

GREENGOV.SG REPORT FOR FINANCIAL YEAR 2023



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Ministry of Sustainability and the Environment

Environment Building

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We would like to extend our appreciation to public sector officers from all Ministries and agencies for their support, as well as organisations and individuals who contributed their feedback and suggestions to this report.

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ENQUIRIES

For any questions or feedback on the report, please email MSE_Feedback@mse.gov.sg.

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FOREWORD

“We need to act today, take incremental steps, in order to preserve our way of life for tomorrow.”

Grace Fu

Minister for Sustainability and the Environment and
Minister-in-Charge of Trade Relations

Climate change is real, and its impact can be felt all over the world today. 2014 to 2023 was the warmest decade recorded for Singapore. 2023 alone saw 37 high heat stress days where the wet bulb globe temperature was equal to or more than 33°C. Singapore's Third National Climate Change Study ("V3") published in January 2024, projected the various impacts of climate change on Singapore, including rising sea levels, rainfall patterns, and intense dry spells. These impacts can significantly affect our livelihoods, worsen resource scarcity and public health at a national level, and threaten our viability as a nation. If we do not act now, our children and our children's children will have to face an even harsher world than it already is today.

Acting fast is therefore paramount, to preserve what we have built, and to build a more sustainable Singapore for future generations. As a nation, we have committed to reduce our emissions to around 60 million tonnes of CO₂ equivalent in 2030 after peaking our emissions earlier, and to achieve net zero emissions by 2050. We are taking immediate action to green our buildings, transport and utilities infrastructure, while continuously exploring and developing new measures, and harnessing the latest technological developments such as carbon capture and storage.

Global collaboration is crucial to tackle climate change. We work with like-minded partners to amplify our efforts and impact on the international stage, such as participating actively at climate negotiations, and partnering other countries to develop robust carbon markets in compliance with Article 6 of the Paris Agreement. To this end, we have signed Implementation Agreements



with Papua New Guinea and Ghana on carbon credits cooperation, and we are pushing forward with operationalising these agreements. We are in continued discussions with other countries to cooperate on carbon credits.

Beyond these, the public sector is pushing ahead in its sustainability efforts to meet our net zero target around 2045. We are striving to do better, building on earlier efforts, and seeking partnerships with the community and private sector to achieve greater impact.

This second GreenGov.SG report expands on our first report published in 2023 by incorporating waste data, and providing further granularity of the categorisation of our facilities to better contextualise the public sector's resource footprint. The reporting journey is a continuous one of progress and improvement. In this vein, we have shared some of the challenges we faced and our experiences, which we hope are useful to organisations or groups looking to implement sustainability strategies. We have also included details of the public sector's performance against environmental sustainability targets, strategies and case studies to facilitate learning by other organisations.

The public sector's efforts alone are not enough. For these to bear fruit, everyone – corporates, community groups and individuals alike – will need to do their part as well, to help build a sustainable Singapore for tomorrow.

ABOUT THIS REPORT

This report details the environmental performance of the public sector as an entity, specifically covering the environmental parameters of emissions, energy, water and waste, for the Financial Year ("FY") 2023 running from 1 April 2023 to 31 March 2024.¹ It covers the Singapore public sector and its assets in Singapore, including office buildings, healthcare facilities, schools, public utilities installations, and public transport infrastructure and vehicles.

This report does not aim to disclose or update on national-level policies, which are more comprehensively covered in other publications, such as sectoral masterplans or roadmaps.² It complements these existing national publications, by showcasing the efforts of the Singapore public sector to become more environmentally sustainable in its operations, in support of our national plans. Apart from this GreenGov.SG report, Statutory Boards are also publishing their own environmental sustainability disclosures to show their individual efforts in sustainability, starting from FY2024. These can be accessed via this link: <https://go.gov.sg/sb-sustainability-disclosures>

Following the publication of the inaugural GreenGov.SG report in 2023, we received valuable feedback from our stakeholders and members of the general public. We have considered the suggestions and incorporated them where possible into this report.

We hope this report is informative and inspires greater awareness and action on climate change and sustainability. We welcome further feedback and suggestions at MSE_Feedback@mse.gov.sg, to help us continuously improve our efforts.

¹ We have adapted from leading international frameworks, standards and definitions, where applicable, in drafting this report.

² A list of relevant publications can be found in Appendix B.

3 EXECUTIVE SUMMARY



EXCEL

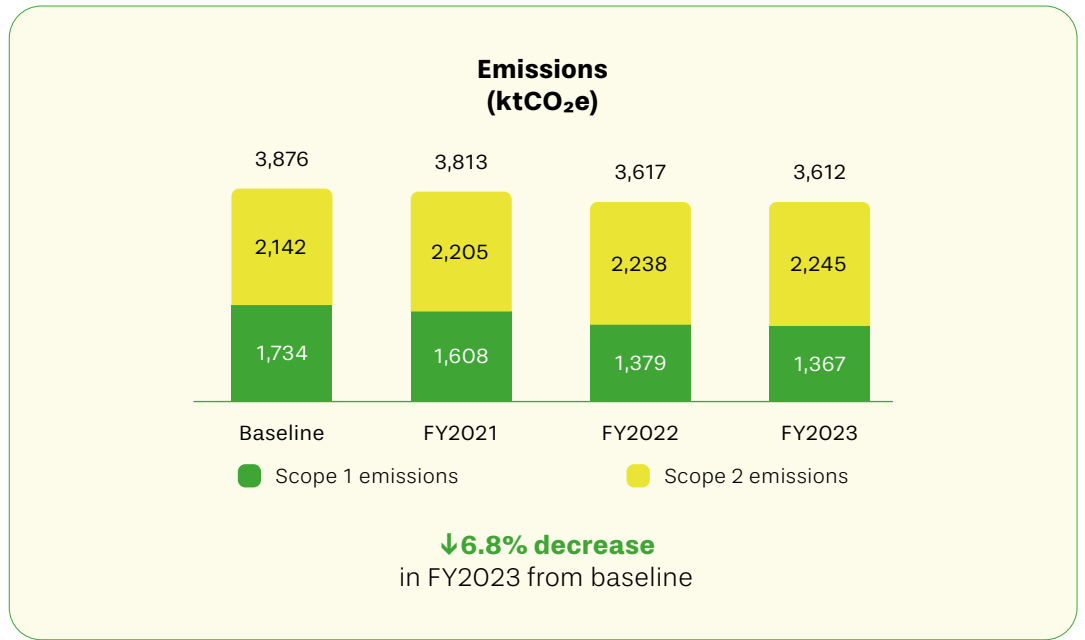
GREENHOUSE GAS EMISSIONS AND ENERGY

Our GreenGov.SG Target



Net zero emissions around 2045, after peaking emissions around 2025

Our Performance

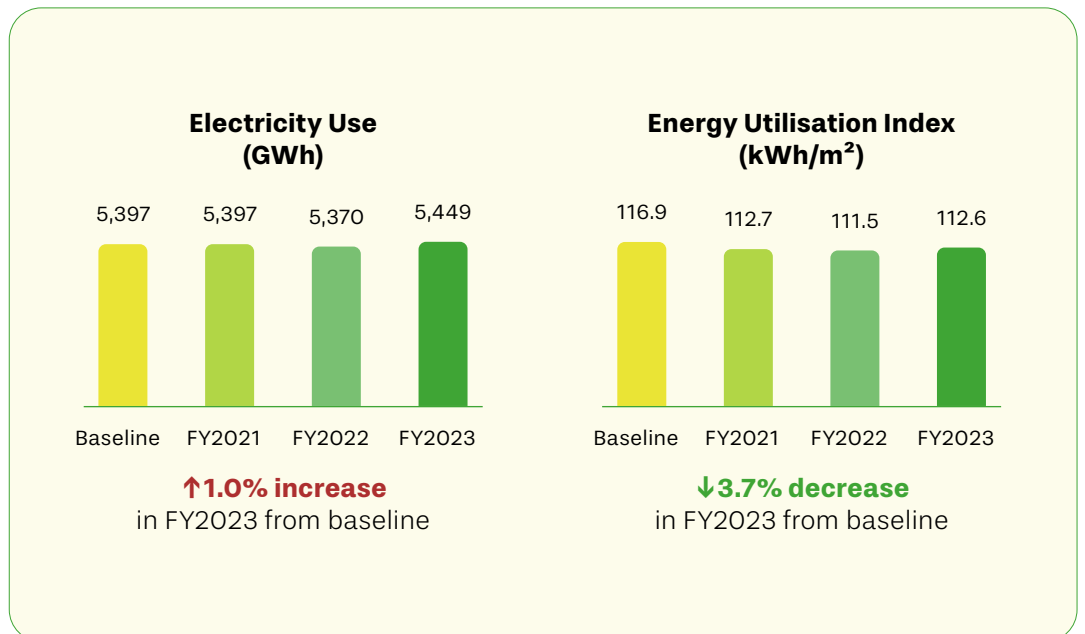


Our GreenGov.SG Target



10% reduction in energy use per unit area³ by 2030

Our Performance



³ In terms of electricity used per unit area.

EXCEL

GREENHOUSE GAS EMISSIONS AND ENERGY

Key Takeaways

Overall, as lives for Singaporeans returned to normalcy post-COVID, demand for public sector services also returned close to pre-pandemic levels. We saw the public sector's total emissions in FY2023 decrease slightly by about 0.2% compared to FY2022 as the decrease in Scope 1 emissions outweighed the increase in Scope 2 emissions.

Scope 1 emissions decreased slightly as our Tuas South Waste-to-Energy Plant generated less emissions in FY2023, which offset the increase in diesel use due to increased bus service mileage. Scope 2 emissions increased as we used more electricity to support the expansion of our public infrastructure in the transport and healthcare sectors. Our rail network expanded, as more stations were opened. Our hospitals expanded in capacity to accommodate more beds and new healthcare facilities were opened to meet the growing demand for various healthcare services. We expect emissions to continue to increase for a bit more as we complete a number of key infrastructural projects which were delayed due to COVID-19 disruptions.

Emissions in FY2023 remain lower than baseline⁴ levels due to the decommissioning of Tuas Waste-to-Energy Plant in 2022, and waste was diverted to other incineration plants, including those managed by the private sector.

Electricity used per unit area decreased in FY2023 compared to the baseline⁵ but increased slightly from FY2022. The overall improvement from baseline was due to new facilities being designed to higher energy efficiency standards and retrofitting of older ones with more energy efficient systems.

Our GreenGov.SG Strategy

Reduce

- Design energy-efficient infrastructure and equipment
- Retrofit existing buildings with more energy efficient systems
- Improve building management practices

Replace

- Maximise solar deployment
- Pursue electrification to replace fossil fuel-powered vehicles and equipment

Remove

- Develop innovative carbon capture solutions to remove residual emissions

⁴ We have referenced FY2020 as the baseline year for emissions, as this was when we began data collection for emissions.

⁵ The baseline for electricity use is the average of FY2018 to FY2020, to better reflect hybrid working arrangements post-pandemic.

EXCEL

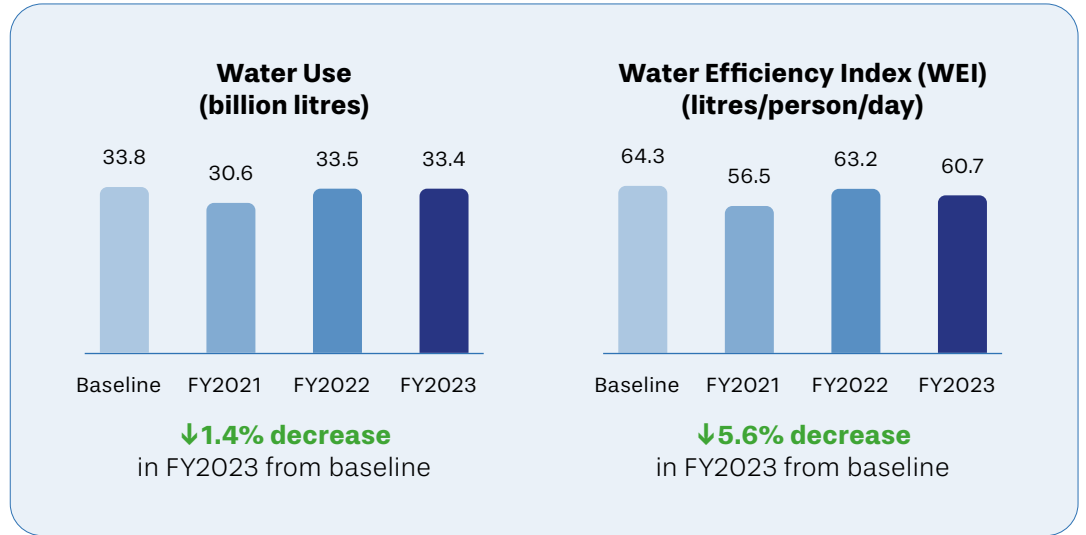
WATER

Our GreenGov.SG Target



10% reduction in water use per person per day by 2030

Our Performance



Key Takeaways

The public sector's total water use decreased slightly, by 0.4% in FY2023 compared to FY2022 and by 1.4% compared to the baseline. Our water use per person per day in FY2023 was 4.0% lower than FY2022 and 5.6% lower than the baseline.⁶ This resulted from efforts to better manage water consumption across our premises, even as we catered for the return of more occupants and visitors.

Our GreenGov.SG Strategy

Reduce

- Design water-efficient buildings
- Use water-efficient appliances and fittings
- Improve water-related maintenance to reduce water loss

Replace

- Use non-potable water such as rainwater where feasible

Reuse

- Reuse water across operations

⁶ The baseline for water use is the average of FY2018 to FY2020, to better reflect hybrid working arrangements post-pandemic.

EXCEL

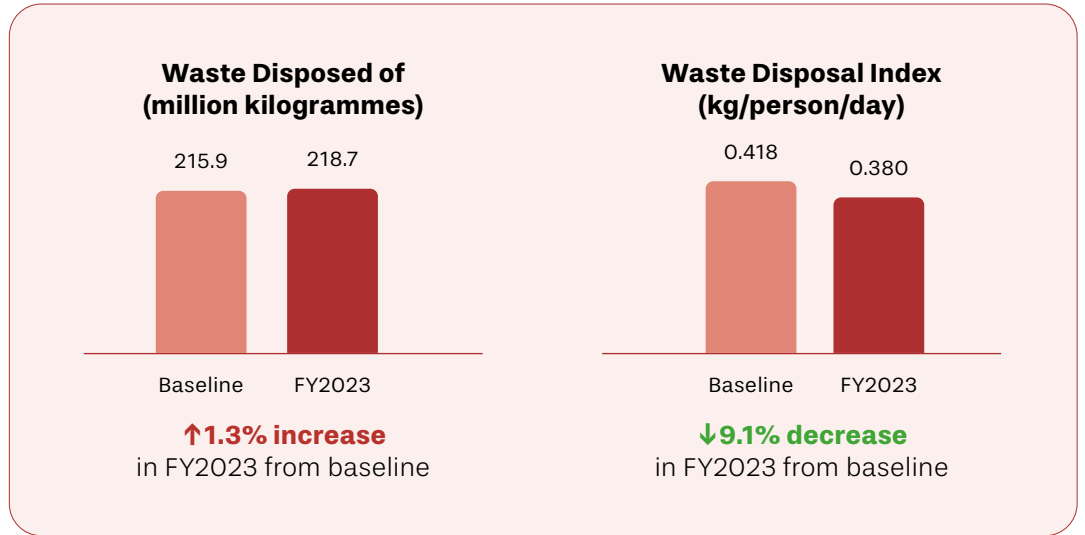
WASTE

Our GreenGov.SG Target



30% reduction in waste disposed of by 2030⁷

Our Performance



Key Takeaways

The public sector's total waste disposed of increased by 1.3% in FY2023 from the baseline⁸ due to increased levels of activity and higher footfall at our facilities. Waste disposed of per person decreased by 9.1% as we have scaled up our implementation of waste reduction efforts and recycling programmes across government facilities. With increased efforts to measure our waste data and attribute it to the correct sources, we are better able to manage our waste.

Our GreenGov.SG Strategy

Reduce

- Adopt reusables and minimise single-use disposables
- Right-size or under-cater food at events to minimise food waste

Reuse

- Maximise useful life of equipment or materials
- Repurpose unwanted items by finding creative new uses

Recycle

- Recycle materials and convert them into useful products

⁷ In terms of waste disposed of per person per day.

⁸ The baseline for waste disposed of is FY2022 as this is when requirements for public waste collector to weigh waste at the premises-level started.

ENABLE

Our GreenGov.SG Commitment & Strategy

Promote a **green economy**, such as through green procurement policies

Highlights



Introduced sustainability criteria in **five construction project tenders**, including the new Cross Island Line Phase 2, and **an ICT hardware bulk tender**.



Expanded support for businesses through **sustainability-related grants** to support sustainability reporting and energy efficiency improvements, and **introduced knowledge sharing platforms and courses**.

Our GreenGov.SG Commitment & Strategy

Nurture a **green citizenry** by rallying the public through our public touchpoints and community programmes

Highlights



Supported **250 sustainability initiatives** under the SG Eco Fund, which engaged **more than 670,000 people**.



Launched the annual Go Green SG movement, bringing together **partners from the People, Public and Private ("3P") sectors**, to organise and participate in fun and educational activities to promote environmental sustainability and climate resilience.

EXCITE

Our GreenGov.SG Commitment & Strategy

Embed a **culture of learning** and a **culture of action** within the public sector to inspire and empower public officers to contribute actively towards environmental sustainability

Highlights



Continued to train public officers through formal courses such as the **Sustainability 101 for Policy Officers** and other asynchronous modes such as the **Sustainability e-Primer**.



Organised ground-up initiatives to raise awareness on sustainability and to reduce our resource footprint.

4 INTRODUCTION



FY2023 in a nutshell

FY2023 saw gradual growth and recovery following the COVID-19 pandemic. It was the first full year since January 2020 that we reverted to Disease Outbreak Response System Condition ("DORSCON") Green.⁹ The World Health Organisation also declared the end of the COVID-19 pandemic in May 2023.



Growth in all sectors of our economy, except manufacturing, translating to an overall modest **growth of 1.1%**, easing off from the prior year's expansion of 3.8%



Population **grew by 5%** from 2022 to reach 5.92 million



Our international visitor arrivals: **13.6 million**, more than double compared to 2022, and around two-thirds of 2019



Public transport ridership levels **increased by 12.6%**, reaching 93.5% of pre-COVID-19 levels

This year was marked by a return to normalcy in the daily lives of most Singaporeans. Taking a stroll around town or the heartlands, one could see the colour and bustle returning to our commercial and recreational spaces compared to past years. People returned to their workplaces and public transport ridership was almost back to pre-pandemic levels. International travel resumed and tourism arrivals in Singapore doubled from 2022.

The public sector continued to expand our infrastructure to meet public needs, including a longer rail network to strengthen inter-connectivity and accessibility, and more healthcare institutions to support our ageing population.

⁹ The DORSCON level was stepped down from Yellow to Green on 13 February 2023.

4.1.

Singapore's Commitment to Environmental Sustainability

Our climate scientists have projected that mean sea levels around Singapore could rise by up to 1.15 metres by 2100 and by up to 2 metres by 2150 under a high emissions global warming scenario. This means that large parts of Singapore will be susceptible to coastal flooding, especially during high tides, storm surges and heavy rainfall. Under the same scenario, temperatures in Singapore will also rise significantly, with a majority of the days having high heat stress by 2100.

The threat of climate change is global and so is the solution. This is why we are vested in reducing our emissions and resource consumption, as we encourage other countries to do the same. The goal of keeping global mean temperature rise to below 1.5°C above pre-industrial levels can only be achieved through collective action.

The Singapore Green Plan 2030 ("Green Plan") was launched in February 2021 as our response to this grave threat, and to strengthen our commitment to the United Nations 2030 Agenda for Sustainable Development and the Paris Agreement. The Green Plan is a whole-of-nation sustainability roadmap that aims to rally bold efforts and spur collective action to tackle climate change and advance our national agenda on sustainable development.

