



National
Environment
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OUR SUSTAINABILITY COMMITMENTS

This document provides supplementary information on
NEA's Annual & Sustainability Report 2022/2023

Our Sustainability Commitments

Championing sustainability starts from within. NEA was the first public agency in Singapore to publish a sustainability report, and will continue to be one of the lead agencies for the GreenGov.SG initiative.¹

ACHIEVING WOG SUSTAINABILITY TARGETS

Under the new GreenGov.SG initiative which was launched in July 2021, the public sector has set sustainability targets that include reducing its energy² and water³ consumption by 10 per cent by 2030 from the average of 2018 to 2020 levels, and reducing the amount of waste⁴ disposed of by 30 per cent by 2030 from 2022 levels. To achieve these GreenGov.SG targets, NEA continues to implement resource management measures for our premises, such as office buildings, incineration plants, laboratories, and hawker centres.

ACHIEVING THE GREEN MARK

GreenGov.SG requires all new public sector buildings to achieve at least Green Mark (GM) Platinum Super Low Energy (SLE) standards or equivalent, while all existing public sector buildings are to obtain GM Platinum SLE standards or equivalent upon the next major retrofitting. NEA is working towards GM certification for our premises. Many of our premises have attained GM certifications. For example, Choa Chu Kang Columbarium attained the GM Platinum Positive Energy due to measures such as good natural ventilation, energy-efficient lighting installation, and generation of on-site solar energy.

REDUCING CORPORATE CARBON FOOTPRINT

The waste-to-energy (WTE) plants operated by NEA are the main contributor to our corporate carbon footprint. The Scope 1 emissions of WTE plants fell after Tuas Incineration Plant was decommissioned in February 2022. To lower these Scope 1 emissions, NEA aims to reduce the amount of waste generated in Singapore, and divert plastics away from incineration plants through mechanical and chemical recycling initiatives. NEA has also partnered Keppel Seghers Pte Ltd to study the feasibility of implementing carbon capture technology at WTE plants.

While NEA's Scope 2 emissions in FY2022 were comparable to FY2021, our Scope 3 emissions had increased due to the resumption of flights for business travel.

¹ NEA's annual report and Our Sustainability Commitments supplementary document were prepared in accordance with the GRI 2021 Standards

² The GreenGov.SG target for energy is to improve the energy consumption per unit of gross floor area by 10 per cent by 2030 from the average of 2018 to 2020 levels

³ The GreenGov.SG target for water is to improve the water consumption per person per day by 10 per cent by 2030 from the average of 2018 to 2020 levels

⁴ The GreenGov.SG target for waste is to reduce the amount of waste disposed of per person per day by 2030 from 2022 levels

Corporate Carbon Footprint⁵

	FY20		FY21		FY22	
	Tonnes of CO ₂ (% of total aggregate)	Ranking	Tonnes of CO ₂ (% of total aggregate)	Ranking	Tonnes of CO ₂ (% of total aggregate)	Ranking
Direct Carbon Emissions (Scope 1)						
WTE Plants ⁶	791,434 (99.0%)	1	626,984 (98.8%)	1	485,916 (98.5%)	1
Landfill Operations and NEA-owned Vehicles ^{7 8}	5,438 (0.7%)	2	5,329 (0.8%)	2	4,988 (1.0%)	2
Liquefied Petroleum Gas (LPG) and Town Gas ⁹	2,637 (0.3%)	4	2,316 (0.4%)	4	2,358 (0.5%)	4
Sub-total CO₂ Emissions (Scope 1)	799,509 tonnes CO₂		634,629 tonnes CO₂		493,262 tonnes CO₂	
Indirect Carbon Emissions (Scope 2)						
Electricity ¹⁰ (NEA Office Premises ¹¹)	2,849 (64.5%)	3	2,958 (66.4%)	3	3,087 (66.7%)	3
Electricity ¹² (NEA Facilities ¹³)	1,567 (35.5%)	5	1,493 (33.6%)	5	1,542 (33.3%)	5
Sub-total CO₂ Emissions (Scope 2)	4,416 tonnes CO₂		4,451 tonnes CO₂		4,629 tonnes CO₂	
Indirect Carbon Emissions (Scope 3)						
Local ¹⁴ Staff Business Travel	302 (94.0%)	6	277 (85.0%)	6	265 (49.2%)	7
Overseas ¹⁵ Business Travel (Flight only)	19 (6.0%)	7	49 (15.0%)	7	274 (50.8%)	6
Sub-total CO₂ Emissions (Scope 3)	321 tonnes CO₂		326 tonnes CO₂		539 tonnes CO₂	

