diligence.		
2-11	Chair of the highest governance body	Annual Report	Annual Report: 5, 11	
2-12	Role of the highest governance body in overseeing the management of impacts	Our Sustainability Approach	8	
2-13	Delegation of responsibility for managing impacts	Our Sustainability Approach	8	
2-14	Role of the highest governance body in sustainability reporting	Our Sustainability Approach	10-11	
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	Integrity, Ethics and Compliance This includes sensitive information of business affairs and are not to be disclosed due to confidentiality reasons.	55	
2-17	Collective knowledge of the highest governance body	Our Sustainability Approach	8	
2-18	Evaluation of the performance of the highest governance body			
2-19	Remuneration policies	This includes sensitive information of business affairs and are not to be disclosed due to confidentiality reasons.		
2-20	Process to determine remuneration			
2-21	Annual total compensation ratio			

GRI 2021 STANDARDS	DESCRIPTION	SECTION OF REPORT / REASONS FOR OMISSION	PAGE REFERENCES		
4. Strategy, policies and practices					
2-22	Statement on sustainable development strategy	Message from Our Chairman	6-7		
2-23	Policy commitments	Integrity, Ethics, and Compliance, Employee Engagement and Development, Repository of Links LTA's policy commitments are approved at different levels, with broader policies requiring endorsement by the relevant ministries, while internal operational policies are approved by the Chief Executive.	55, 56, 60		
2-24	Embedding policy commitments	Integrity, Ethics, and Compliance	55		
2-25	Processes to remediate negative impacts	Employee Engagement and Development	56-57		
2-26	Mechanisms for seeking advice and raising concerns	Integrity, Ethics, and Compliance	55		
2-27	Compliance with laws and regulations	Integrity, Ethics, and Compliance	55		
2-28	Membership associations	 Advanced Remanufacturing and Technology Centre (ARTC) Anchor Member Intelligent Transportation Society (ITS) Singapore Member International Association of Public Transport (UITP) Member Singapore Standards Council (SSC) Member World Road Association (PIARC) Member 			
5. Stakeholder engagement					
2-29	Approach to stakeholder engagement	Our Sustainability Approach	9		
2-30	Collective bargaining agreements	60% of LTA's employees are covered by a Collective Agreement. As a Statutory Board, LTA adheres to public service policies and procedures for most employment terms. Nevertheless, staff benefits and welfare are negotiated and mutually agreed upon with the Union, Amalgamated Union of Statutory Board Employees (AUSBE), under the Collective Agreement, benefiting all employees.			
GRI 2021 STANDARDS	DESCRIPTION	SECTION OF REPORT / REASONS FOR OMISSION	PAGE REFERENCES		
--	--	---	------------------------	--	--
GRI 3 (2021): Material Topics					
3-1	Process to determine material topics	Our Sustainability Approach	10-11		
3-2	List of material topics	Our Sustainability Approach	10-11		
Material Topic: Inclusivity and Accessibility					
3-3	Management approach	Inclusivity Features of Public Transport, Inclusivity for Road Users	27, 38		
Material Top	ic: Asset Management				
3-3	Management approach	Asset Management for Environmental Impact Control	32-35		
301-1	Materials used by weight or volume	Data Tables	62		
301-2	Recycled input materials used	Data Tables	62		
Material Topic: Climate Change and Operational Environment Impact Management					
3-3	Management approach	Land Transport Emissions Profile, LTA Premise Emissions and Environmental Data	13-14, 40-44		
302-1	Energy consumption within the organisation	Road Infrastructure Emissions and Environmental Data, LTA Premise Emissions and Environmental Data, Data Tables	29-31, 40-42, 61-63		
302-3	Energy intensity	LTA Premise Emissions and Environmental Data, Data Tables, Definitions and Methodologies	40, 61-63, 67-68		
303-1	Interactions with water as a shared resource	LTA Premise Emissions and Environmental Data	42		
303-5	Water consumption	LTA Premise Emissions and Environmental Data, Data Tables, Definitions and Methodologies	42, 63, 67		
305-1	Direct (Scope 1) GHG emissions	Data Tables, Definitions and Methodologies	61-63, 67		

GRI 2021 STANDARDS	DESCRIPTION	SECTION OF REPORT / REASONS FOR OMISSION	PAGE REFERENCES	
305-2	Energy indirect (Scope 2) GHG emissions	Data Tables, Definitions and Methodologies	61-63, 67	
305-4	GHG emissions intensity	Data Tables, Definitions and Methodologies	61-63, 67-68	
306-1	Waste generation and significant waste-related impacts	LTA Premise Emissions and Environmental Data	43-44	
306-2	Management of significant waste-related impacts	LTA Premise Emissions and Environmental Data	43-44	
306-3	Waste generated	LTA Premise Emissions and Environmental Data, Data Tables, Definitions and Methodologies	43, 63, 68	
306-4	Waste diverted from disposal	LTA Premise Emissions and Environmental Data, Data Tables, Definitions and Methodologies	43, 63, 68	
306-5	Waste directed to disposal	LTA Premise Emissions and Environmental Data, Data Tables, Definitions and Methodologies	43, 63, 68	
Material Topic: Financial Stewardship				
3-3	Management approach	Financial Stewardship	45	
201-1	Direct economic value generated and distributed	Please refer to our Annual Report for the Financial Highlights of this financial year. LTA reports a Statement of Comprehensive Income.		

GRI 2021 STANDARDS	DESCRIPTION	SECTION OF REPORT / REASONS FOR OMISSION	PAGE REFERENCES		
Material Topic: Safety of Commuters and Our People					
3-3	Management approach	Safety of Commuters and Public Transport Workers, Safety of Road Users, Safety of Our People	25-26, 37, 50-54		
403-1	Occupational health & safety management system	Safety of Our People	50		
403-2	Hazard identification, risk assessment and incident investigation	Safety of Our People	51		
403-3	Occupational health services	Safety of Our People	50-53		
403-5	Worker training on occupational health & safety	Safety of Our People	53		
403-6	Promotion of worker health	Safety of Our People	54		
403-7	Occupational health and safety impacts directly linked by business relationship	Safety of Our People	50		
403-8	Workers covered by an occupational health and safety management system	Safety of Our People	50		
403-9	Work-related injuries	Safety of Our People, Data Tables, Definitions and Methodologies Information on recordable work-related injuries of employees is unavailable as LTA currently tracks high-consequence work- related injuries with >3 days MC and fatalities. LTA will refine incident tracking processes to include minor injuries with <3 days MC and report recordable work-related injuries in future reports.	50, 64, 69		
416-1	Assessment of the health and safety impacts of product and service categories	LTA has assessed the health and safety impacts for improvement in our significant product and service categories where relevant			
416-2	Incidents of non-compliance concerning the health and safety impacts of products and services	LTA has not identified any non-compliance with regulations or voluntary codes			

GRI 2021 STANDARDS	DESCRIPTION	SECTION OF REPORT / REASONS FOR OMISSION	PAGE REFERENCES	
Material Topic: Integrity, Ethics and Compliance				
3-3	Management approach	Integrity, Ethics and Compliance	55	
205-1	Operations assessed for risks related to corruption	Integrity, Ethics and Compliance	55	
205-2	Communication and training about anti-corruption policies and procedures	Data Tables LTA's Code of Conduct sets out the key principles underlying the behaviour expected of all public officers, including the prevention of fraud and corruption. All LTA employees are to affirm their understanding and compliance with LTA's Code of Conduct through an annual declaration exercise.	65	
205-3	Confirmed incidents of corruption and actions taken	Data Tables	65	





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