Key programmes of the Green Plan are organised along five pillars, namely:



City in Nature

Restoring nature into the urban landscape and strengthening connectivity between Singapore's green spaces



Sustainable Living

Keeping our environment clean, as well as saving resources and energy as a way of life in Singapore



Energy Reset

Using cleaner energy and increasing our energy efficiency to lower our carbon footprint



Green Economy

Ensuring that our future economy remains competitive amidst carbon and resource constraints, and rallying businesses towards sustainable economic growth



Resilient Future

Adapting and protecting ourselves against the effects of climate change

Anchoring the five pillars are two enablers:



Green Government

A public sector-wide sustainability movement



Green Citizenry

Where every individual, household, organisation and business plays their part in co-creating and co-delivering solutions for sustainability

Approach to Addressing Climate Risks

As a low-lying tropical island state, Singapore faces significant risks from the effects of climate change. To safeguard our land and our people, we are adopting a forward-looking, data-driven and adaptable approach.



Understand

To effectively tackle climate risks, we first need to understand the specific impacts of climate change on Singapore's environment, infrastructure and community through data collection, research and climate modelling.

In January 2024, the Centre for Climate Research Singapore ("CCRS"), which conducts research into the climate and weather patterns affecting Singapore and the Southeast Asia region, released their latest projections from the Third National Climate Change Study ("V3"). The V3 produced detailed projections of climate change at higher resolutions of 2 km over Singapore and 8 km over the rest of Southeast Asia, using CCRS's customised Regional Climate Model, downscaling the Intergovernmental Panel on Climate Change ("IPCC")'s latest global climate models.¹⁰ This is the highest resolution set of climate change projections for Southeast Asia. CCRS is working with international and regional stakeholders to share this dataset for further studies.

Findings from the V3 show that by 2100, we can expect:

- a rise in the annual average daily mean temperature by 0.6°C to 5.0°C.
- the mean sea level around Singapore to rise by 0.23 m to 1.15 m.
- between 54 and 326 days of high heat stress per year.



Prepare & Adapt

Once we have a comprehensive understanding, we can take proactive steps to prepare by implementing adaptable strategies, strengthening our infrastructure and raising public awareness to mitigate future climate risks.

At the national level, we continue to develop plans to adapt to the long-term impacts of climate change:

- Flood and Coastal Resilience:
 - Developing Long Island in the East Coast area to protect our coasts.
 - Upgrading the drainage system to strengthen our long-term flood resilience.
- Heat Resilience:
 - Introducing a Heat Stress Advisory, to guide the public on the conduct of outdoor activities to minimise heat stress and heat-related illnesses.
 - Designing new towns in Singapore to preserve wind corridors as far as possible.

¹⁰ Global climate models are run at a typical spatial resolution of 150 km and do not show more localised-level variations.

Approach to **Addressing Climate Risks**



Prepare & Adapt

We collaborate with academia and the industry to address challenging problems:

- The Coastal Protection and Flood Resilience Institute ("CFI") Singapore was launched by PUB and the National University of Singapore ("NUS") to strengthen coastal protection and inland flood management capabilities. Since its launch, CFI has kickstarted 17 engineering projects to address sea level rise.
 - One of the solutions being studied is the integration of nature-based solutions such as mangroves and seagrasses with manmade structures to strengthen our coastal defences.
- The National Environment Agency ("NEA") has launched a second grant call in January 2024 under the Climate Impact Science Research ("CISR") Programme for new research proposals on the impacts of climate change on water resources, food security, and warming trends on human health, among other areas.
 - One of the earlier awarded projects under the first CISR grant call aims to study the effect of climate change on vector-borne disease transmission in Singapore.



Review

We will review our plans regularly and ensure that they remain effective and aligned with the latest scientific research and information, as well as emerging global trends.

For instance, we regularly review our building codes to ensure that our buildings remain resilient to projected increases in temperatures and wind speeds, based on the most updated climate information and projections.

We will also adopt new technological solutions where possible.

4.2.

GreenGov.SG

The public sector's sustainability movement, also known as GreenGov.SG, was launched in July 2021 and is one of the key enablers of the Green Plan. Building on our earlier efforts under the "Public Sector Taking the Lead in Environmental Sustainability" initiative, we set ambitious targets to reduce carbon emissions and resource use to influence and inspire the private sector and our community to contribute towards advancing Singapore's long-term sustainability.

Our GreenGov.SG efforts are organised along three pillars – Excel, Enable and Excite. We have also mapped these to the United Nations Sustainable Development Goals.¹¹ The following chapters elaborate on the initiatives and actions we have taken under each of these pillars.

EXCEL

with ambitious targets and practical strategies





6
CLEAN WATER AND SANITATION

7
AFFORDABLE AND CLEAN ENERGY

9
INDUSTRY, INNOVATION AND INFRASTRUCTURE

12
RESPONSIBLE CONSUMPTION AND PRODUCTION

13
CLIMATE ACTION

	Greenhouse Gas Emissions	Peak emissions around 2025 and achieve net zero emissions around 2045
	Energy	Reduce energy use by 10% from the baseline by 2030 ¹²
	Water	Reduce water use by 10% from the baseline by 2030 ¹³
	Waste	Reduce waste disposed of by 30% from the baseline by 2030 ¹⁴

ENABLE

a green economy and green citizenry

12
RESPONSIBLE CONSUMPTION AND PRODUCTION

17
PARTNERSHIPS FOR THE GOALS

	Green Economy	Incorporate environmental sustainability considerations into all government procurement by 2028
	Green Citizenry	Embed environmental sustainability into public touchpoints and community-based programmes

EXCITE

public officers to think and work sustainably

17
PARTNERSHIPS FOR THE GOALS

	Capability Building	Elevate environmental sustainability awareness and knowledge across the public sector
	Culture Building	Enable public officers to take environmental sustainability action

¹¹ More information can be found in Appendix C.

¹² Energy use is represented by the Energy Utilisation Index, which is energy used per unit area.

¹³ Water use is represented by the Water Efficiency Index, which is water used per person per day.

¹⁴ Waste disposed of is represented by the Waste Disposal Index, which is waste disposed of per person per day.

5 EXCEL

with Ambitious Targets and Practical Strategies



The "Excel" pillar sets out our targets to reduce our environmental footprint. Apart from greenhouse gas emissions, energy and water use, we have added our waste data for the first time in this report. These key parameters measure the impact of the public sector's operations on our environment. By doing so, we can better track the progress of our efforts to tackle climate change, improve our energy and water security, preserve our only landfill, and ensure prudent and sustainable use of our resources.

Categorisation of facilities

In this chapter, we have presented the public sector's performance data collectively, as well as by categories.¹⁵ In the previous report, we presented our data across three categories: (i) built environment, (ii) mobility and (iii) utilities. In this report, we have further divided the built environment category into four sub-categories to give a clearer picture of how resources are utilised, so that we can implement more targeted sustainability measures.

Category	Examples of GreenGov.SG facilities	Who uses these facilities?
Public Sector Offices	<ul style="list-style-type: none"> Environment Building, Ministry of Manpower Headquarters 	<ul style="list-style-type: none"> Mostly public officers A relatively smaller number of visitors who attend meetings
Public Sector Operations	<ul style="list-style-type: none"> Includes non-office buildings such as immigration checkpoints, social service centres, labs and data centres 	<ul style="list-style-type: none"> Sizeable group of public officers Number of visitors varies depending on facility. For example: <ul style="list-style-type: none"> High number of travellers at checkpoints Significant number of visitors at social service centres Very few or no visitors at data centres and labs
Education and Healthcare	<ul style="list-style-type: none"> Ministry of Education schools, Institute of Technical Education, polytechnics and universities 	<ul style="list-style-type: none"> Mostly students, teachers and staff Relatively fewer visitors. Visitor numbers may spike during certain events like open house
	<ul style="list-style-type: none"> Hospitals, polyclinics and specialist clinics 	<ul style="list-style-type: none"> Mostly healthcare staff and patients Significant number of visitors
Public Amenities and Tenanted Industrial Facilities	<ul style="list-style-type: none"> Tenanted industrial facilities – government-owned industrial parks and estates 	<ul style="list-style-type: none"> Mostly business owners and their employees Very few visitors, mainly for deliveries or meetings
	<ul style="list-style-type: none"> Tenanted commercial facilities – shopping malls and hawker centres 	<ul style="list-style-type: none"> Relatively small number of business owners and their employees High number of customers and patrons
	<ul style="list-style-type: none"> Community clubs, sports facilities, libraries, museums and heritage centres 	<ul style="list-style-type: none"> Relatively small number of public officers High number of visitors and patrons
Mobility	<ul style="list-style-type: none"> Train stations, bus interchanges, public trains and buses 	<ul style="list-style-type: none"> Relatively small number of public transport operator staff High number of passengers
Utilities	<ul style="list-style-type: none"> Waste-to-energy, water and sewage treatment plants 	<ul style="list-style-type: none"> Very few public officers Very few visitors and/or contractors

Formerly 'Built Environment'

¹⁵ A breakdown of the performance data by Ministry family can be found in Appendix A.

Restatement of Historical Data

We are committed to improving the transparency, accuracy and completeness of our sustainability reporting. In the last GreenGov.SG report, we highlighted some data gaps, such as the omission of electricity consumption from district cooling, and the use of proxy data where measured data was not readily available. Following its publication, we incorporated feedback from our stakeholders to improve our data collection processes and methodologies, and worked to address our data gaps. In this report, we have restated past data for some Ministry families where more accurate or complete data became available. The changes are broadly due to:

- Inclusion of energy consumption from district cooling after putting in place processes to collect the data
- Incorporating additional facilities and assets not previously accounted for following agencies' review of their reporting scope
- Incorporating measured data and improved estimates derived from more accurate information and data from agencies

The resultant changes for the whole public sector have been reflected as well. These adjustments are necessary to improve the accuracy of our reporting. We will continue to improve our data collection and verification processes to ensure better data quality.

5.1.

Greenhouse Gas Emissions and Energy

5.1.1. Performance

Emissions

The public sector has committed to achieve net zero emissions around 2045, five years ahead of our national ambition to achieve net zero emissions by 2050.¹⁶ We believe that the public sector needs to lead by example in transitioning towards a net zero future. We hope that through our efforts, we can inspire and spur collective action within society.

The public sector aims to peak emissions before the same milestone is attained at the national level. We had earlier set a target to peak emissions around 2025, based on the planned completion of several major infrastructure projects in the first half of this decade. However, due to COVID-19 disruptions, these projects were delayed. We are closely monitoring the impact of this disruption on our emissions trajectory while doing our best to complete these projects as soon as possible to meet the needs of Singapore's population and economy. To mitigate the environmental impact from the increase of public sector services and operations, we are adopting the best-in-class sustainability technologies and processes in our facilities and operations, to minimise resource use and reduce our carbon footprint.

In FY2023, the public sector emitted 3.6 million tonnes of CO₂ equivalent ("CO₂e"). This comprises both Scope 1 and 2 emissions.¹⁷ Our total emissions decreased slightly by 0.2% from FY2022 and was 6.8% lower than the baseline.

	Baseline	FY2021	FY2022	FY2023	Change from FY2022	Change from baseline
Scope 1 emissions (ktCO₂e)	1,734	1,608	1,379	1,367	▼ -0.9%	▼ -21.2%
Scope 2 emissions (ktCO₂e)	2,142	2,205	2,238	2,245	▲ 0.3%	▲ 4.8%
Total emissions (ktCO₂e)	3,876	3,813	3,617	3,612	▼ -0.2%	▼ -6.8%

¹⁶ These targets are contingent on technological progress as well as international cooperation to enable mitigation measures.

¹⁷ Scope 1 emissions refer to direct greenhouse gas emissions from sources that are owned or controlled by an organisation, such as petrol and diesel. Scope 2 emissions refer to indirect emissions associated with the purchase of electricity, steam, heating and cooling.

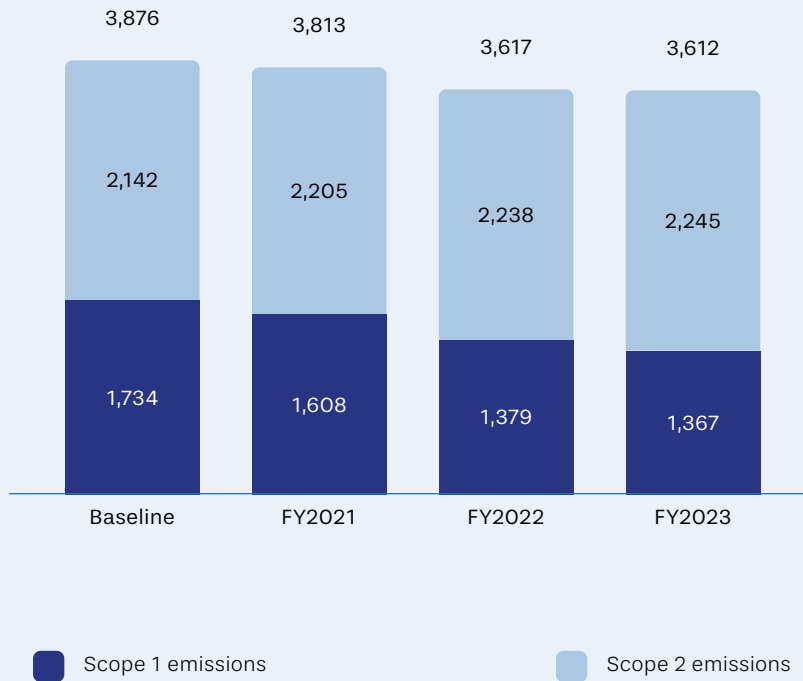
Scope 1 Emissions

Our Scope 1 emissions in FY2023 decreased by 0.9% from FY2022. This was due to a decrease in emissions from our Tuas South Waste-to-Energy Plant, which offset an increase in diesel consumption as bus service mileage increased from improving bus frequencies and coverage. Our FY2023 emissions were 21.2% lower than the baseline mainly due to the decommissioning of the Tuas Waste-to-Energy Plant in 2022.

Scope 2 Emissions

Our Scope 2 emissions in FY2023 increased by 0.3% from FY2022 and 4.8% from the baseline mainly due to the expansion of our public infrastructure in the transport and healthcare sectors. The Thomson-East Coast Line ("TEL") Stage 3 was opened in November 2022 and operated for the full duration of FY2023. New healthcare facilities were added, such as Tan Tock Seng Hospital ("TTSH") Integrated Care Hub and Woodlands Health, to accommodate more hospital beds and growing patient needs.

Emissions (ktCO₂e)

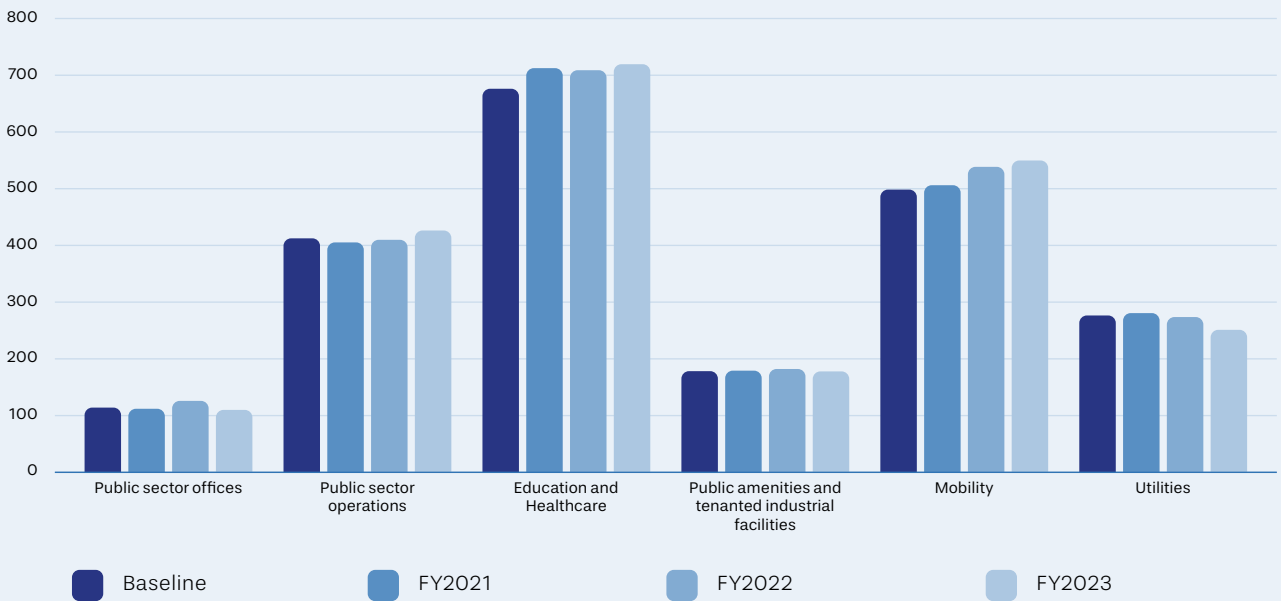


Scope 1 Emissions (ktCO₂e)



*We have omitted the categories for public sector offices, education and healthcare, and public amenities and tenanted industrial facilities in this graph as their Scope 1 emissions are not as significant.

Scope 2 Emissions (ktCO₂e)



We recognise that Scope 3 emissions from an organisation's value chain activities is part of the organisation's environmental footprint. As the public sector is large, performs diverse functions and operations, and procures a wide range of goods and services, we are studying this issue, to determine an appropriate approach to take that would balance cost and effort, lead to meaningful outcomes, and reflect Singapore and the public sector's unique circumstances.

Notwithstanding this, we are pushing ahead to progressively green our public sector procurement, and leveraging our position as a large buyer to catalyse demand for greener goods and services.

We are also supporting the Singapore Business Federation's efforts to develop the [Singapore Emission Factors Registry](#) together with the Agency for Science, Technology and Research ("A*STAR"), and voluntary knowledge contribution from Singtel and PricewaterhouseCoopers ("PwC") Singapore.¹⁸ This Registry, which aims to build up a database of localised emission factors, will help companies report their carbon emissions within Singapore's context.

5.1.1. Performance

Energy

In this report, the public sector's energy use refers to purchased electricity and cooling. In FY2023, the public sector used 5,449 GWh of electricity, including purchased cooling from district cooling systems. This is a 1.5% increase from FY2022 and a 1.0% increase from the baseline.

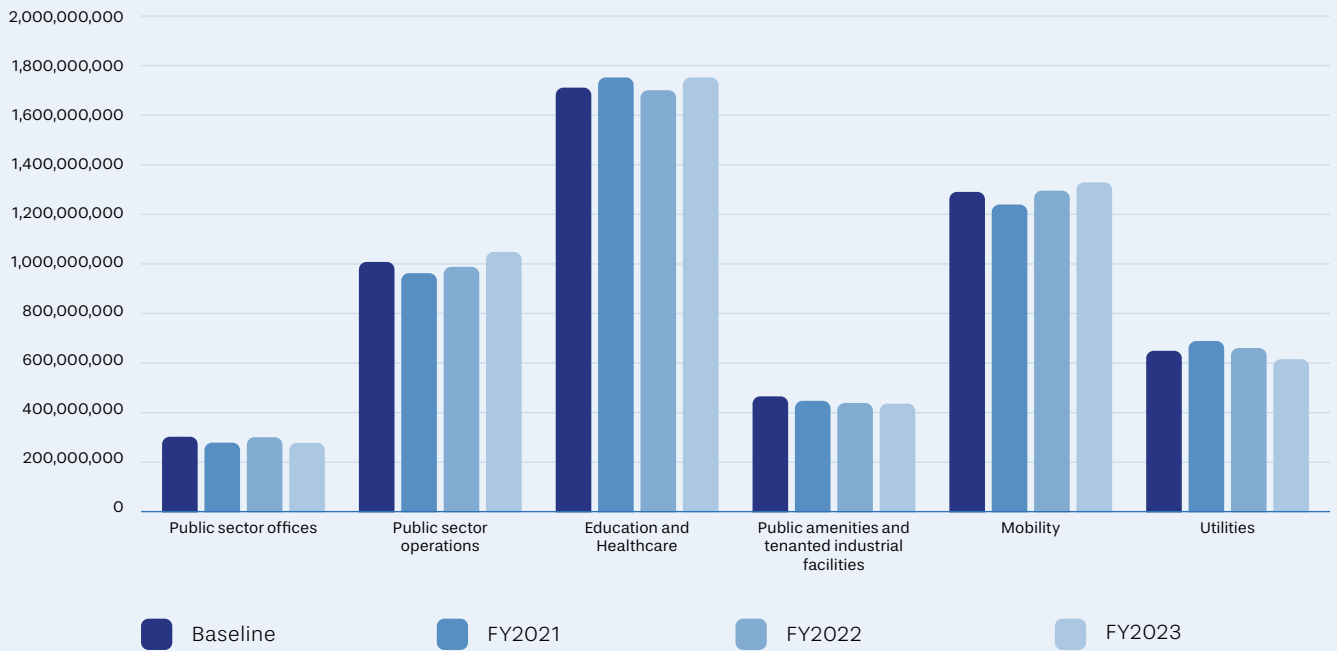
The increase from FY2022 can be attributed to the expansion of our public infrastructure, including a full year of operations for Stage 3 of the Thomson-East Coast line, which added 11 new stations and 13.2 km to the rail network from November 2022, and new healthcare facilities such as TTSH Integrated Care Hub and Woodlands Health.