⁵ NEA's corporate carbon footprint is calculated in accordance with the GHG Protocol Corporate Accounting and Reporting Standard set by the World Business Council for Sustainable Development and World Resources Institute. This is in line with the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National GHG Inventories, which is used in Singapore's international reporting to the UN Framework Convention on Climate Change. The computations for GHG emissions from waste incineration at Tuas South Incineration Plant are also in accordance with the 2006 IPCC Guidelines for National GHG Inventories.

⁶ Consumption is largely dependent on public demand for NEA's services. The Scope 1 emissions for waste incineration have been restated for FY2021 to reflect actual emissions. January to March 2023 figures are based on estimates, and will be finalised at the end of 2023 upon verification. The actual figure for FY2022 will be updated in next year's report.

⁷ Carbon emissions for NEA-owned vehicles are calculated based on amount of fuel (diesel and petrol) used. Diesel consumed by vehicles, equipment, diesel generator, and marine vessels used at Tuas Marine Transfer Station and Semakau Landfill were also included in the calculation of carbon emissions.

⁸ The Scope 1 emissions for landfill operations and NEA-owned vehicles have been restated for FY2020 and FY2021 to 5,438 tonnes CO₂ (from 4,006 tonne CO₂) and 5,329 tonnes CO₂ (from 3,996 tonnes CO₂) respectively to correct calculation errors.

⁹ Carbon emissions are calculated for LPG and Town Gas used at Choa Chu Kang Crematorium and Mandai Crematorium respectively. The emissions are impacted by factors beyond NEA's control, such as the number of after-death services required.

¹⁰ Grid-average emission factor data is used to calculate GHG emissions from electricity NEA purchased from the national grid. FY2022 figures are calculated based on 2021 electricity grid emission factors: 0.4057 kg CO₂/kWh (www.ema.gov.sg/cmsmedia/Publications_and_Statistics/Statistics/18RSU.pdf).

¹¹ The Scope 2 emissions for NEA offices have been restated for FY2020 and FY2021 to 2,849 tonnes CO₂ (from 2,844 tonne CO₂), and 2,958 tonnes CO₂ (from 2,936 tonnes CO₂) respectively, to base the electricity consumption figures on utility bills instead of meter readings.

¹² The electricity consumed at Tuas South Incineration Plant and Tuas Marine Transfer Station was excluded from the carbon emissions calculation, as the electricity used at these premises is self-generated. For Semakau Landfill, the electricity consumed was generated by diesel generators on the landfill. The diesel consumed by generators had been accounted for under Scope 1 – Landfill operations and NEA-owned vehicles.

¹³ The Scope 2 emissions for NEA facilities have been restated for FY2020 and FY2021 to 1,567 tonnes CO₂ (from 1,458 tonnes CO₂) and 1,489 tonnes CO₂ (from 1,458 tonnes CO₂) respectively to include the carbon emissions from our air pollution and weather monitoring stations.

¹⁴ Carbon emissions were calculated based on local business travel by staff vehicles, excluding the travel journeys of NEA staff to and from their homes. According to LTA, cars and motorcycles are fuelled by petrol with average motor vehicle fuel efficiency of 10.45 L/100 km ('Singapore Land Transport Statistics in Brief', 2009).

¹⁵ Carbon emissions arising from overseas business travel (flight only) are based on the Overseas Travel Report submitted by the air travel management contractor.