Despite our infrastructural expansion, we have pursued efforts to retrofit our systems and buildings with energy efficient technologies to reduce energy use.

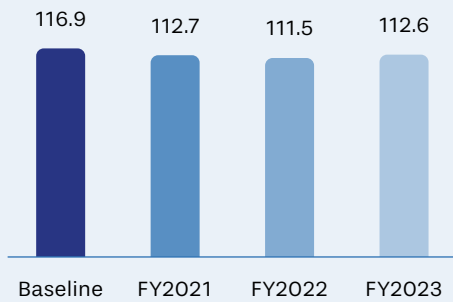
	Baseline	FY2021	FY2022	FY2023	Change from FY2022	Change from baseline
Electricity consumption (GWh)	5,397	5,397	5,370	5,449	▲ 1.5%	▲ 1.0%
Energy Utilisation Index (kWh/m²)	116.9	112.7	111.5	112.6	▲ 1.0%	▼ -3.7%

¹⁸ The registry was launched in October 2024 and will continue to be expanded.

Electricity Use (kWh)



Energy Utilisation Index, EUI (kWh/m²)



In FY2023, the Energy Utilisation Index¹⁹ ("EUI") of the public sector was 112.6 kWh/m², which was an increase of 1.0% from FY2022 and a decrease of 3.7% from the baseline.

The EUI increase from FY2022 was due to the increase in absolute energy consumption as all our premises resumed operations fully in FY2023. The EUI decrease from the baseline was due to improvements in the energy efficiency of our facilities. Our new buildings are progressively being built to Green Mark Platinum Super Low Energy ("SLE") standards and we are retrofitting our older buildings with new technologies such as energy-efficient HVAC²⁰ systems and improving their overall energy management.

5.1.2. Strategy

We have adopted the 3R framework "Reduce, Replace and Remove" for our decarbonisation strategy.

Strategy Snapshot



Reduce emissions from our operations



Replace our current energy source with lower-carbon alternatives



Remove carbon by exploring new technologies

¹⁹ Energy used per unit area.

²⁰ Heating, Ventilation and Air Conditioning.

5.1.2. Strategy

Reduce



65 buildings
have met or exceeded
Green Mark Platinum
SLE standard

Buildings contribute to around 47% of the public sector's emissions and 64% of our electricity use. Under GreenGov.SG, we have placed a strong emphasis on designing energy efficient buildings and keeping them as efficient as possible over their lifespan, in line with the Building and Construction Authority ("BCA")'s Green Building Masterplan.

From 2021, all new and existing public sector buildings that undergo major retrofitting are required to achieve the Green Mark Platinum SLE standard. Green Mark Platinum SLE buildings would achieve at least 60% energy savings compared to 2005 levels.

As of FY2023, 65 buildings have met or exceeded the standard. These include new buildings like SAFRA Choa Chu Kang which opened in end-2023 and older buildings that have undergone retrofits, such as Republic Polytechnic, which is over 20 years old.

We are accelerating plans to green our older buildings as significant emissions reduction can be achieved through retrofitting and right-sizing ageing HVAC components such as chillers. Furthermore, these retrofits typically pay for themselves through life-cycle cost-savings and ensure more prudent use of public funds in the long term.

Optimising energy efficiency through operational adjustments

For buildings that are not as old and hence not yet due for retrofitting or renovation, energy efficiency can be improved through operational adjustments such as setting the indoor air-conditioning thermostat to 25°C or higher, and selectively switching off power-consuming components such as chillers and lights when demand is low. Such measures can be easily replicated in other buildings and do not require high upfront costs.

Watt an idea: Saving energy through little tweaks

The Environment Building managed to overcome the challenge of being a 38-year-old building with an approximate total gross floor area ("GFA") of 49,000 m² to achieve the best-in-class Green Mark Platinum SLE without major retrofits.

The Ministry of Sustainability and the Environment ("MSE"), which calls the Environment Building its

home, is always on the lookout for ways to lower its total building energy consumption. Not satisfied with the Green Mark Platinum certification attained in 2011 following retrofits, MSE went on a mission to implement a series of no-cost energy saving measures to upgrade the Environment Building to Green Mark Platinum SLE.

MSE's checklist for Green Mark Platinum SLE	Estimated energy savings
Raised the temperature of water supplied by chillers from 7°C to 9°C	5%
Limited "lights on" hours <ul style="list-style-type: none"> Office lighting is turned off for at least one hour during lunch time Lights are switched off by default and can be activated only by users <ul style="list-style-type: none"> Removal of auto switch-on mode for office lighting Lights are automatically switched off by 9pm Lights at lift lobbies are dimmed after office hours Motion sensors were installed at low traffic areas such as the staircase and toilets 	9%
Raised the indoor ambient temperature from 22°C to 25°C	5-10%

Watt an idea: Saving energy through little tweaks



▲ Lift lobbies during office hours.



▲ Dimmed lift lobbies after office hours.

Greening our commutes

The Land Transport Authority ("LTA") is working with the public transport operators to make sure that our public transport facilities and operations become more resource-efficient. How many of these new features have you noticed at our MRT stations?

- Hybrid cooling using fans minimises the need to lower the temperatures, by improving the air circulation
- Light Emitting Diode ("LED") fixtures instead of traditional lighting saves up to 35% of energy

- Escalators with a dual speed feature that move slower during non-peak hours helps to conserve energy
- Motion sensors at staircases, toilets and staff rooms activate the lights and fans only when there are people around

We also continue to tap on regenerative braking in our new MRT lines, where we are getting more efficient in harnessing kinetic energy from braking processes to power nearby stations and trains.

Pathways to power savings

Since September 2023, LTA has converted all our street lights into smart ones operated by a remote control and monitoring system ("RCMS"). The RCMS is able to turn our street lights on and off based on daily sunset and sunrise timings, and is more responsive to stormy weather conditions. It has helped LTA save around 8.75

million kWh a year. Coupled with the replacement of all street lighting from conventional bulbs to LED bulbs, these efforts have reduced the energy consumption from street lighting by more than 25% since FY2018, while enhancing visibility and reliability, and reducing maintenance needs.



▲ Singapore is the first country in the world to convert all its street lights to smart ones.



▲ The smart street lights are controlled from LTA's Intelligent Transport System Centre.

Saving energy while saving lives

It would not come as a surprise that public healthcare facilities consume a fair amount of energy, as various equipment and services need to be kept running round the clock to ensure quality care for our patients. However, this has not stopped our hospitals from exploring ways to make these energy-intensive operations more efficient.

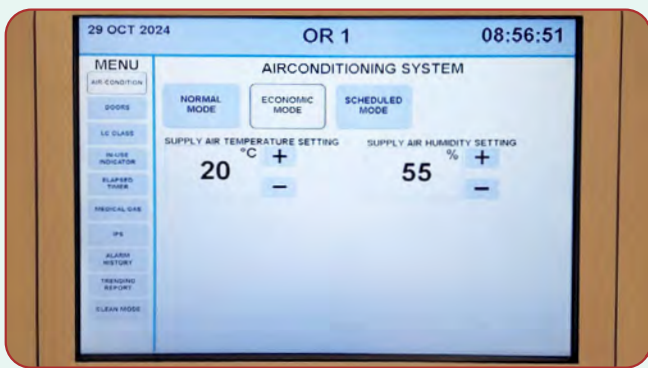
Hospitals have stringent infection control requirements in their operating theatres. This means that the temperature, humidity and room pressure of the operating theatre needs to be maintained at certain set points around the clock. Naturally, this makes them big energy consumers.

The National University Health System ("NUHS") has developed an "eco mode" for the air-conditioning

and humidity control systems of operating theatres in Ng Teng Fong General Hospital, National University Hospital and Alexandra Hospital. When the theatres are not in use, the systems go to "sleep" by raising the temperature and humidity slightly and reducing air-exchange. This happens without compromising on the sterile conditions needed for surgeries.

The "eco mode" lived up to its name by helping NUHS achieve substantial energy savings of at least 1,755,222 kWh annually, enough to power around 400 4-room HDB flats for a year.

NUHS has shared its learnings from this initiative with its other healthcare counterparts, to help advance sustainability within the healthcare sector.



The dashboard in the operating theatre that is used to activate eco or normal mode.

5.1.2. Strategy Retrofitting for energy-efficient buildings

Heat recovery has never been this cool

In 2023, TTSH made its HVAC operations more energy-efficient through its Mini-Chiller Heat Recovery system. This works by capturing waste heat from the hospital's air conditioning process and repurposing it to replace electric heaters²¹ in the chiller systems.

This upgrade allows TTSH to save around 800,000 kWh a year – equivalent to reducing over 320 tCO₂e each year.

By implementing such retrofits and energy-saving features, our hospitals have proven that we can save lives and be environmentally conscious too.



TTSH's Mini-Chiller Heat Recovery System helps to save energy by replacing energy-consuming electric heaters with heat generated from the mini chiller.

²¹ Chiller systems work by heating and cooling refrigerants, which are key to the chilling process. Electric heaters are used to heat up the refrigerants.

5.1.2. Strategy

Energy-efficient building design

Incorporating sustainable design elements allows buildings to significantly reduce energy consumption without sacrificing comfort and functionality.

Sun-lighting up our offices

The pyramid skylight at the Ministry of Foreign Affairs ("MFA") Atrium is helping MFA to save around 13,000 kWh per year by making use of the sunlight to illuminate the space. To keep the Atrium cool and comfortable, solar film has also been applied to the skylight to reflect the sun's UV rays.



Pyramid skylight at MFA Atrium reduces the need for artificial lighting.

Designing Sustainable Districts

By undertaking sustainability at a district-level, we are able to harness synergies to reduce our energy footprint.



Punggol Digital District: A smart urban district with sustainability at its core

Punggol Digital District ("PDD") is more than just our first smart district. It is also one of our first district-level developments that was designed with sustainability at its very core.

Energy-saving features:

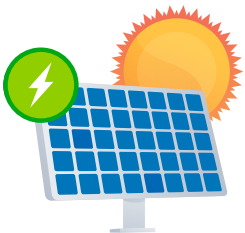
- All buildings in the district developed by JTC and Singapore Institute of Technology ("SIT") have achieved a minimum standard of Green Mark Platinum. Three specific buildings – JTC's Mass Engineered Timber ("MET") building, SIT's MET Food Court and Multi-Purpose Hall – have attained Green Mark Platinum SLE standards. These **best-in-class energy-efficient buildings** will achieve at least 40% energy savings, compared to 2015 standards, once up and running.
- The **PDD's district cooling system** consists of a 4 km underground pipe network that is expected to achieve up to 30% reduction in energy consumption compared to standard commercial buildings.
- **Rooftop photovoltaic (PV) panels** will be installed across the district to generate at least 3,000 MWh of solar energy annually. This is equivalent to the annual energy consumption of around 680 4-room HDB flats.
- The district will be supported by **GovTech's Open Digital Platform**, which is a smart city operating system that will track and analyse building and environmental data. This will leverage on Artificial Intelligence and Machine Learning to help make informed decisions to enhance energy efficiency.
- Businesses housed in Punggol Digital District will have to sign **green leases** and commit to operate sustainably. This could involve optimising their energy consumption levels and using appliances which are low in energy and water consumption.

Beyond energy savings, the district's design also facilitates synergies and savings in other domains such as water and waste:

- **PDD features a water sensitive urban design** for water management, with bioswales, raingardens and rainwater harvesting to capture rainwater for reuse as non-potable water for landscape irrigation. Across the district, this will save 208 million litres of water annually, enough to fill around 80 Olympic-sized swimming pools.
- **Waste collection will be a lot smoother**, minimising traffic from waste trucks, noise, pests and odours associated with traditional waste collection, thanks to an underground pneumatic waste conveyance system. Chutes for recycling have been installed in the buildings. All food and horticulture waste will be recycled into fertiliser using biodigesters, reducing over 3 tonnes of organic waste per day.
- The district achieved **100% landscape replacement**, allowing its users to benefit from the urban greenery, biodiversity and ecosystem services such as reduction of urban heat island effect.
- The district also encourages the community to embrace **greener modes of transport** with the following provisions:
 - Over 1,500 bicycle parking lots and handy end-of-trip facilities like lockers and showers.
 - Up to 151 electric vehicle charging lots have been catered for, and will be activated as market demand increases.
- The eight-storey MET building is the tallest **concrete-timber hybrid office** building in Southeast Asia. Its embodied carbon performance of 15 kgCO₂e/m² is 98% lower than BCA's benchmark (1,000 kgCO₂e/m²) for non-residential buildings. Timber used for the building construction was **sourced from sustainably managed forests**, where new trees are continuously planted to replace those that are harvested.

5.1.2. Strategy

Replace



Deployed around **500 MWp** of solar energy

We continue our switch to low-carbon energy sources to power our operations and phase out energy-intensive systems in favour of innovative and more energy-efficient alternatives.

Expanding our solarisation efforts and decarbonising the grid

Under the Green Plan, Singapore has committed to achieve 1.5 and 2 gigawatt-peak ("GWp") of solar energy deployment across Singapore by 2025 and 2030 respectively. To help achieve this target, the public sector will deploy at least 1.5 GWp of solar energy by 2030. As of FY2023, we have deployed a total of more than 500 MWp of solar energy, which is an increase of around 25% from last year!²²

Solar-powering every square foot

JTC is leveraging its position as a leading industrial infrastructure developer in Singapore to deploy solar at the spaces and facilities it manages. Through its SolarLand and SolarRoof initiatives, JTC has installed solar panels on unutilised land at its industrial estates and on rooftops of its buildings. As of FY2023, JTC has deployed around 93 MWp of solar photovoltaic system across more than 60 buildings and over 50 hectares

of interim unutilised land. They have also partnered with their private sector tenants to maximise solar deployment at their industrial properties.

In the longer term, JTC aims to further increase its solar deployment footprint, potentially reaching 1.25 GWp, contributing to about 60% of our national solar deployment target of 2 GWp by 2030.

²² The solar deployment figures for FY2022 have been recomputed to incorporate JTC's SolarLand deployment which was not included in the previous year's calculations. This adjustment aims to provide a more accurate representation of solar deployment by the public sector.

Sentosa: Where fun meets sun

There's no shortage of sunshine at Sentosa. That is why the Sentosa Development Corporation ("SDC") has teamed up with its island businesses under the Sentosa Solarisation Programme to push the limits of deploying solar.

With Phase 1 of the programme wrapped up, a total of 46 locations now have new solar panels, with over 5.2 MWp of solar capacity. This is expected to produce close to 6.6 GWh of solar energy annually, which can power around 97,700 hotel room night stays.

Beyond rooftop solar, SDC and its island businesses are exploring unconventional technologies and installations, such as the solar pavements which are being piloted at Fort Siloso Skywalk till December 2024. The results of the pilot will determine the viability for future deployments of solar panels on pavements, as SDC is targeting to generate 6 MWp of solar energy by 2025 with the close support of its island businesses.



▲ Solar panels installed on the roof top of Palawan Kidz City, amongst 45 other locations across Sentosa and Lazarus Island.

Beyond solar, we are studying the feasibility of low-carbon energy alternatives such as hydrogen and advanced geothermal systems. Regional cooperation is also key. We are working with ASEAN countries to integrate our power grids and access low-carbon electricity in the region.

5.1.2. Strategy

Using innovative technologies to replace resource intensive processes



Digital Learning Laboratory at the Civil Defence Academy

Virtual reality technology has gotten better and more realistic in recent times. The Home Team Science and Technology Agency and Singapore Civil Defence Force ("SCDF") collaborated with academic and industry experts to introduce Extended Reality ("XR") technology to their training platforms. This complements conventional physical training methods by digitally simulating fire, rescue, or hazardous materials training scenarios.

Emergency responders don the SCDF's new multi-sensory suit, which combines Virtual Reality ("VR") and haptic feedback to simulate real-world elements such as heat, vibration, and smoke scents, enhancing the immersion and realism of training scenarios such as during a fire or a road traffic accident. While conventional training often includes cutting through vehicles to rescue trapped 'persons', the XR system allows trainees to practise these skills in a virtual environment.

Traditional exercises involving the burning of materials and physical infrastructure are still conducted, but the XR system has facilitated more frequent, low-impact practice sessions. All in all, the use of the XR system has helped SCDF to reduce their carbon footprint and waste generation, as they have procured fewer scrap cars for such training, earning them cost savings of around 46%.

That is not all there is to the XR system – it also includes simulators that allow trainees to practise emergency driving skills, including use of fuel-efficient techniques such as smooth acceleration and braking. By incorporating such XR-enhanced training, SCDF can use less fuel, reduce their carbon footprint and minimise vehicle wear and tear, all while making sure trainees receive top quality training to be proficient emergency responders.



▲ Purpose-built driving simulator at the Civil Defence Academy to enhance driving training.



◀ SCDF's new multi-sensory suit paired with the XR training system to simulate real-world scenarios for more immersive and realistic training.

5.1.2. Strategy

Remove

The last 'R' in our 3R framework is Remove. For hard-to-abate emissions or emissions sources that are hard to replace, such as from essential public services including waste incineration and used water treatment, we are studying innovative solutions such as carbon capture, utilisation, and storage ("CCUS") technology.

5.2.

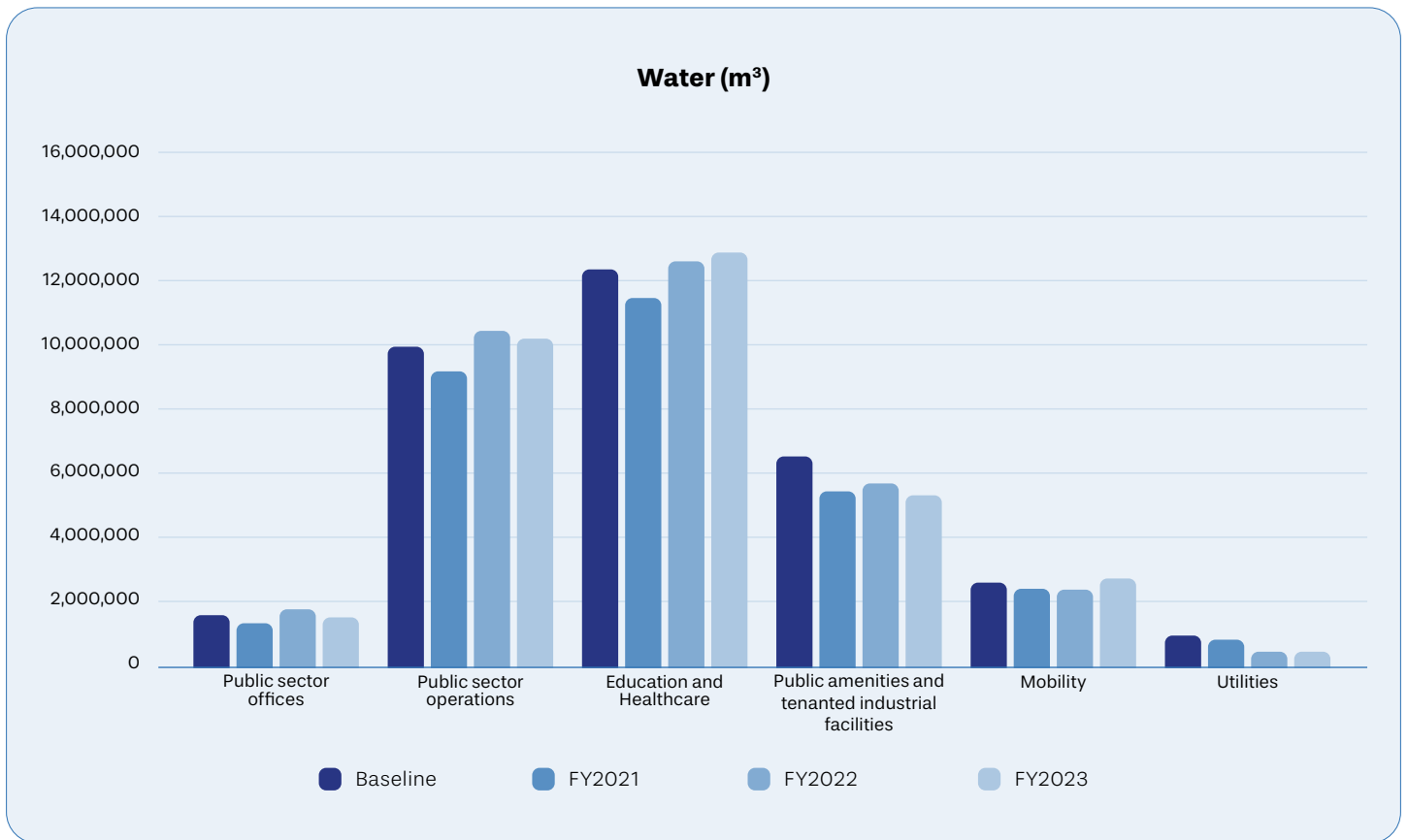
Water

5.2.1. Performance

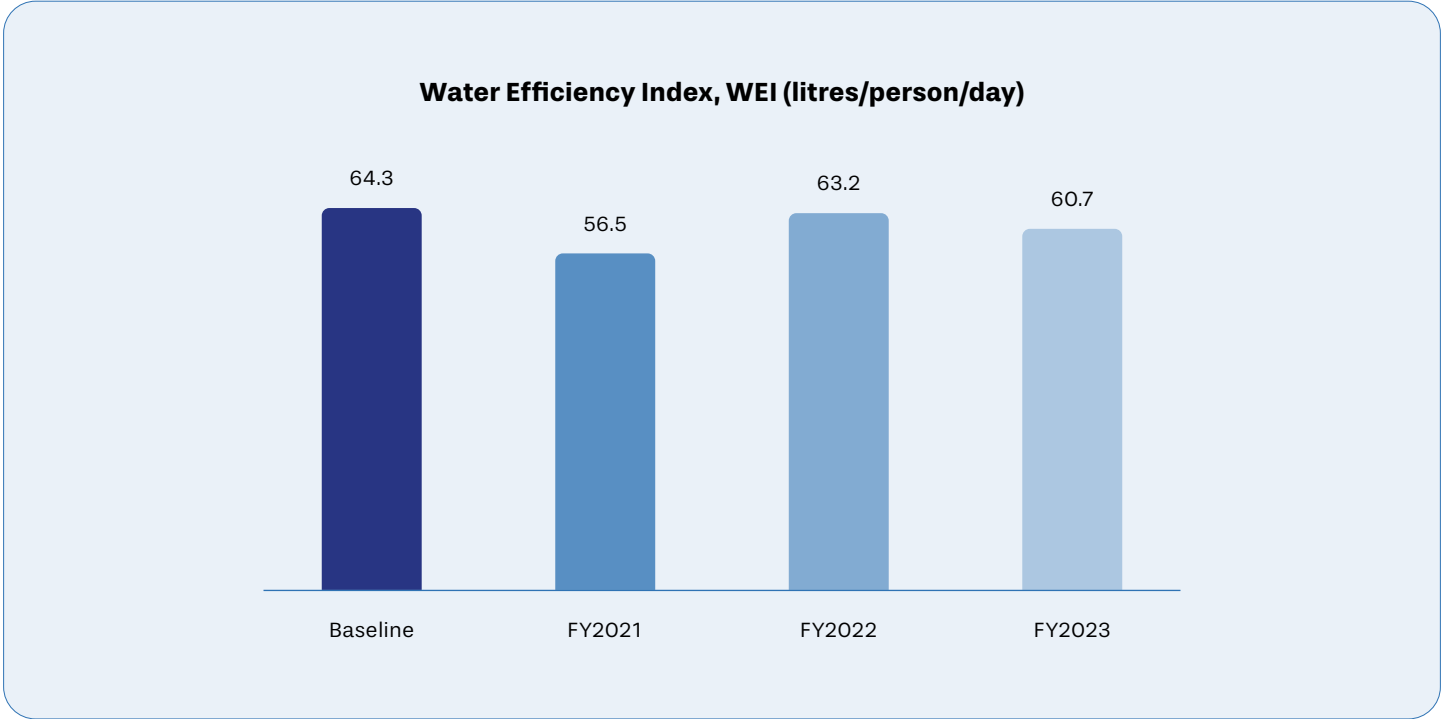
In FY2023, the public sector used around 33.4 billion litres of water. Our water consumption decreased by 0.4% from FY2022 and 1.4% from the baseline.

This was mainly due to a reduction in water use at public amenities and tenanted industrial facilities, as well as our utilities plants, which offset the increase from some of the other sectors.

	Baseline	FY2021	FY2022	FY2023	Change from FY2022	Change from baseline
Water consumption (billion litres)	33.8	30.6	33.5	33.4	▼ -0.4%	▼ -1.4%
WEI (litres/person/day)	64.3	56.5	63.2	60.7	▼ -4.0%	▼ -5.6%



Our Water Efficiency Index²³ ("WEI") in FY2023 was 60.7 litres/person/day, which was 4.0% lower than FY2022 and 5.6% lower than the baseline. This resulted from efforts to better manage water consumption across our premises, even as we catered for the return of more occupants and visitors. The number of public sector buildings that have achieved PUB's Water Efficient Building ("WEB") (Basic) Certification has increased to over 930 in FY2023, reflecting our commitment to adopt more water-saving practices at our premises.



5.2.2. Strategy



More than **930 buildings** have attained the WEB Certification that encourages adoption of water efficient measures in premises and processes

Water is a valuable resource. To ensure we have a robust water supply for Singapore, PUB introduced NEWater and desalinated water to supplement our rainwater and imported water sources. However, these are energy-intensive water treatment processes. This is why beyond stewarding our water resources, the public sector is also taking steps, as a consumer, to conserve water and use it efficiently.

Reduce

New public sector facilities, and existing ones undergoing renovation of their washrooms, are required to install water fittings of the highest water efficiency 3-ticks rating. This is a hallmark of highly water-efficient appliances and fittings, and helps us to save up to 60% of water on average compared to 1-tick alternatives.

Beyond these, our agencies have implemented further measures to be as water-efficient as possible. Let's find out more about some of these efforts!

²³ Water used per person per day.

Testing the waters with smart sensors

Embracing the spirit of Smart Nation 2.0, the National Heritage Board ("NHB") installed a smart water meter at their Heritage Conservation Centre so that they could monitor water usage in real time. This helps them to better track and manage their water use. The meter also helps NHB to detect any leaks early, to prevent water wastage. Seeing that these meters have helped improve water management efforts, from 2025, all our national museums and heritage institutions will be equipped with these smart water meters.



Smart water meter at Heritage Conservation Centre. ▶



Museums are open every day – even on public holidays – to welcome local and international visitors. As there is a need to keep these museum toilets spick-and-span, they are cleaned frequently. Wondering if this could be done in a more water-economical way, NHB installed ammonia sensors and people count sensors in toilets across its museums. These sensors track toilet usage patterns and conditions, and allowed NHB to save water by optimising their toilet cleaning schedules.

◀ Example of an ammonia sensor in a museum.

The Ministry of Manpower ("MOM") has installed rain sensors at their MOM Services Centre to detect and measure rainfall. These sensors are also linked to the Services Centre's drip irrigation system. Once these sensors detect rainfall, they will trigger a snooze button on the irrigation controller, to delay or skip the next watering cycle to prevent overwatering. It's almost as if they have given their plants their own weather app!



A rainfall sensor-controlled drip irrigation system at MOM Services Centre. ▶



Being water-wise with façade cleaning

The Inland Revenue Authority of Singapore ("IRAS") has adjusted their building cleaning regime to help them to save water (and money too). Instead of washing their building façade twice a year, they now do so once a year, and have managed to save about 559,000 litres of water annually. Besides this, they are also upgrading their cleaning gear to replace older high pressure water jets with newer and more efficient fittings. This alone has allowed them to save a further 272,000 litres annually. That is slightly over \$3,000 in savings every year.

One hurdle that the team at IRAS overcame was that their contract had specified the number of façade cleaning sessions to be carried out in a year, which reduced flexibility in making adjustments without a contract variation. Following this experience, IRAS is considering whether a performance-based contract where cleaning is performed as-and-when necessary could be a better and more environmentally friendly option.

5.2.2. Strategy

Replace

We are assessing and adopting ways to **replace potable water with non-potable water** where feasible, such as for irrigation, general washing and cooling.



Making a splash with rainwater harvesting

To make the most of the reality that Singapore is one of the rainiest countries in the world, some of our schools – Hougang Primary School, Greenwood Primary School, Mee Toh School and Yio Chu Kang Secondary School, to name a few – have installed rainwater harvesting systems to collect rainwater for non-potable use, such as maintaining the school's green spaces and general cleaning. Students at Yio Chu Kang Secondary School and Greenwood Primary School even participated in designing and installing the system themselves. What better way to learn than by doing!

Hougang Primary School connected the system to their automated sprinklers, which are further powered by solar energy, to distribute the rainwater collected.

Mee Toh School was awarded the prestigious Singapore Watermark Award in 2024 to recognise their efforts in embarking on various water conservation initiatives. One of these initiatives was proposed by students who engineered the Wishy-Washy, a prototype that uses collected rainwater to clean recyclable items. The school is working on Wishy-Washy 2.0 to dry these items after the wash.

Reuse

Potable water that is clean enough after one-time use or after treatment can be reused for non-potable applications, such as irrigation, flushing toilets and cleaning maintenance.

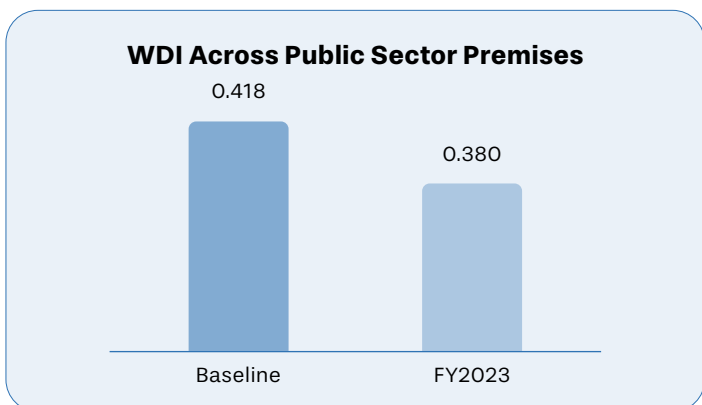
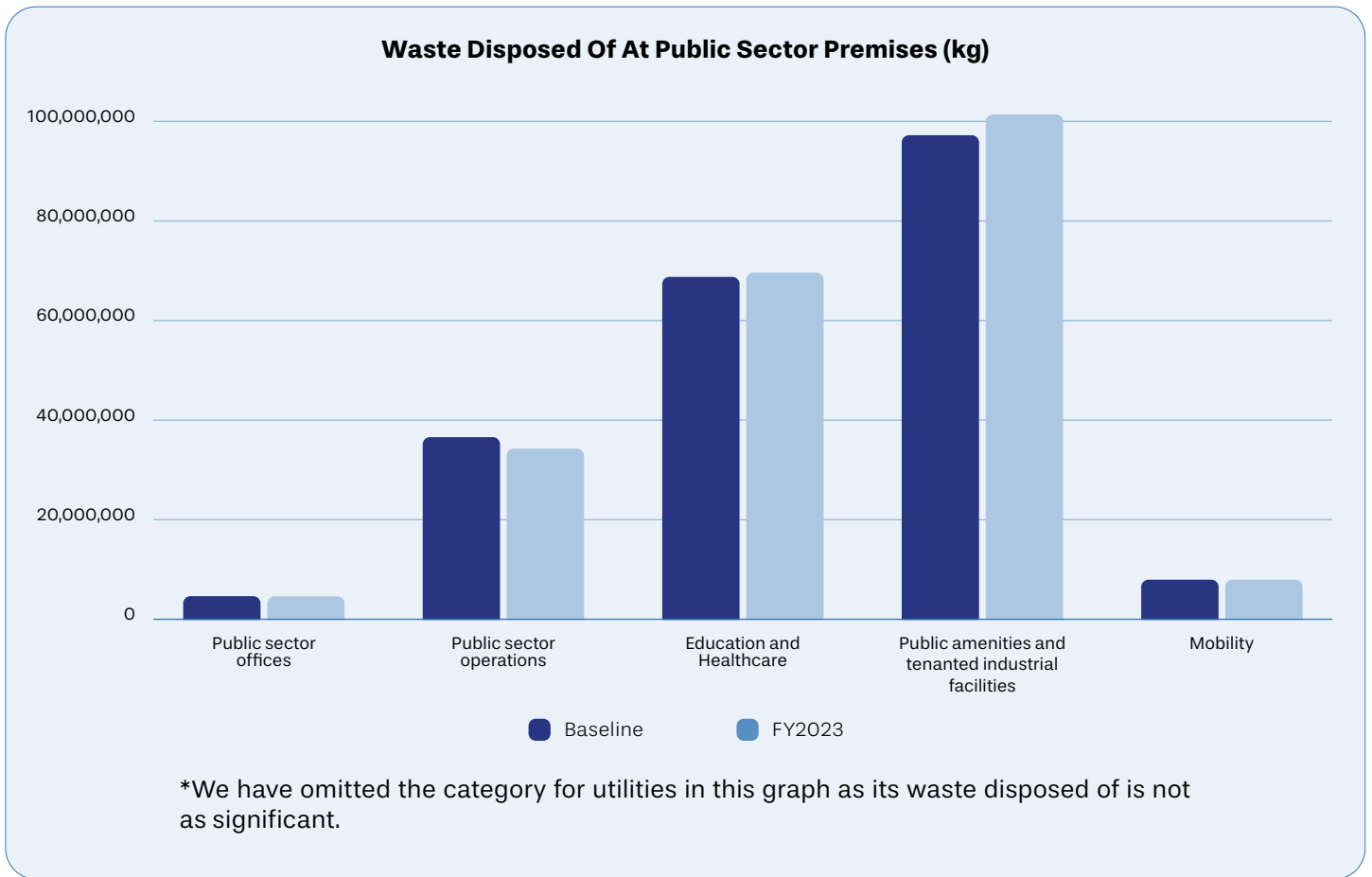
5.3.

Waste

5.3.1. Performance

In FY2023, the public sector disposed of around 218.7 million kilogrammes of waste, a 1.3% increase from the baseline. The increase is due to a return to normalcy post-COVID-19 at our tenanted industrial facilities as well as at some of our public-facing facilities with more visitors using these facilities.

	FY2022	FY2023	Change from baseline
Waste disposed of (million kg)	215.9	218.7	▲ 1.3%
Waste Disposal Index (kg/person/day)	0.418	0.380	▼ -9.1%



We have set a target to reduce our Waste Disposal Index²⁴ ("WDI") by 30% by 2030, compared against the baseline. The WDI in FY2023 was 0.380 kg/person/day, which was 9.1% lower than the baseline.

This is despite an absolute increase in waste disposed of across the public sector. Collectively, our efforts to reduce waste and increase reuse and recycling at our public sector offices and operational buildings ensured the amount of waste generated by each occupant and visitor was less in FY2023 than in FY2022, even as we catered for the return of more occupants and visitors at our facilities.

²⁴ Waste disposed of per person per day.



Wasting no effort to improve our data

We have been on a year-long quest to study our data collection process. Unlike electricity and water, waste disposal is not metered, and is tricky to measure. Some of our facilities also share the same bin centre with their neighbours or tenants, which may or may not be from the public sector. This made it quite challenging to identify the source, and avoid double counting the waste data. This challenge likely extends beyond the public sector.

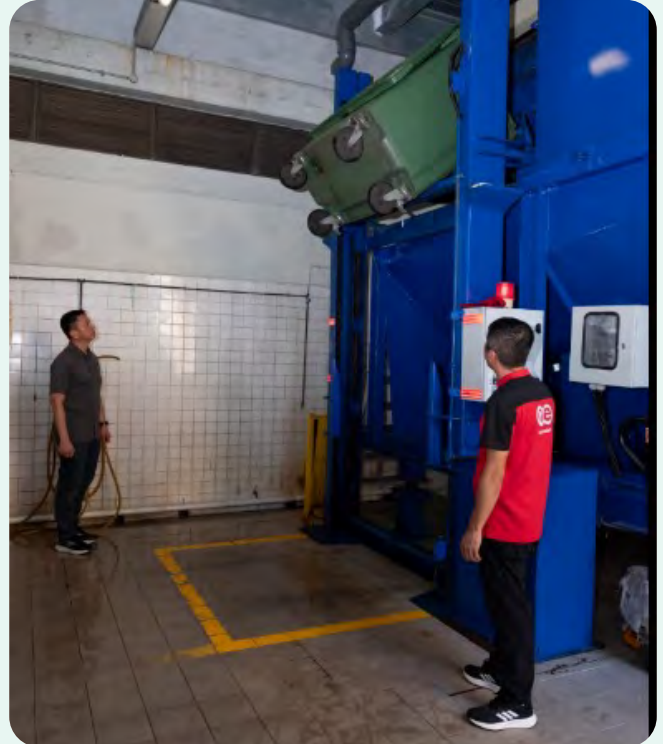
The team at MSE channelled their inner detectives and investigated the waste collection process. They staked out the bin centre to observe how the waste was weighed by collection trucks operated by the Public Waste Collector ("PWC"). They then compared the measurements against the building's in-house compactor. The weight of the compactor is recorded before any waste is added, and recorded once again after all the 660-litre green bins have been emptied. This allows the team to accurately track the amount of the waste disposed of each day.

The MSE team met with the appointed PWC, SembWaste Pte Ltd²⁵, to discuss data variances and practical challenges, and brainstorm ways to enhance the reliability of the waste data. One improvement made was to finetune the geofencing boundaries around GreenGov.SG facilities, so that the GPS location tag for each facility became more precise. In this way, the accuracy of the real-time waste data was more accurately logged by the collection truck at each location.

MSE and NEA also further engaged SembWaste Pte Ltd, ALBA W&H Smart City Pte Ltd and 800 Super Waste Management Pte Ltd collectively, to refine the waste data collection process across the three appointed PWCs, and share best practices and learning points.

MSE, which is the landlord of Environment Building, has also piloted a system whereby waste collected from the offices of its tenants are disposed of in different green bins and weighed separately to facilitate targeted waste reduction measures.

Waste from tenants at Environment Building is disposed of in different green bins, marked by labels of different colours.



▲ Cleaning staff at Environment Building explains how waste is compacted and weighed on-site to Government Chief Sustainability Officer Lim Tuang Liang.



²⁵ PWCs are appointed through open tenders to provide refuse and recyclables collection services for domestic and trade premises for one of six geographical regions within Singapore. Many of our GreenGov.SG facilities are served by PWCs and we usually obtain waste data from these PWCs.

5.3.2. Strategy

Over the past 40 years, waste disposed in Singapore has increased seven-fold on the back of rapid urbanisation, economic development and population growth. Our only landfill at Pulau Semakau will be full by 2035 if we continue to generate waste at the current rate. MSE and NEA launched the Zero Waste Masterplan in 2019, which lays out our key strategies to move away from the existing "take-make-dispose" economic model, towards a circular economy where we maximise the use of resources.



In 2023, around **3.3 billion kg** of waste was disposed of nationally. Around **7%** of this waste is from public sector premises.

A crash course on trash

As a land-scarce nation, we've had to find ways to turn our challenges and constraints into opportunities in waste management.

General waste from residential and commercial premises which is not sent for recycling is sent for incineration, which is quite an effective method of waste disposal as it reduces the volume of waste by up to 90% of its original volume. This substantially reduces the amount of space the waste would otherwise have taken up at Semakau Landfill.

On top of incinerating our waste, we also generate electricity through the process. All of our incineration plants can also be called waste-to-energy ("WTE") plants, because the heat from incineration is used to produce electricity.

Under the Zero Waste Masterplan, we have also set national-level 2030 targets to reduce the waste sent to landfill per capita per day by 30%, and achieve an overall recycling rate of 70%. You may already be aware of some regulations that we updated to help us achieve these targets:



From July 2023, larger supermarket operators were required to impose a mandatory disposable carrier bag charge. This is not a decision that was taken lightly. The idea stemmed from a Citizens' Workgroup on Reducing Excessive Consumptions of Disposables that was convened in September 2020. Details such as the charging model were further ironed out through extensive engagement and consultations with the industry and the public. The larger supermarket operators have reported reduction in the number of disposable carrier bags taken by customers, by around 70% to 80%.



In March 2023, we announced that we would be introducing the beverage container return scheme to nudge more people to recycle their beverage containers. Craving an ice-cold packaged drink to beat the heat? You may find that the cost of this drink may have gone up a little – all for a good cause. Certain pre-packaged drinks will now include a small deposit as part of their price, which will be refunded when you return these empty beverages at designated return stations.

The scheme is set to commence in 2026, as we work with our stakeholders in the beverage production industry to firm up several operational details.

Besides introducing new laws and regulations, we are also doing our part to adopt the 3Rs – reduce, reuse and recycle – ourselves, within the public sector. These efforts will help us to reduce the amount of waste sent for incineration and greenhouse gas emissions as a result.



Scrutinising our scraps through waste audits

To get a better handle on the key waste streams at different types of public facilities and implement specific measures to improve waste management, we arranged for 10 of our facilities to undergo waste

audits for a start. We chose facilities that were quite different from one another, to reflect and examine the circumstances and challenges faced across GreenGov.SG facilities. These facilities include:

Public sector offices	Public sector operations	Public amenities
<ul style="list-style-type: none"> • Civil Service College • Currency House • MAS Building 	<ul style="list-style-type: none"> • Animal & Plant Health Centre • Civil Defence Academy Complex • Police Cantonment Complex 	<ul style="list-style-type: none"> • Gardens by the Bay* • National Gallery Singapore • Sengkang Sport Centre • Taman Jurong Market & Food Centre

*Waste audit for Gardens by the Bay was conducted as a pilot project under the Tourism Accelerator Programme by Singapore Tourism Board

We had some very interesting findings and tailored recommendations on how we can best reduce waste at these facilities. Here's what we found out...

Waste profile

Across all facility types, the largest waste streams observed from the audits were food waste, plastic waste (including single-use disposables and takeaway

packaging), and paper and cardboard. Interestingly, we learnt that quite a fair amount of tissue paper was also found in the trash at these facilities.

A closer look into our public amenities...

Most of the waste generated here tends to be food waste such as:

- kitchen scraps – fruit peels, sugarcane bagasse
- edible food and liquids

...or waste linked to food, such as plastic, glass or cardboard packaging.

It would also come as little surprise that most of the waste is generated at food establishments and dining areas within these amenities.

In contrast, the profile of waste from bins at non-dining areas of these amenities saw more plastics like beverage containers, which often still have liquids in them.

How can we collectively tackle the different waste streams?



Benefits of reducing food waste:

- Reduce waste sent for incineration
- Reduce environmental impact of procuring and transporting food
- Food security
- Cost savings!

Our GreenGov.SG agencies are encouraged to better estimate food orders when organising events, and order just enough food for, or slightly less than, the expected number of attendees. This has already been recommended in our [best practice guide for organising events](#). If there is still extra food post-event, food that is still fit for consumption can be distributed to those who did not participate in the event.

Facilities that generate significant amounts of waste should try to implement some form of food waste management such as food waste treatment.

Find out more: HDB's deployment of on-site food waste treatment systems on page 44.



Scrutinising our scraps through waste audits



Opt for re-usable ware to reduce plastic waste

At staff canteens, discounts can be offered to customers who bring their own containers and cutlery, to incentivise the use of reusables over disposable ware.

You may be aware that if you have a cooked meal at our newer hawker centres, you will not be provided with disposables if you dine in. This is part of NEA's efforts to reduce single-use disposables at these hawker centres. Disposables are still available for those who order takeaways. If you are consuming your food at home, or have your own re-usable ware stashed in your office, you can help out by declining these disposables if you do not need them.

Find out more: GovTech's "Bring Your Own" stations on page 41.



Clean your plastics so that they can be chucked into a recycling bin

Many facilities are encouraging recycling through the provision of clearly labeled and prominent recycling bins. We will also soon have reverse vending machines to collect back empty beverage containers.

The next time you are at one of our community facilities, you can also contribute by emptying your bottles before discarding them into our recycling bins.

A waste sample taken from Sengkang Sports Centre showed that around 25% of the waste was made of up non-empty bottles filled with liquids. With just a little bit of effort to clean these bottles, these can be discarded in the recycling bins and avoid contamination.



Getting tenants onboard

Facilities with multiple tenants can look into designing more user-friendly recycling programmes. For example, recycling bins can be placed at prominent and more easily accessible locations, than general waste bins. These recycling bins should be clearly labelled, and remind people not to throw rubbish into these bins. It would also be a bonus if these bins could be portable, so that the tenants can move these around. Besides bins, other storage modes like metal cages can also be considered – as long as it gets the job done.

If you are a facility owner, you could also conduct your own waste audit and find out how you can better optimise resources to better tackle different waste streams at your facility. For instance, following the waste audit at Gardens by the Bay, they started working with some of their tenants to pilot the segregation of metal and plastic recyclables instead of disposing of them as general waste, as these were identified as significant waste streams.



Education & awareness

As we advance on our waste reduction journey across public sector facilities, agencies need to continue to educate their staff on recycling and waste management practices through training and awareness-raising campaigns.

5.3.2. Strategy

Reduce

It may seem obvious but the most effective way to reduce waste is to not generate it. We recognise that this is easier said than done, but there are some little things everyone can do to help, such as being more mindful of what we use and throw. Think of all the single-use plastic cups for our daily caffeine needs that can be saved if we opt for reusable ones.

In our best practice guide for organising environmentally friendly events, we have laid out some guidelines for event organisers, be it public sector agencies or other organisations, to consider when organising events. These include:

- minimising the use of disposables by providing reusable crockery and cutlery for participants' use or by requesting participants to bring their own reusable cups, cutlery and containers
- avoiding giving out disposable single-use bags
- avoiding single-use event set ups

Setting up a "Bring-Your-Own" station to reduce lunchtime waste

Did you know that our techies at the Government Technology Agency of Singapore ("GovTech") are also greenies at heart? They teamed up with Plastic-Lite Singapore to design and set up a Green Bounce station, a "one-stop station" of re-useable food containers for GovTech staff to takeaway their lunch and mitigate any Styrofoam or plastic guilt. Not only is this station stocked with reusable containers and utensils with clear labels for halal and non-halal ware, as well as bags donated by GovTech staff, there's even a UV-steriliser to make these reusables extra clean. And for the cherry on top of the cake, the station itself is made from upcycled furniture cut-offs!

GovTech staff picks up a reusable container from the Green Bounce station to reduce the use of plastic or Styrofoam containers.



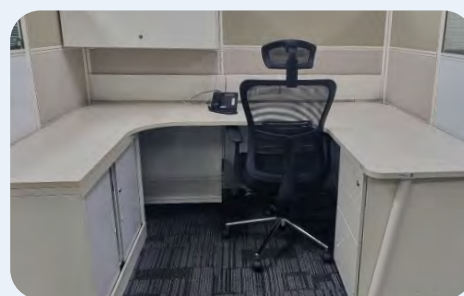
Office Tetris: Maximising space, minimising fuss

The Energy Market Authority ("EMA") managed to fit an expanding department into the same office space, while avoiding large volumes of waste generated from major renovations. It just took a little bit of creativity in the redesigning process. They swapped out the old L-shaped desktops with rectangular ones and added an extra chair, turning one-person cubicles into cosy duplexes.

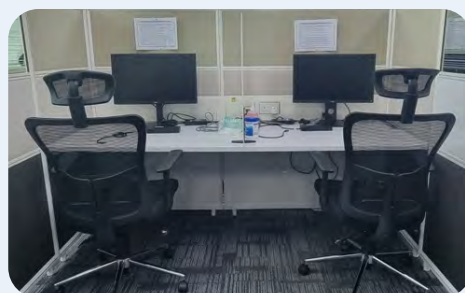
Using geometry to their advantage, EMA reduced the need for new furniture purchases, minimised disposal of old furniture, and limited the amount of re-wiring and cabling work needed. This idea was rather budget-friendly as well, accruing 70% savings.

Replacement of the L-shaped table to convert a one-person cubicle into a two-person desk.

Before



After



5.3.2. Strategy

Reuse

It is a waste to prematurely throw items or materials away while they are still in good condition. This is why we are ingraining the practice of reusing when we can. In some cases, this involves finding ways to extend the lifespan of things. In others, we can re-purpose them with some ingenuity for other practical uses.



Blast from the past: Giving old exhibition materials a new lease of life

Once an exhibition is over, the exhibition design and operation team at National Gallery Singapore ("the Gallery") gets to work finding ways to give the exhibition materials a second life. Instead of discarding existing structures and equipment, the Gallery stores items that can be re-used or re-purposed, such as pedestals, furniture or showcases, minimising the need to purchase new materials for future exhibitions. When they cannot reuse items, the Gallery plays matchmaker and finds new homes

for these items through the Museum Roundtable network²⁶ and schools.

For its *Tropical: Stories from Southeast Asia and Latin America* exhibition, the Gallery had procured a huge volume of sand to re-create a tropical scene. After the exhibition ended, the sand was donated to fill up a school playground sandpit, and some was even used for a sand art staff-bonding workshop for Gallery staff to channel their inner Michaelangelo and craft their own unique sand terrariums.



▲ New life for the sand from the Gallery as it is used to form a sand pit at a school.



▲ Colourful sand art terrariums made using dyed re-purposed sand from a past exhibition.

“Our efforts weren’t always smooth-sailing. Logistics is a big challenge. Although some schools or museums may be interested to give our exhibit items a second life, they might decide not to do so after a site recce, as they may face difficulties arranging their own transport, or storing some of these large and heavy items like showcases, plinths and platforms.

Storage of exhibition materials is also not always viable due to space constraints. Furthermore, certain materials can be a fire hazard if not stored properly. But despite these challenges, we’re glad to have a network of likeminded partners to help us continue pushing forward in our mission to be more sustainable. Every little bit counts.”

Teo Yen Sy, Assistant Director, Artwork & Exhibition Management at the National Gallery Singapore

²⁶ The Museum Roundtable is a collective established by the National Heritage Board, comprising over 50 public and private museums and heritage galleries.

5.3.2. Strategy

Recycle

It is not always possible to eliminate waste entirely or reuse everything as we go about our operations and daily activities. The next best step is to close as many waste loops as we can through converting recyclables into useful products. Under GreenGov.SG, building owners are required to cater for recycling programmes by ensuring that:

- there are recycling bins within their premises or within the vicinity, including for e-waste if the building is publicly accessible and has a high footfall
- food waste is segregated and treated on-site or sent for off-site treatment, for buildings with F&B establishments



From trash to tarmac: Recycling plastic waste for our roads

LTA is collaborating with institutes of higher learning and industry experts to develop a new road mix. Plastic waste is first processed, and incorporated as an additive to produce new road mix that is more durable than the standard asphalt mix. You need not be worried as these new road mixes undergo careful and rigorous testing to ensure that they meet our stringent environmental standards.

In FY2023, LTA, together with NUS, developed a new plastic-bituminous composite mix for general use on roads. There were two types of mixes developed:

one tailored for application on expressways and the other for arterial roads. These mixes, used in their respective trials at West Coast Highway and Pan-Island Expressway ("PIE"), withstood our local weather tantrums very well. Because of their unique properties, they had the added benefits of reducing noise from the roads and heat from our urban environment. Having wrapped the project up in February 2024, the project team is gearing up to include these custom mixes in more roads around Singapore.



▲ New road mix for arterial roads (top left) on trial at West Coast Highway (bottom left).

▲ New road mix for expressway (top right) on trial at PIE near Yunan Garden (bottom right).



A recipe for fighting food waste

Ever since HDB installed two food waste treatment systems at HDB Hub to process food waste from its F&B tenants, it has seen an 8% reduction in total waste disposed of daily. These systems break down organic waste and convert them into grey water that can be discharged through the sewer system.

Setting up the food waste treatment systems was just one part of the equation. The other part was making sure that it was being utilised correctly

through engagement and education. HDB handed out food waste bins to its F&B tenants to sort their food waste, and actively engaged them to share proper food waste segregation techniques. To further reduce food waste and maximise the use of the food waste treatment systems, HDB Hub will also be exploring pilots where staff, office tenants and nearby residents are invited to join in the food waste recycling fun.



▲ Food waste bin, distinct from other bin types, is being emptied into the food waste treatment system.



▲ The panel on the food waste treatment system showing the weight of the food waste contained.

Giving old batteries a new pulse

It comes as no surprise that the healthcare sector generates significant amounts of waste, mainly because they need to implement infection control practices and maintain hygiene. In operating theatres at Sengkang General Hospital ("SKH"), single-use wound debridement devices are widely used to maintain sterile conditions. These devices are fitted with a new set of batteries before every operation to ensure that they function throughout the entire duration. The lifespan of a battery exceeds that of the single-use device itself. At SKH, instead of discarding such used batteries, they are removed after each surgical procedure and reused in the patient pain

control pump post-surgery. SKH staff even use a multimeter – a stethoscope for batteries, if you will – to check the remaining battery life. Batteries with readings of more than 1.5V are reused once again in smaller appliances, ensuring that only spent batteries are finally deposited in the e-waste recycling bins.

It may seem like a simple effort, but it required a good dose of behavioural change by the healthcare team at SKH. The effort paid off – SKH saw around a 25% reduction of monthly order of batteries. More importantly, it showed that every bit counts and everyone can play a part in tackling e-waste.

Shifting our practice, one medication package at a time

Traditionally, all pharmaceutical medication packaging is discarded as waste and not recycled. TTSH partnered with a local recycling company in Singapore to recycle these non-hazardous packaging. This initiative has also been expanded to satellite pharmacies across TTSH to maximise impact.

Recycling does not always have to be fancy. Sometimes all it takes is to reconsider what we throw away. With this in mind, the Nursing team at TTSH worked together with the Pharmacy team to bring about behaviour change throughout the hospital.

Medication packaging, such as medication carton boxes and product information leaflets, are usually

discarded as general waste. However, as these packaging are non-hazardous, they can actually be sent for recycling. TTSH teamed up with a local recycling company, Plaspulp Union to recycle these pharmaceutical paper packaging.

This initiative, which started in June 2024, has now spread across TTSH, inspiring others in the hospital to re-think what they discard. The Pharmacy team has been tracking its waste and recycling data at the department level and has seen the fruit of its efforts - a steady monthly increase in the amount of paper sent for recycling.



▲ Poster at TTSH highlighting the Pharmacy's recycling initiatives.

6 ENABLE

A Role for Businesses and the Community



Our aspiration is for a public sector that works alongside Singaporeans and Singapore residents to build a sustainable Singapore. This can only happen if everyone pitches in. Under the Enable pillar, we are continuously refining our policies, procurement practices, and public engagement and outreach efforts, to nurture a **green economy** and a **green citizenry**.

6.1.

Green Economy

How we green our procurement

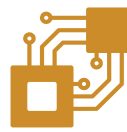
By increasing demand for greener products and services, the public sector can help enable the industry to green their operations and supply chains. We have previously introduced resource efficiency and environmental sustainability considerations for goods and services procured by the public sector across these nine categories in 2007, and continue to update them in line with developments and technological progress:



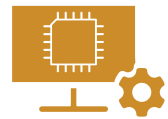
Accommodation and event venues



Building design and building products



Electrical and electronic equipment



Information and communications technology ("ICT") equipment



Landscaping



Printing paper



Public waste collection and cleaning services



Vehicles



Water fittings and equipment

We are scaling up the considerations for the construction and ICT sectors, introducing more sustainability-related considerations for projects, including some supplier-based considerations. From FY2024, up to 5% of evaluation points will be set aside for environmental sustainability considerations for large construction and ICT tenders when their minimum estimated procurement values are above \$50 million and \$10 million respectively. Together, these two sectors account for more than 60% of the value of the public sector's procurement contracts. We consulted the industry and incorporated their feedback into tenders for construction and ICT projects from 2023.

Our eventual goal is to have all government procurement tenders include environmental sustainability considerations by 2028 in a manner that takes into account industry developments. As such, environmental sustainability considerations are also being incorporated into other project categories, with a view towards broader adoption across the public sector. For example, in the tender for engaging consultants to advise us on sustainability reporting, i.e. this GreenGov.SG report, we also included criteria to assess the tenderers on their companies' environmental sustainability efforts.

We have highlighted some of our green procurement initiatives in the subsequent pages.

Giving the green light for sustainable construction

Besides expanding our public transport network to provide greener alternatives to cars, LTA is also looking into ensuring that our public transport infrastructure is built in a sustainable way. LTA introduced sustainability criteria into the construction tender for the new Cross Island Line Phase 2 and worked with the industry to incorporate their feedback. Beyond requirements, which included ensuring resource conservation and management, tenderers who proposed additional sustainability initiatives were awarded additional points. Overall, the responses from the tenderers were promising!

86% included proposals to use more sustainable materials. Such materials include Ground Granulated Blast-furnace Slag ("GGBS"), to substitute up to 70% of cement.

43% of tenderers were also accredited with green certification schemes such as **ISO50001**.

This can reduce embodied carbon by more than 50% compared to only using concrete.



Some tenderers had also proposed project-specific initiatives such as employing solar street lighting for temporary traffic diversion.

LTA has also engaged its Electrical & Mechanical ("E&M") contractors to better understand their readiness to green their operations and supply chain, and were heartened that 62% of the contractors have a clear corporate sustainability strategy that covers both the company and its supply chain. New E&M tenders called by LTA have also included sustainability requirements such as sourcing of equipment and materials that demonstrate sustainable manufacturing and installation practices with low carbon footprint, including the use of low Global Warming Potential refrigerant chillers for all new chillers regardless of cooling capacities.

Our quest to go green as we go digital

We are pushing forward with our Smart Nation ambitions and plans for Singapore, and making use of new digital capabilities to make public services more accessible and convenient for Singapore residents. As we reap the benefits of digitalisation, we are also inevitably consuming more energy for computational processes and storage, which can accumulate over time.

GovTech is greening its procurement to minimise the environmental impact of our digitalisation, and to promote more sustainable practices within the ICT & Smart Systems ("ICT&SS") sector. It has incorporated sustainability criteria for the Personal Computer ("PC") bulk tender, which aggregates and supplies PC and associated peripherals for public officers across public sector agencies. Feedback from the industry was sought and incorporated to ensure that the criteria were effective without creating undue burden for suppliers.

Moving forward, the public sector will include the following considerations for future ICT-related tenders meeting the \$10 million threshold:



whether the suppliers have published climate-related disclosures



environmental sustainability certification for supplied products



level or extent of sustainable packaging utilised

Next on GovTech's to-do list for green procurement is to look at Cloud Service Providers and Data Centre operators.

Beyond procurement, we are exploring the use of other levers to encourage the adoption of environmental sustainability.

Giving our State properties a green lease of life

As the landlord of leased State land and property, Singapore Land Authority ("SLA") is not only aiming to reduce the environmental footprint of its operations, but also working with their tenants to encourage more sustainable practices. Here's a glimpse at some of their efforts:

- 1 As part of Price-Quality tenders to let out State properties, SLA awards up to 10% of the total score to potential bidders who demonstrate a strong commitment to sustainability such as through sustainable initiatives and practices.
- 2 SLA is progressively implementing green tenancy requirements for all new non-residential tenancy agreements with commercial uses, with the aim of having green requirements in all commercial tenancy agreements. Tenants will need to make sure that their electrical appliances and water fittings attain efficiency ratings to reduce utility consumption levels.
- 3 To help tenants navigate this green transition, SLA has also produced an in-house tenant sustainability guide that offers practical suggestions, such as selecting efficient water and electrical fittings, as well as a directory of green resources.

Through these initiatives, SLA is working hand in hand with the tenants at its State properties towards a more sustainable Singapore.

#SustainableActions Toolkit
Adopt Environmentally Friendly Habits


► Procurement

Green Procurement

As you renovate and fit out your unit, look out for products and services certified by the Singapore Green Building Council.


Singapore Green Building Product Certification

- The Certification enhances carbon-efficiency and facilitates sustainable procurement, by ensuring that sustainability is integrated throughout the design and manufacturing process of green building products.





Singapore Green Building Services Scheme

- The Scheme recognises building consultants who are committed to supporting the green movement, and strive to promote best practices to support environmental sustainability in the industry.
- Certified firms have strong track record in Green Mark projects and environmental credentials that stand out from their peers.



TIP

Find a list of certified Singapore Green Building Products and Services here.

Products
Services

16

▲ An excerpt on green procurement from SLA's in-house tenant sustainability guide.

How we help businesses transition

For more details, please visit [Enterprise Singapore's website.](#)

Greening businesses can come with a cost, and the government has made a range of resources and grants available to reduce that price tag. To help businesses, especially Small and Medium Enterprises ("SMEs"), join this journey, we expanded our support for businesses in 2024, such as by expanding the scope of the Enterprise Financing Scheme - Green and launching a new SME Sustainability Reporting Programme. These are intended to help companies develop sustainability as a source of competitive advantage as Singapore transitions to a green economy.

Some of our polytechnics are also offering platforms and programmes to promote knowledge sharing across industry and academia, such as:

Looking for help in Carbon Accounting?

For those looking to assess your carbon footprint, Republic Polytechnic ("RP") has launched GO Carbon Management Programme ("goCMP") in partnership with the Singapore Logistics Association, to empower SMEs to calculate their operational carbon footprint. With this knowledge, they would be better placed to progress towards net zero. Drawing on its extensive expertise in supply chain management, RP supports companies in establishing their emissions baseline using the Greenhouse Gas ("GHG") Protocol and provides guidance throughout their carbon reduction efforts. Since its inception, nearly 20 SMEs have benefited from goCMP. RP's expertise in supply chain management and logistics allows it to tap on its experienced staff to train SMEs in the logistics sector on inventory scoping, verification, carbon accounting and management.

goCMP is also included in the list of pre-approved programmes accepted for Workforce Singapore's Career Conversion Programme for Sustainability Professionals, making it even easier for companies to upskill their workforce and adopt greener practices.

...or help in developing Green Solutions?

If you are a corporate looking to green your operations, you may be interested in what Nanyang Polytechnic ("NYP") has to provide. Under their Alliance for Sustainability Innovation ("ASI") launched in October 2023, over 300 SMEs are learning how to improve productivity and efficiency in a sustainable manner from industry experts from TÜV SÜD, Schneider Electric, KPMG, and Singtel. The ASI enables these corporates to collaborate with NYP's schools and other industry partners on sustainability projects.

For example, tech firm W-Locate worked together with a team of NYP lecturers to pioneer a solution to reduce the carbon footprint from cement mixers at constructions. Not only does this reduce GHG emissions, there are also cost savings as less fuel is used!

ASI was launched at the 'Decoding Sustainability: Inspiring Innovation & Empowering Enterprises' event in October 2023.



6.2.

Green Citizenry

Every individual, household and organisation can bring unique values and perspectives to pioneer sustainability solutions for Singapore in their respective areas of influence. This is why we are partnering fellow Singaporeans to include environmental sustainability messages or ideas at our various community touchpoints and events, so that together, we can integrate environmental sustainability into our way of life.

Sprouting the next generation of sustainability champions

The National Library Board ("NLB") has been busy nurturing our future sustainability champions – they have coordinated over 280 sustainability-related programmes that have reached out to nearly 17,000 participants. These programmes are flourishing thanks to the enthusiastic support of partners like Dunman Secondary School ("DSS").

With a bag full of storybooks, these enterprising DSS students managed to capture the attention of their young audience through fun activities tied to the storybooks, such as seed planting.

The next time you visit the library, you might be able to witness first-hand NLB and its partners working hand-in-hand to plant the seeds for a more sustainable future.



▲ DSS students leading an interactive storytelling session.

Go Green SG: A national sustainability movement

In the spirit of rallying to take collective action towards a sustainable future for Singapore, we launched a nationwide programme, Go Green SG.

Launched by then-DPM Lawrence Wong in June 2023, the inaugural edition featured over 300 activities organised by more than 160 partners from across the 3P sectors, more than double the number of partners and activities as compared to Climate Action Week in 2022.



▲ Go Green SG participants learnt about carbon sources and carbon sinks through the Carbon and Climate Tour organised by Gardens by the Bay.



▲ Go Green SG participants doing their part to keep our beaches clean in a beach clean-up organised by Stridy.



▲ Participants also got the chance to attend exclusive behind-the-scenes tours and learning journeys, such as to the Ulu Pandan Water Reclamation Plant.

▲ Preschoolers from PCF Sparkletots learnt how to correctly identify recyclables.

Our second edition of Go Green SG was even bigger in scale. In July 2024, we had 51,000 participants engage in around 400 sustainability-related activities, organised by 200 of our committed 3P sector partners. Participants were engaged in a variety of activities, from making coasters from upcycled plastics to learning about sustainable farming practices.

MISSION ACCOMPLISHED



96%

of participants agreed that Go Green SG increased their understanding of sustainability efforts



>90%

of participants said they were willing to advocate for and lead a more sustainable lifestyle after taking part in Go Green SG

This whole-of-nation sustainability movement was possible thanks to the support from our 3P sector partners, including over 13 public agencies, which helped MSE to orchestrate this whole-of-public sector effort.

Visit <https://www.gogreen.gov.sg> to see our summaries and photos from the various Go Green SG activities.



Empowering communities for a greener Singapore through the SG Eco Fund



Supported **250** sustainability initiatives which engaged **more than 670,000** people

Are you passionate about environmental sustainability and want to spread the green message? The SG Eco Fund could help you kickstart your ideas into action. Set up in 2020, the Fund supports projects that advance environmental sustainability and also involve the community in Singapore. As of FY2023, the SG Eco Fund has supported more than 250 ground-up environmental sustainability initiatives started by passionate individuals from all walks of life, covering various domains, such as waste reduction and recycling, nature and biodiversity conservation and community farming. Through these initiatives more than 670,000 members of the community have been engaged on environmental sustainability.

One of the projects supported by the SG Eco Fund is by The Green and Purple Movement Pte Ltd. The social enterprise converted a multi-storey carpark rooftop into a community farm, which provided employment for Persons with Disabilities and the elderly. More than 1,000 residents from nearby residences had the chance to be involved in composting of food waste and growing of vegetables. What's more – through the collective efforts of the community, over 1,400 kg of vegetables were produced, with some sold to sustain the community farm and the rest distributed to the community.

7 EXCITE

Public Officers to Think and Work Sustainably



At the heart of GreenGov.SG are dedicated public officers who are passionate and curious about sustainability, seek new knowledge, and put what they have learnt into action. We endeavour to embed a culture of learning and a culture of action, so that every public officer is inspired and empowered to contribute actively towards environmental sustainability. It is our hope that Singaporeans and businesses share our enthusiasm, and will join us as we build a greener and more sustainable Singapore.

7.1. A Culture of Learning

As public officers, we handle a diverse range of issues in our day-to-day work, from developing new policies which improve the lives of Singaporeans to ensuring our public utilities and amenities are functional and in good shape. Even as we perform these various functions, it is increasingly important for each and every public officer to also know how to care for the environment as our shared resource. The courses and training that we develop and conduct together with our knowledge partners are open to all public officers who wish to learn more about environmental sustainability.

Greening our workforce

Through the Sustainability 101 Course for Policy Officers which began in October 2022, we have trained around 220 public officers and equipped them with the skills and knowledge to develop well-balanced, science-based policies that align with Singapore Green Plan goals. The National Climate Change Secretariat ("NCCS") in the Prime Minister's Office Strategy Group worked closely with the NUS School of Continuing and Lifelong Education and the Centre for Nature-based Climate Solutions ("CNCS") of NUS to put together a comprehensive course curriculum, outlined below, which was then conducted by CNCS.

- ✓ Appreciate international developments and sustainability trends
- ✓ Understand policy implications of the IPCC reports
- ✓ Develop perspectives on core pillars mitigation, adaptation, green economy, international negotiations, sustainability champions, and science and technology
- ✓ Develop awareness of sustainability reporting and green financial instruments
- ✓ Understand how to incorporate sustainability considerations in their respective work domains

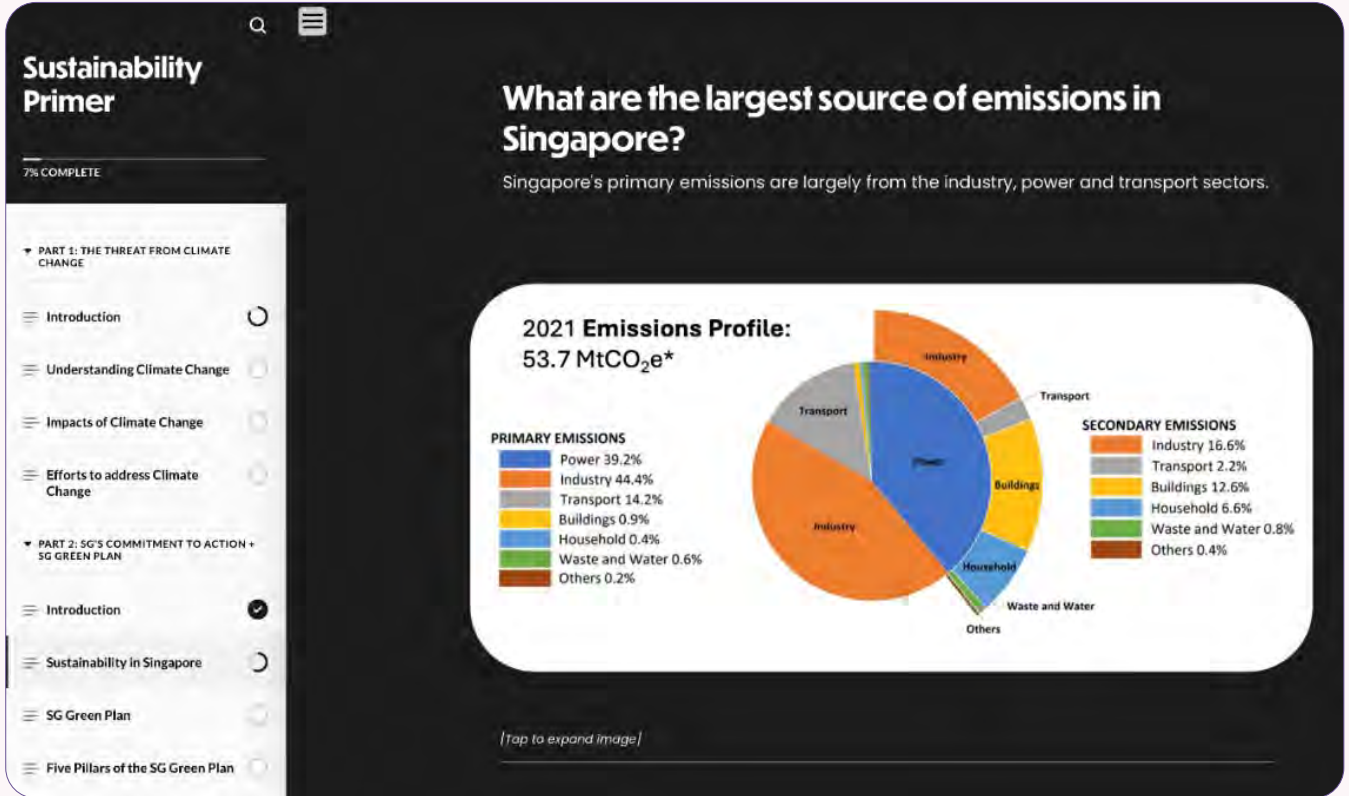
Sustainability 101 contributes to our "whole-of-nation" efforts to create a sustainable pipeline of green talent for Singapore.



▶ A group presenting their project proposal during the Sustainability 101 course.

Priming ourselves for success

MSE aims to bring all public officers along the journey of greening the public sector. Within six months of the launch of the MSE Family Sustainability e-Primer in 2023, over 8,000 public officers in the MSE family had completed the digital course and familiarised themselves with climate change issues and the sustainability priorities of the public sector. In the spirit of "sharing is caring", MSE teamed up with NCCS and the Civil Service College ("CSC") to roll out the Sustainability Primer for Public Officers. This is now also available for all public officers to access and learn at their own pace and convenience through their digital devices.



A screenshot from the Sustainability Primer for Public Officers.

We complement formal courses and training with informal learning platforms, such as our Community of Practice ("CoP") network. The CoP was initiated for public officers to share best practices and learn from each other on environmental sustainability issues in different fields, such as energy efficient buildings, sustainability reporting and food waste management. CoP sessions are lively affairs, with public officers freely exchanging ideas and solutions to tackle various problems they encountered in their sustainability journey. These sessions are not limited to the CoP network, but are open to all public officers who are interested in the topic.

7.2. A Culture of Action

Beyond being immersed in a culture of learning, it is our hope that public officers translate what they have learnt into action to reduce our environmental footprint. To this end, our public sector agencies have adopted creative ways to nurture a culture of sustainability among their staff.

Beyond the camo: Building a greener MINDEF/SAF

The Ministry of Defence ("MINDEF")/Singapore Armed Forces ("SAF") has adopted a two-pronged approach to nurture a culture of learning and a culture of action within their organisation.

In January 2024, MINDEF/SAF organised the inaugural Sustainability Learning Day at the Marina Barrage. Over 100 sustainability advocates across MINDEF/SAF gathered for a fruitful day of learning and exchanging notes on best practices on sustainability at work to tackle climate change.

These environmental advocates reaffirmed their commitment towards the Green Plan as they updated one another on sustainability developments and ground-up initiatives such as the use of recycled materials for runway repair and ways to reduce power consumption of IT systems. MINDEF/SAF also recognised and appreciated individuals, including National Servicemen, Active Servicemen and Defence executives, who implemented ideas and initiatives to make their workplace more sustainable.

MINDEF/SAF also introduced some friendly competition through the SAF Sustainability Challenge, a year-long eco-showdown involving 33 camps and bases with the goal of raising awareness and instilling ownership on resource consumption, as well as to award those which are able to achieve the biggest reductions in their resource use.

Camps and bases jumped right in, and monitored their consumption closely. Higher-than-usual consumption levels were identified and corrective measures were quickly implemented, such as repairing leakages. These efforts contributed to approximately 7% reduction in overall MINDEF's WEI.

Tuas Naval Base, Tengah Airbase, and Seletar Camp emerged as top performers and their efforts in reducing electricity and water usage through advocacy and technology were recognised at the MINDEF/SAF Sustainability Learning Day.

This challenge proved that when it comes to sustainability, collective action (and a little element of competition) drives meaningful progress.



“We rose up to the challenge of reducing our resource footprint. We installed solar panels in around 90% of our buildings, and switched to water-efficient fittings. We also ramped up our recycling efforts. Implementing all of these initiatives was no mean feat and I am thankful for our supportive commanders. We will continue to work towards a sustainable future.”

▲ Major (MAJ) Kevin Tan Cheng Cai, Logistics Branch, Headquarters Army Combat Engineers Group received the award on behalf of Seletar Camp which won the SAF Sustainability Challenge Award for various sustainability initiatives in the camp.

Nurturing continued enthusiasm for sustainability

Through an aerobic home composting workshop, 40 Ministry of Social and Family Development ("MSF") officers learnt more about composting and the art of balancing carbon-rich and nitrogen-rich materials to facilitate the decomposition process. Participants brought home their own aerobic home composting bin starter kits to tackle food waste in their homes. A dedicated WhatsApp support group was also created for these home composting enthusiasts to clarify doubts with the workshop trainer and encourage each other along their journey.

Public officers from the Ministry of National Development ("MND") and its agencies (BCA, Council for Estate Agencies, Gardens by the Bay, HDB, National Parks Board and Urban Redevelopment Authority) have come together to form the MND Family Green Group to engage fellow colleagues on sustainability matters. In FY2023, the MND Family Green Group adopted the theme "Waste Less, Save More". In line with the theme, the group organised field trips for MND Family officers to understand waste management and processing of e-waste in Singapore, as well as a workshop at Jurong Lake Gardens to learn composting techniques, processes, and best practices, to then take back and implement in their respective workplaces.



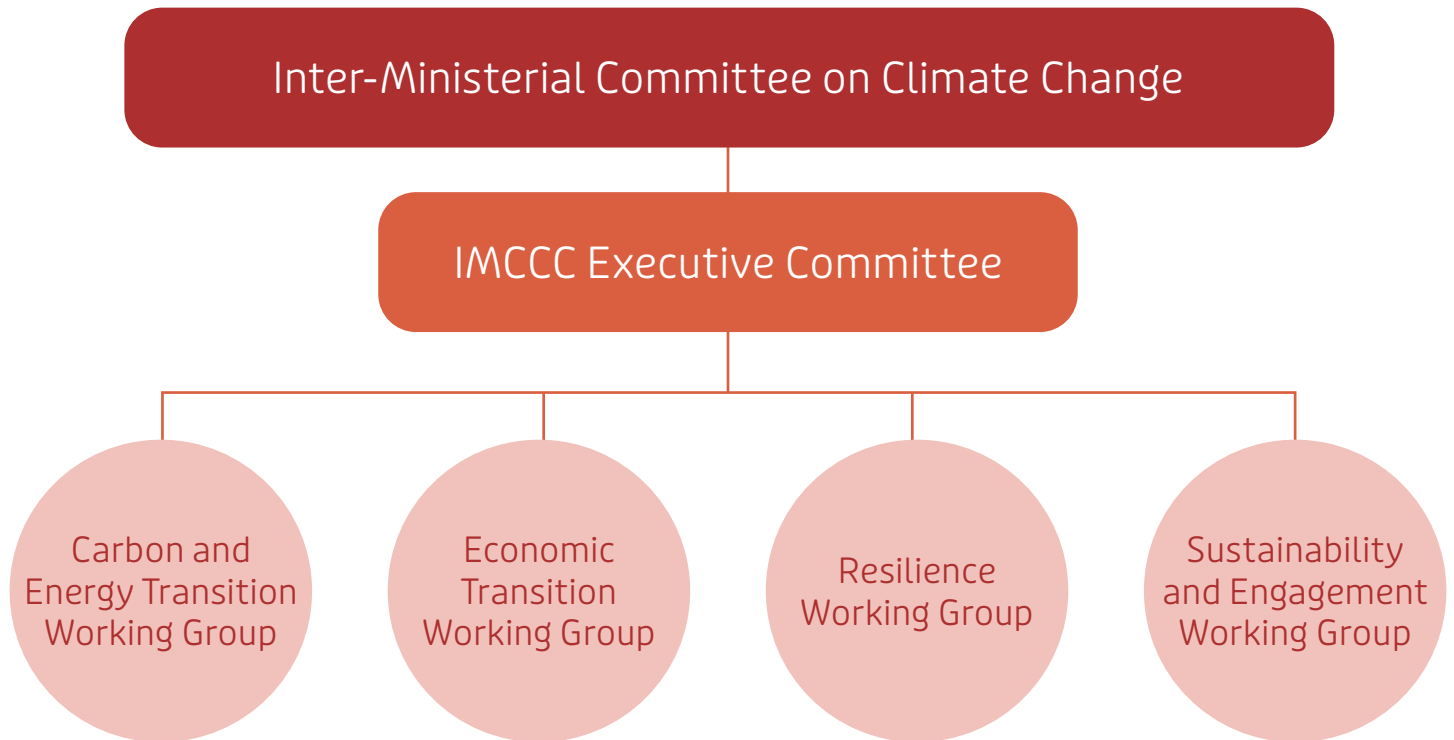
MSF officers who attended the workshop each received a composting bin starter kits.

8 GOVERNANCE



Given the scale of our operations, spearheading sustainability across the public sector requires a coordinated approach that is supported by strong leadership. This is important, as good governance provides strategic direction and ensures accountability across our agencies towards the realisation of the targets set.

The Inter-Ministerial Committee on Climate Change ("IMCCC") enhances coordination on climate change policies across the public sector, to ensure that Singapore is prepared for the impacts of climate change.



The IMCCC was established in 2007. It currently comprises the following members:

- **Mr Teo Chee Hean (Chair)**
Senior Minister and Coordinating Minister for National Security
- **Mr Gan Kim Yong**
Deputy Prime Minister and Minister for Trade and Industry
- **Ms Grace Fu**
Minister for Sustainability and the Environment and Minister-in-charge of Trade Relations
- **Dr Vivian Balakrishnan**
Minister for Foreign Affairs
- **Mr Desmond Lee**
Minister for National Development
- **Ms Indraneel Rajah**
Minister, Prime Minister's Office, Second Minister for Finance and Second Minister for National Development
- **Dr Tan See Leng**
Minister for Manpower and Second Minister for Trade and Industry
- **Mr Chee Hong Tat**
Minister for Transport and Second Minister for Finance

To support the IMCCC's work, the IMCCC Executive Committee ("Exco") and various Working Groups have been established. The IMCCC Exco comprises the Permanent Secretaries, Managing Directors, Chairmen and Chief Executives of the relevant Ministries and Statutory Boards.

The IMCCC Exco oversees the Working Groups. The Working Groups and their responsibilities are as follows:

Carbon and Energy Transition Working Group

The Carbon and Energy Transition Working Group oversees the implementation of mitigation measures and develops plans to enable Singapore's transition to a low-carbon and clean energy future.

Economic Transition Working Group

The Economic Transition Working Group oversees Singapore's transformation towards a sustainable and low-carbon economy for both existing sectors and new growth areas.

Resilience Working Group

The Resilience Working Group studies Singapore's vulnerability to the effects of climate change and develops long-term plans aimed at safeguarding the nation's resilience to future environmental changes.

Sustainability and Engagement Working Group

The Sustainability and Engagement Working Group develops plans to drive the national sustainability agenda. This includes GreenGov.SG, capability building efforts within the public sector, as well as domestic and international engagement programmes.

We appointed our first Government Chief Sustainability Officer ("GCSO") in January 2023 to better drive our governmental sustainability efforts. The GCSO works with public agencies to develop plans aimed at realising a sustainable, resource-efficient and climate-resilient Singapore, and spearheads the government's partnership with various stakeholders, including businesses, civil society partners and individuals. The GCSO also partners the Chief Sustainability Officers of public agencies to develop and coordinate strategies for GreenGov.SG, through the GreenGov.SG Steering Committee.

9 APPENDIX



APPENDIX A – Performance Data

9.1. General Information

9.1.1. Boundaries

The performance data presented in this report includes all Ministries, Organs of State and Statutory Boards. The current year is defined as FY2023, which runs from 1 April 2023 to 31 March 2024. The assets in scope are limited to those located in Singapore, and include premises funded and/or managed by government agencies.

In this appendix, we have provided a breakdown of the performance data by the following Ministry families:

- Ministry of Communications and Information ("MCI")²⁷
- Ministry of Culture, Community and Youth ("MCCY")
- Ministry of Defence ("MINDEF")
- Ministry of Education ("MOE")
- Ministry of Finance ("MOF")
- Ministry of Foreign Affairs ("MFA")
- Ministry of Health ("MOH")
- Ministry of Home Affairs ("MHA")
- Ministry of Law ("MinLaw")
- Ministry of Manpower ("MOM")
- Ministry of National Development ("MND")
- Ministry of Social and Family Development ("MSF")
- Ministry of Sustainability and the Environment ("MSE")
- Ministry of Trade and Industry ("MTI")
- Ministry of Transport ("MOT")
- Prime Minister's Office ("PMO")
- Organs of State²⁸ ("OOS")

9.1.2. Utility Consumption Data

All utility consumption by public sector agencies is generally accounted for. If a public sector building is occupied by multiple public sector agencies, the consumption is generally attributed to the public sector agency which is the building landlord. Where feasible, the consumption of private sector tenants is excluded, as they do not fall under the scope of GreenGov.SG. If a public sector agency is located in a private sector building, the consumption is generally accounted for, if measured data on consumption of individual utilities can be obtained.

²⁷ MCI has been renamed the Ministry of Digital Development and Information ("MDDI") effective 8 July 2024. For the purpose of this report, we have used MCI to reflect FY2023 operating circumstances.

²⁸ Includes the Judiciary, Parliament, the Attorney-General's Chambers and the Auditor-General's Office.

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9.1.3. Waste Data

Waste disposed of is accounted for by public sector agency owners of their respective premises. Agencies have been advised to use measured waste data in the first instance, as reported by the Public Waste Collectors ("PWCs") or the General Waste Collectors ("GWCs") which serve the GreenGov.SG premises. For PWCs, the waste is weighed at the point of collection through load cells installed on the waste collection truck. Premises that have on-site waste weighing capabilities may report waste data obtained through self-weighing.

9.1.4. Data Preparation and Restatement

The GreenGov.SG Secretariat has obtained recommendations from a consultant on our data preparation processes, and will continue to refine our data governance and controls. We have restated some of our past data due to improvements in our data collection processes and methodologies. We have provided explanations in footnotes where necessary.

9.2. Greenhouse Gas Emissions and Energy

9.2.1. Baseline

The public sector aims to peak our emissions around 2025 and achieve net zero emissions around 2045. We have taken FY2020 to be the baseline year for emissions, as this was when we began to systematically collect emissions data.

The public sector has set a target to improve EUI by 10% by 2030 from the average of FY2018 to FY2020. This baseline was chosen because we want to better reflect hybrid working arrangements post-pandemic.

9.2.2. Total Emissions (Scope 1 and 2)

The public sector's total Scope 1 and 2 emissions for FY2023 was 3,611,856 tCO₂e. Our total emissions decreased slightly by 0.2% from FY2022 as the decrease in Scope 1 emissions outweighed the increase in Scope 2 emissions. There was a 6.8% decrease compared to the baseline, mainly due to the decommissioning of Tuas Waste-to-Energy Plant in 2022. We expect emissions to continue to increase for a bit more as we complete a number of key infrastructural projects which were delayed due to COVID-19 disruptions.

APPENDIX A – Performance Data

TABLE 1 – Scope 1 and 2 emissions by Ministry family

Ministry family	Baseline (tCO ₂ e)	FY2021 (tCO ₂ e)	FY2022 (tCO ₂ e)	FY2023 (tCO ₂ e)	Change from baseline to FY2023
MCI	13,815	14,839	14,874	15,082	9.2%
MCCY ²⁹	53,494	61,414	62,607	60,117	12.4%
MINDEF	512,534	472,590	478,592	492,664	-3.9%
MOE	410,387	432,059	441,501	432,287	5.3%
MOF ³⁰	18,592	16,759	17,301	17,921	-3.6%
MFA	2,973	3,043	2,943	2,826	-4.9%
MOH	274,499	290,546	291,247	297,909	8.5%
MHA	156,619	161,854	159,549	176,957	13.0%
MinLaw ³¹	3,454	3,402	3,447	2,639	-23.6%
MOM	8,336	7,995	8,607	7,324	-12.1%
MND ³²	52,470	55,741	55,171	56,201	7.1%
MSF ³³	6,864	7,043	7,043	7,471	8.8%
MSE ³⁴	1,093,290	1,031,421	795,912	722,873	-33.9%
MTI ³⁵	117,009	120,140	120,352	111,648	-4.6%
MOT ³⁶	1,118,193	1,098,582	1,120,252	1,170,986	4.7%
PMO ³⁷	24,628	25,803	28,751	27,935	13.4%
OOS	9,432	9,610	9,154	9,016	-4.4%
TOTAL	3,876,589	3,812,841	3,617,303	3,611,856	-6.8%

²⁹ MCCY's historical total emissions were restated to exclude facilities that are not under its operational control, and to incorporate updates to diesel consumption.

³⁰ MOF's historical total emissions were restated to include more accurate and complete data from its facilities.

³¹ MinLaw's historical total emissions were restated to include the emissions generated by their public sector tenants.

³² MND's historical total emissions were restated to include more accurate and complete data from its facilities and Scope 2 emissions from district cooling.

³³ MSF's historical total emissions were restated to incorporate updates to diesel consumption.

³⁴ MSE's historical total emissions were restated to include more accurate and complete data from its facilities.

³⁵ MTI's historical total emissions were restated to include Scope 2 emissions from data centres and district cooling.

³⁶ MOT's historical Scope 2 emissions were restated to include more accurate and complete data from its facilities and operations.

³⁷ PMO's historical total emissions were restated to include facilities that were not reported in the FY2022 report.

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9.2.3. Scope 1 Emissions

The public sector's total Scope 1 emissions for FY2023 were 1,367,002 tCO₂e, a 0.9% decrease compared to FY2022. This can be attributed to a decrease in the direct emissions generated by our operational Tuas South Waste-to-Energy Plant, which offset the increase in diesel use due to increased bus service mileage from improving bus frequencies and coverage. Our FY2023 emissions were 21.2% lower than the baseline, mainly due to the decommissioning of the Tuas Waste-to-Energy Plant. Waste has been diverted to other waste-to-energy plants in Singapore, including those operated by the private sector.

TABLE 2 – Scope 1 emissions by Ministry family

Ministry family	Baseline (tCO ₂ e)	FY2021 (tCO ₂ e)	FY2022 (tCO ₂ e)	FY2023 (tCO ₂ e)	Change from baseline to FY2023
MCI	15	17	15	17	13.3%
MCCY	1,123	1,052	1,047	1,065	-5.2%
MINDEF	290,863	248,443	253,494	263,057	-9.6%
MOE	721	1,087	680	619	-14.1%
MOF	159	139	182	181	13.8%
MFA	19	17	15	20	5.3%
MOH	1,414	1,276	2,092	1,179	-16.6%
MHA	40,911	45,960	49,458	48,501	18.6%
MinLaw	2	4	4	4	100.0%
MOM	74	152	153	116	56.8%
MND	42	30	26	45	7.1%
MSF	368	344	349	278	-24.5%
MSE ³⁸	795,618	732,867	501,261	450,837	-43.3%
MTI	511	1,159	832	1,106	116.4%
MOT	602,095	575,094	569,155	599,653	-0.4%
PMO	311	337	392	314	1.0%
OOS	16	16	11	10	-37.5%
TOTAL	1,734,262	1,607,994	1,379,166	1,367,002	-21.2%

³⁸ MSE's Scope 1 emissions include emissions from NEA's waste-to-energy plants, which generate electricity during the waste incineration process. Any excess electricity generated that is not used by the plant is sold to the electricity grid. There is a small amount of double counting of emissions, as the emissions generated from producing electricity are accounted under MSE's Scope 1 emissions and in the Grid Emission Factor, which affect Ministries' Scope 2 emissions. Around 3% of electricity from the grid is generated by waste-to-energy plants.

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9.2.4. Scope 2 Emissions

The public sector's total Scope 2 emissions for FY2023 were 2,244,854 tCO₂e, a 0.3% increase from FY2022 and a 4.8% increase compared to the baseline. The increase is mainly due to the increased use of electricity due to the expansion of our transport and healthcare infrastructure. The Thomson–East Coast Line ("TEL") Stage 3 was opened in November 2022 and operated for the full duration of FY2023. New healthcare facilities were added, such as Tan Tock Seng Hospital (TTSH) Integrated Care Hub and Woodlands Health, to accommodate more hospital beds and growing patient needs. This outweighed reductions in emissions due to the 1.2% improvement in the national Grid Emission Factor ("GEF"). The GEF decreased from 0.417 kg CO₂/kWh in FY2022 to 0.412 kg CO₂/kWh in FY2023 due to a higher proportion of solar in our fuel mix, and lower diesel consumption.

TABLE 3 – Scope 2 emissions by Ministry family

Ministry family	Baseline (tCO ₂ e)	FY2021 (tCO ₂ e)	FY2022 (tCO ₂ e)	FY2023 (tCO ₂ e)	Change from baseline to FY2023
MCI	13,800	14,822	14,859	15,065	9.2%
MCCY	52,371	60,362	61,560	59,052	12.8%
MINDEF	221,671	224,147	225,098	229,607	3.6%
MOE	409,666	430,972	440,821	431,668	5.4%
MOF	18,433	16,620	17,119	17,740	-3.8%
MFA	2,954	3,026	2,928	2,806	-5.0%
MOH	273,085	289,270	289,155	296,730	8.7%
MHA	115,708	115,894	110,091	128,456	11.0%
MinLaw	3,452	3,398	3,443	2,635	-23.7%
MOM	8,262	7,843	8,454	7,208	-12.8%
MND	52,428	55,711	55,145	56,156	7.1%
MSF	6,496	6,699	6,694	7,193	10.7%
MSE	297,672	298,554	294,651	272,036	-8.6%
MTI	116,498	118,981	119,520	110,542	-5.1%
MOT	516,098	523,488	551,097	571,333	10.7%
PMO	24,317	25,466	28,359	27,621	13.6%
OOS	9,416	9,594	9,143	9,006	-4.4%
TOTAL	2,142,327	2,204,847	2,238,137	2,244,854	4.8%

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9.2.5. Electricity Use

The public sector's electricity use in FY2023 was 5,448,673,581 kWh, a 1.5% increase from FY2022 and 1.0% increase from the baseline. This was mainly due to the increase in electricity consumption to cater to the expansion of our public infrastructure in the transport and healthcare sectors. FY2023 saw a full year of operations for Stage 3 of the TEL, which added 11 new stations and 13.2 km to the rail network from November 2022, as well as the opening of new healthcare facilities such as TTSH Integrated Care Hub and Woodlands Health to meet the growing demand for healthcare services.

TABLE 4 – Electricity used by Ministry family

Ministry family	Baseline (kWh)	FY2021 (kWh)	FY2022 (kWh)	FY2023 (kWh)	Change from baseline to FY2023
MCI	37,470,395	36,282,932	35,649,343	36,565,713	-2.4%
MCCY ³⁹	144,132,614	147,763,749	147,695,961	143,329,670	-0.6%
MINDEF	556,706,961	548,707,224	540,063,186	557,297,775	0.1%
MOE	1,104,920,889	1,055,011,886	1,057,633,061	1,047,738,799	-5.2%
MOF ⁴⁰	55,192,080	40,682,732	41,072,768	43,058,041	-22.0%
MFA	7,831,277	7,408,581	7,025,254	6,810,922	-13.0%
MOH	617,127,265	708,127,787	693,748,899	720,218,195	16.7%
MHA	292,020,248	283,707,273	264,135,038	311,786,767	6.8%
MinLaw ⁴¹	9,511,540	8,317,052	8,259,983	6,396,695	-32.7%
MOM	21,220,438	19,198,834	20,283,548	17,496,126	-17.6%
MND ⁴²	135,240,287	136,380,387	132,305,537	136,300,069	0.8%
MSF	16,210,895	16,398,125	16,059,547	17,457,669	7.7%
MSE ⁴³	690,654,744	730,855,382	706,935,748	660,280,551	-4.4%
MTI ⁴⁴	296,731,887	291,263,699	286,758,461	268,305,080	-9.6%
MOT ⁴⁵	1,333,661,539	1,281,488,836	1,322,209,184	1,386,730,810	4.0%
PMO ⁴⁶	57,137,225	62,339,505	68,040,119	67,040,394	17.3%
OOS	21,311,323	23,486,290	21,937,287	21,860,305	2.6%
TOTAL	5,397,081,607	5,397,420,274	5,369,812,924	5,448,673,581	1.0%

³⁹ MCCY's historical electricity use was restated to exclude facilities that are not under its operational control.

⁴⁰ MOF's historical electricity use was restated to include more accurate and complete data from its facilities.

⁴¹ MinLaw's historical electricity use was restated to include the consumption from its public sector tenants.

⁴² MND's historical electricity use was restated to include more accurate and complete data from its facilities and consumption from district cooling.

⁴³ MSE's historical electricity use was restated to include more accurate and complete data from its facilities.

⁴⁴ MTI's historical electricity use was restated to include consumption from data centres and district cooling.

⁴⁵ MOT's historical electricity use was restated to include more accurate and complete data from its facilities and operations.

⁴⁶ PMO's historical electricity use was restated to include facilities that were not reported in the FY2022 report.

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9.2.6. Energy Utilisation Index

In FY2023, the public sector's EUI was 112.6 kwh/m², a 1.0% increase compared to FY2022. The increase in EUI was due to the increase in absolute energy consumption as all our premises resumed operations fully in FY2023. The EUI in FY2023 decreased by 3.7% from the baseline, due to overall improvements in energy efficiency of government facilities as our new buildings are progressively built to Green Mark Platinum SLE standards, which achieve at least 60% energy savings compared to 2005 levels, and older buildings and systems are retrofitted to be more energy efficient, such as by replacing old cooling systems.

TABLE 5 – EUI by Ministry family

Ministry family	Baseline (kWh/m ²)	FY2021 (kWh/m ²)	FY2022 (kWh/m ²)	FY2023 (kWh/m ²)	Change from baseline to FY2023
MCI	173.2	167.7	164.6	161.6	-6.7%
MCCY ⁴⁷	100.9	103.2	103.3	97.5	-3.4%
MINDEF	83.2	82.0	80.4	80.8	-2.9%
MOE	76.5	72.3	73.4	72.5	-5.2%
MOF ⁴⁸	131.3	94.5	103.3	103.1	-21.5%
MFA	205.5	187.8	178.1	172.7	-16.0%
MOH	306.9	322.2	282.9	281.1	-8.4%
MHA ⁴⁹	127.3	119.2	109.8	127.6	0.2%
MinLaw ⁵⁰	185.2	153.9	155.9	120.7	-34.8%
MOM	179.6	162.8	166.6	145.1	-19.2%
MND ⁵¹	110.2	105.4	99.6	107.5	-2.5%
MSF ⁵²	64.6	64.1	62.2	70.0	8.4%
MSE ⁵³	96.6	105.3	98.2	100.5	4.0%
MTI ⁵⁴	177.2	157.0	150.5	127.2	-28.2%
MOT ⁵⁵	213.1	183.9	189.0	201.9	-5.3%
PMO ⁵⁶	165.0	135.0	149.1	144.5	-12.4%
OOS	103.4	85.9	103.9	103.5	0.1%
TOTAL	116.9	112.7	111.5	112.6	-3.7%

⁴⁷ MCCY's historical EUI was restated to exclude the facilities that are not under its operational control.

⁴⁸ MOF's historical EUI was restated to include the include more accurate and complete data from its facilities.

⁴⁹ MHA's historical EUI was restated to include more accurate and complete data from its facilities.

⁵⁰ MinLaw's historical EUI was restated to include the consumption from its public sector tenants.

⁵¹ MND's historical EUI was restated to include more accurate and complete data from its facilities and consumption from district cooling.

⁵² MSF's historical EUI was restated to include more accurate and complete data from its facilities.

⁵³ MSE's historical EUI was restated to include more accurate and complete data from its facilities.

⁵⁴ MTI's historical EUI was restated to include consumption district cooling.

⁵⁵ MOT's historical EUI was restated to include more accurate and complete data from its facilities.

⁵⁶ PMO's historical EUI was restated to include facilities that were not reported in the FY2022 report.

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9.2.7. Methodology and Assumptions Used in Calculating Greenhouse Gas Emissions and Energy

Greenhouse Gas Emissions

The methodology for calculating Scope 1 and 2 emissions is aligned with the Greenhouse Gas ("GHG") Protocol. We have set our organisational boundary under the GHG Protocol's 'Operational Control' approach. Under this approach, a reporting entity has control over an operation if the former or one of its subsidiaries has full authority to introduce and implement operating policies.

In line with the 'Operational Control' approach, our reporting scope covers buildings and premises that are owned, occupied, and/or operated by the public sector.

Scope 1 Emissions

Scope 1 emissions relate to the direct burning of non-renewable fuel on site. This entails combustion of natural gas, town gas, petrol and diesel amongst others.

Data on fuel consumption is obtained from the respective Facility Managers of each premises. Town gas consumption is obtained from GovTech Trusted Centre for Sensor Data with utility account numbers for the respective premises.

If actual fuel consumption data for any operation or period of time is not available, an estimate is made based on the best available information (e.g. using the consumption from a similar period of time as a proxy).

Scope 2 Emissions

Scope 2 emissions relate to the consumption of purchased electricity and cooling.

Emissions Factors

The emission factors for Scope 1 emissions were obtained from the 2006 Intergovernmental Panel on Climate Change ("IPCC") Guidelines Volume 2 Chapters 2 and 3⁵⁷ except for town gas where a country-specific emission factor was used. On the other hand, Net Calorific Values ("NCVs") were derived based on the GHG Protocol's Emissions Factor for Cross-Sector Tools.

To calculate Scope 2 GHG emissions, the latest GEF data was obtained from the Energy Market Authority's website.⁵⁸

The emission factors used in our calculations are as follows:

TABLE 6 – Scope 1 Emission Factors

Fuel Type	Carbon dioxide (CO ₂) (tC/TJ) ^{59, 60}	Methane (CH ₄) (kg/TJ)	Nitrous Oxide (N ₂ O) (kg/TJ)
Town Gas	15.20	5	0.1
Natural Gas	15.30	1	0.1
Petrol	18.90	25	8
Diesel	20.20	3.9	3.9
Jet Kerosene	19.50	0.5	2
Aviation Gasoline	19.10	0.5	2
Diesel (Marine)	20.20	7	2

⁵⁷ 2006 IPCC Guidelines for National Greenhouse Gas Inventories Vol 2 Ch 2: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.

2006 IPCC Guidelines for National Greenhouse Gas Inventories Vol 2 Ch 3: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf.

⁵⁸ SES Chapter 2: Energy Transformation, EMA. <https://www.ema.gov.sg/resources/singapore-energy-statistics/chapter2>.

⁵⁹ 1996 IPCC Guidelines on Net Calorific Values and Emission Factors for Oils - Table 1: https://www.ipcc-nggip.iges.or.jp/public/gp/bgp/2_1_CO2_Stationary_Combustion.pdf.

⁶⁰ TC/TJ is tonnes of Carbon per Terajoule. For further conversion to CO₂, it needs to be multiplied by a factor of 44/12. TJ is in net calorific value basis.

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TABLE 7 – Global Warming Potential of Greenhouse Gases

Gas	Global Warming Potential
CO ₂	1
CH ₄	28
N ₂ O	265

TABLE 8 – Scope 2 Emission Factors

Year	GEF (kg CO ₂ /kWh)
2023	0.412
2022	0.417
2021	0.409
2020	0.407

Energy

Energy use and EUI metrics relate to purchased electricity from the grid and purchased cooling. The total electricity use is defined as electricity consumed from the grid and electricity use from purchased cooling via district cooling systems ("DCS").

Solar energy generated and used on-site is not included. Biomass energy used and energy used for district cooling are also not included. We are working to include other forms of energy used in future reports.

Electricity use from district cooling is calculated using cooling energy consumed in RTh multiplied by the efficiency of the DCS, obtained from the DCS provider.

$$\text{Refrigeration Ton-hour (RTh)} \times \text{Efficiency factor of DCS}$$

EUI is calculated using the following formula:

$$\frac{\text{Total electricity used in Year X}}{\text{Total GFA in Year X}}$$

Baseline EUI is calculated using the following formula:

$$\frac{\sum \text{Total electricity used between FY2018 and FY2020}}{\sum \text{Total GFA between FY2018 and FY2020}}$$

EUI is computed for buildings in the built environment category only.⁶¹ It is not meaningful to calculate EUI for other categories as they may not have GFA or their electricity use is less dependent on floor area.

Where utility account numbers are available, electricity use data is obtained from GovTech Trusted Centre for Sensor Data⁶². For the remaining facilities, electricity use data is reported by the respective Facility Managers of each premises. For electric vehicle ("EV") charging, electricity use data is obtained from meters at onsite EV charging stations. In a small number of cases where actual electricity use data for any operation or period of time is not available, an estimate is made based on the best available information (i.e. applying an average across a similar period or calculating proxies).

Data on GFA is reported by the respective staff overseeing the premises and is verified by each Ministry's Sustainability Manager.

⁶¹ Buildings in the built environment category exclude infrastructure such as water treatment and waste-to-energy plants, and transport fleets.

⁶² GovTech Trusted Centre for Sensor Data is part of the Government Data Architecture initiative that manages the data lifecycle effectively from acquisition to destruction. Utility data obtained from the GovTech Trusted Centre for Sensor Data is considered to be of high quality and authoritative.

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9.3. Water

9.3.1. Baseline

Similar to the approach taken for energy, the baseline has been established as the average of FY2018 to FY2020.

9.3.2. Water Use

In FY2023, the public sector used 33,358,520,320 litres of water, a 1.4% decrease compared to the baseline and 0.4% decrease from FY2022. This was mainly due to a reduction in water use in our public amenities and tenanted industrial facilities, which offset increases from some other sectors.

TABLE 9 – Water use by Ministry family

Ministry family	Baseline (litres)	FY2021 (litres)	FY2022 (litres)	FY2023 (litres)	Change from baseline to FY2023
MCI	204,332,973	169,127,959	180,942,000	193,295,000	-5.4%
MCCY ⁶³	2,068,740,070	1,486,100,000	1,995,938,340	1,694,849,900	-18.1%
MINDEF ⁶⁴	5,219,490,580	5,236,816,480	5,905,218,840	5,554,994,000	6.4%
MOE	8,100,212,016	6,841,303,959	8,331,042,800	8,135,765,000	0.4%
MOF ⁶⁵	414,352,570	293,484,000	300,143,600	295,337,000	-28.7%
MFA	37,861,667	37,542,000	39,646,000	34,798,800	-8.1%
MOH	4,388,467,631	4,714,980,830	4,635,982,340	4,845,933,600	10.4%
MHA ⁶⁶	3,742,325,290	2,990,039,550	3,839,820,387	3,866,650,000	3.3%
MinLaw	128,426,400	124,149,000	50,843,300	52,145,600	-59.4%
MOM	100,907,667	87,083,000	103,170,000	94,361,100	-6.5%
MND ⁶⁷	3,046,974,490	2,846,168,000	2,400,352,610	2,438,075,640	-20.0%
MSF	374,035,133	393,728,400	427,163,000	348,734,000	-6.8%
MSE ⁶⁸	1,025,414,120	1,001,622,000	868,469,921	979,151,000	-4.5%
MTI ⁶⁹	1,874,522,900	1,542,582,000	1,627,971,900	1,568,170,300	-16.3%
MOT ⁷⁰	2,869,533,200	2,596,938,000	2,601,796,000	3,037,301,380	5.8%
PMO ⁷¹	150,600,230	116,339,000	96,711,000	111,895,000	-25.7%
OOS	100,497,800	98,975,000	95,127,000	107,063,000	6.5%
TOTAL	33,846,694,737	30,576,979,178	33,500,339,038	33,358,520,320	-1.4%

⁶³ MCCY's historical water use was restated to exclude facilities that are not under its operational control.
⁶⁴ MINDEF's historical water use was restated to include more accurate and complete data from MINDEF facilities.
⁶⁵ MOF's historical water use was restated to include more accurate and complete data from MOF facilities.
⁶⁶ MHA's historical water use was restated to include more accurate and complete data from MHA facilities.
⁶⁷ MND's historical water use was restated to include more accurate and complete data from MND facilities.
⁶⁸ MSE's historical water use was restated to include more accurate and complete data from MSE facilities.
⁶⁹ MTI's historical water use was restated to include more accurate and complete data from MTI facilities.
⁷⁰ MOT's historical water use was restated to include more accurate and complete data from MOT facilities.
⁷¹ PMO's historical water use was restated to include facilities that were not reported in the FY2022 report.

APPENDIX A – Performance Data

9.3.3. Water Efficiency Index

In FY2023, the public sector's WEI was 60.7 litres per person per day, a 4.0% decrease from FY2022 and a 5.6% decrease compared to the baseline. This is a result of improvements in water management and efficiency of water fittings across our premises, even as we catered for the return of more occupants and visitors.

TABLE 10 – WEI by Ministry family

Ministry family	Baseline (litres/pax/day)	FY2021 (litres/pax/day)	FY2022 (litres/pax/day)	FY2023 (litres/pax/day)	Change from baseline to FY2023
MCI	38.1	46.7	42.7	37.7	-1.0%
MCCY ⁷²	189.2	148.1	113.1	76.9	-59.4%
MINDEF ⁷³	202.5	204.6	223.6	204.7	1.1%
MOE	45.2	37.8	46.5	47.6	5.3%
MOF ⁷⁴	176.0	169.0	139.4	217.9	23.8%
MFA	224.5	220.6	153.0	146.7	-34.7%
MOH	165.6	168.9	138.5	155.6	-6.0%
MHA ⁷⁵	87.7	186.0	113.5	83.5	-4.8%
MinLaw ⁷⁶	180.1	460.8	98.0	104.8	-41.8%
MOM	49.5	48.1	49.7	52.6	6.3%
MND ⁷⁷	35.3	22.9	24.4	20.5	-41.9%
MSF	216.6	240.7	228.4	177.0	-18.3%
MSE ⁷⁸	39.6	39.0	40.7	43.6	10.1%
MTI ⁷⁹	96.4	92.4	60.3	117.7	22.1%
MOT ⁸⁰	31.8	24.5	31.2	32.2	1.3%
PMO ⁸¹	73.4	88.6	60.3	66.7	-9.1%
OOS	179.7	175.8	156.3	160.0	-11.0%
TOTAL	64.3	56.5	63.2	60.7	-5.6%

⁷² MCCY's historical WEI was restated to exclude facilities that are not under its operational control.

⁷³ MINDEF's historical WEI was restated to include more accurate and complete data from MINDEF facilities.

⁷⁴ MOF's historical WEI was restated to include more accurate and complete data from MOF facilities.

⁷⁵ MHA's historical WEI was restated to include more accurate and complete data from MHA facilities.

⁷⁶ MinLaw's historical WEI was restated to include more accurate and complete data from MinLaw facilities.

⁷⁷ MND's historical WEI was restated to include more accurate and complete data from MND facilities.

⁷⁸ MSE's historical WEI was restated to include more accurate and complete data from MSE facilities.

⁷⁹ MTI's historical WEI was restated to include more accurate and complete data from MTI facilities.

⁸⁰ MOT's historical WEI was restated to include more accurate and complete data from MOT facilities.

⁸¹ PMO's historical WEI was restated to include facilities that were not reported in the FY2022 report.

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9.3.4. Methodology and assumptions for water data

WEI is calculated using the following formula:

$$\frac{\text{Total water used in Year X}}{\text{Number of operational days in Year X} \times (\text{Average number of occupants per day} + 0.25 \times (\text{Average number of visitors per day}) \text{ in Year X})}$$

Baseline WEI is calculated using the following formula:

$$\frac{\sum \text{Total water used between FY2018 and FY2020}}{\text{Average number of operational days} \times \sum (\text{Average number of occupants per day} + 0.25 \times (\text{Average number of visitors per day}) \text{ between FY2018 and FY2020})}$$

WEI is computed for buildings in the built environment category only.⁵⁵ It is not meaningful to calculate WEI for other categories, as water use is less dependent on the number of occupants and visitors.

Water use data is either obtained from GovTech Trusted Centre for Sensor Data using utility account numbers or from the Facility Managers of each premises. The water use data includes both potable water and NEWater.

The occupancy and visitor number data are reported by Facility Managers. They are generally based on the number of occupants (such as staff, students and tenants) physically present in the respective premises for extended periods of time and number of visitors accounted under the premises' visitor management or tracking systems. Visitors include persons who are in the premises for short periods of time. As it is assumed that their average water use is 25% that of premises' occupants, a factor of 0.25 is also applied to the WEI calculation.

Where actual data for occupancy and visitor numbers are not available, we have used estimates to improve the completeness of the dataset to facilitate meaningful analysis. For example, for premises with missing monthly data, the data from a similar period is used. For example, we may calculate the average of available months' data, or FY2022 data might be used as a proxy for FY2023.

APPENDIX A – Performance Data

9.4. Waste

9.4.1. Baseline

The baseline has been established as FY2022 as this is when requirements for PWCs to weigh waste at the premises-level started.

9.4.2. Waste Disposed Of

In FY2023, the public sector disposed of 218,696,756 kilogrammes of waste, a 1.3% increase compared to the baseline. This was mainly due to a return to normalcy post-COVID-19 at our tenanted industrial facilities as well as some of our public-facing facilities and amenities which saw increased number of visitors. This outweighed the reduction in overall waste at public sector offices and operations.

TABLE 11 – Waste disposed of by Ministry family

Ministry family	Baseline (kilogrammes)	FY2023 (kilogrammes)	Change from baseline to FY2023
MCI	588,213	617,397	5.0%
MCCY	12,253,004	12,748,481	4.0%
MINDEF	21,930,181	19,065,214	-13.1%
MOE	35,372,627	36,175,192	2.3%
MOF	268,342	264,123	-1.6%
MFA	60,739	52,302	-13.9%
MOH	33,914,348	33,863,951	-0.1%
MHA	9,851,639	10,749,251	9.1%
MinLaw	488,475	395,014	-19.1%
MOM	364,022	342,444	-5.9%
MND	21,276,650	21,133,279	-0.7%
MSF	1,778,870	1,839,114	3.4%
MSE	33,137,362	33,371,618	0.7%
MTI	35,218,094	38,604,240	9.6%
MOT	8,597,878	8,695,406	1.1%
PMO	607,146	615,160	1.3%
OOS	150,111	164,570	9.6%
TOTAL	215,857,701	218,696,756	1.3%

APPENDIX A – Performance Data

9.4.3. Waste Disposal Index

In FY2023, the public sector's WDI was 0.380 kilogrammes per person per day, a 9.1% decrease compared to the baseline. Despite the overall increase in waste, we managed to decrease our WDI due to the implementation of waste reduction measures and recycling efforts at various public sector premises, which means that despite the increase in the number of occupants and visitors at these places, each person was disposing of less waste than in FY2022.

TABLE 12 – WDI by Ministry family

Ministry family	Baseline (kilogrammes/person/day)	FY2023 (kilogrammes/person/day)	Change from baseline to FY2023
MCI	0.287	0.242	-15.7%
MCCY	0.612	0.455	-25.7%
MINDEF	0.927	0.790	-14.8%
MOE	0.198	0.196	-1.0%
MOF	0.194	0.179	-7.7%
MFA	0.312	0.220	-29.5%
MOH	1.105	1.034	-6.4%
MHA	0.285	0.215	-24.6%
MinLaw	0.995	0.813	-18.3%
MOM	0.287	0.283	-1.4%
MND	0.304	0.243	-20.1%
MSF	1.139	1.102	-3.2%
MSE	3.173	2.663	-16.1%
MTI	1.686	1.777	5.4%
MOT	0.108	0.097	-10.2%
PMO	0.414	0.379	-8.5%
OOS	0.264	0.254	-3.8%
TOTAL	0.418	0.380	-9.1%

APPENDIX A – Performance Data

9.4.4. Methodology and assumptions for waste data

WDI is calculated using the following formula:

$$\frac{\text{Total waste disposed of in Year X}}{\text{Number of operational days in Year X} \times (\text{Average number of occupants per day} + 0.25 \times (\text{Average number of visitors per day}) \text{ in Year X})}$$

Baseline WDI is calculated using the above formula, for the year FY2022.

WDI is computed for buildings in the built environment category only.⁸² It is not meaningful to calculate WDI for other categories, as waste disposed of is less dependent on the number of occupants and visitors.

Waste disposed of is obtained from the facility's waste collector or through in-house waste weighing. Construction and demolition waste is not included in this report.

As the improvement of our waste data measurement is an ongoing process involving multiple stakeholders, proxies have been applied to improve the completeness of the data and to facilitate meaningful analysis. For example, data from a community facility could be used as a proxy for another community facility with missing waste data, with usage being pro-rated by the facility's GFA.

The occupancy and visitor number data are reported by Facility Managers. They are generally based on the number of occupants (such as staff, students and tenants) physically present in the respective premises for extended periods of time and number of visitors accounted under the premises' visitor management or tracking systems. Visitors include persons who are in the premises for short periods of time. As it is assumed that the waste disposed of by this group is 25% that of premises' occupants, a factor of 0.25 is also applied to the WDI calculation.

Where actual data for occupancy and visitor numbers are not available, we have used estimates to improve the completeness of the dataset to facilitate meaningful analysis. For example, for premises with missing monthly data, the data from a similar period is used. For example, we may calculate the average of available months' data, or FY2022 data might be used as a proxy for FY2023.

⁸² Buildings in the built environment category exclude infrastructure such as water treatment and waste-to-energy plants, and transport fleets.

APPENDIX B – List of Relevant Publications

National publications - General

- 1 Singapore's Long-Term Low-Emissions Development Strategy
- 2 Singapore's First Biennial Transparency Report
- 3 Singapore Green Plan 2030
- 4 Singapore's Third National Climate Change Study – Climate Projections to 2100 Science Report
- 5 Singapore's Climate Action

National publications - Sectoral

- 6 Energy 2050 Committee Report
- 7 Singapore Energy Statistics
- 8 Zero Waste Masterplan
- 9 National Action Strategy on Marine Litter
- 10 Land Transport Masterplan 2040
- 11 Singapore Sustainable Air Hub Blueprint
- 12 Maritime Singapore Decarbonisation Blueprint
- 13 Singapore Green Bond Report for FY2023
- 14 Finance for Net Zero Action Plan

APPENDIX C – United Nations Sustainable Development Goals Mapping

GreenGov.SG commitments	United Nations Sustainable Development Goals ("UN SDG") targets	UN SDG indicators
Greenhouse gas emissions Peak emissions around 2025 Achieve net zero emissions around 2045	9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities	N/A
	13.2 Integrate climate change measures into national policies, strategies and planning	13.2.2 Total greenhouse gas emissions per year
	13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	N/A
Energy Reduce energy use by 10% from the baseline by 2030	7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	N/A
Water Reduce water use by 10% from the baseline by 2030	6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	6.4.1 Change in water-use efficiency over time
Waste Reduce waste disposed of by 30% from the baseline by 2030	12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	N/A
	12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities	N/A
Green economy Incorporate environmental sustainability considerations into all government procurement by 2028	12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle	N/A
	12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities	N/A

APPENDIX C – United Nations Sustainable Development Goals Mapping

GreenGov.SG commitments	United Nations Sustainable Development Goals ("UN SDG") targets	UN SDG indicators
Green citizenry Embed environmental sustainability into public touchpoints and community-based programmes	12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	N/A
	17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships	N/A
Capability building Elevate environmental sustainability awareness and knowledge across the public sector	12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	N/A
	17.16 Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries	
Culture building Enable public officers to take environmental sustainability action	17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships	N/A