Comparison of NEA's Corporate Emissions Intensity¹⁶

	FY20	FY21	FY22
Indirect Carbon Emissions (Scope 2 & 3) (tonnes CO ₂)	4,737	4,777	5,168
Number of person ¹⁷	2,576	2,530	3,973
Carbon Emissions (tonnes CO ₂ per person)	1.8	1.9	1.3

The amount of LPG used at Choa Chu Kang Crematorium and Town Gas used at Mandai Crematorium, are accounted for as part of NEA's corporate carbon footprint, together with diesel and petrol used in NEA-owned vehicles, landfill operations, and for government owned and operated after-death facilities. Total fuel consumption for FY2022 is 120 TJ and has remained comparable to the consumption in the last two FYs.

Fuel Types Used

	FY20	FY21	FY22
LPG and Town Gas	47 TJ	52 TJ	53 TJ
Diesel and Petrol	73 TJ	72 TJ	67 TJ
Total Fuel Consumption	120 TJ	123 TJ	120 TJ

CONSERVING RESOURCES WITHIN NEA

As the leading environment agency in Singapore, NEA is committed to sustainability practices in managing our usage of electricity, water, and waste, and encourages our employees to adopt these practices at work and at home.

Electricity

Electricity usage accounts for less than one per cent of NEA's carbon emissions. In line with GreenGov.SG, we track the electricity consumption at our offices¹⁸ and facilities¹⁹ using the two indicators:

- Total electricity consumption
- Energy Utilisation Index (EUI) – amount of electricity used per floor area

In FY2022, our total electricity consumption fell by about 25 per cent compared to FY2021. The reduction in electricity consumption was due to the decommissioning of Tuas Incineration Plant in February 2022 and reduction in electricity usage across many of our premises. This was due to several factors such as replacement of existing lightings to energy-saving LED-model lightings during repair and redecoration works at Semakau Landfill and Tuas Marine Transfer Station.

Across our premises, a series of initiatives were also implemented to reduce electricity consumption. Where operationally feasible, motion/photo sensors were installed to control lightings where the footfall is low or where the luminance is sufficient. Light fittings are also progressively replaced with energy efficient LED lights. When replacing electrical appliances, we purchase those that are more energy efficient.

In addition, NEA has deployed more solar photovoltaic panels. Currently, 12 premises, including hawker centres, after-death facilities and Semakau Landfill, have rooftop solar panels. Collectively, they generated about 1,500 MWh of electricity in FY2022.

Electricity²⁰ Consumed at NEA Offices and Facilities

	FY20	FY21	FY22
Total Electricity Consumed (KWh)	163,472,523	136,318,142	102,213,550
Offices (KWh)	6,975,335	7,248,944	7,609,750
Facilities (KWh) ²¹	156,497,189	129,069,198	94,603,800

	Baseline ²²	FY20	FY21	FY22
EUI (KWh/m ²) ²³	69.1	66.7	59.2	61.9
Offices (KWh/m ²)	N.A.	191.3	195.2	201.0
Facilities (KWh/m ²)	N.A.	38.9	31.3	31.9

¹⁶ The carbon emissions figures for FY2020 and FY2021 have been restated to include the emissions from NEA's air quality and weather monitoring stations. The number of person figures for FY2020 and FY2021 have also been revised

¹⁷ Defined as the number of occupants, including the number of visitors, contractors and sub-contractors who had visited NEA's premises

¹⁸ This includes offices, laboratories, and data centres

¹⁹ NEA's facilities include Choa Chu Kang Crematorium, Columbarium, Cemetery, and Cemetery Office; Inland Ash Scattering Facility; Burial Preparation Facility; Kranji State Cemetery; Mandai Crematorium and Columbarium; Yishun Columbarium; Semakau Landfill; Tuas Marine Transfer Station; Tuas South Incineration Plant; and air quality and weather monitoring stations. Consumption at NEA's facilities is largely dependent on public demand for NEA's services

²⁰ This refers to electricity obtained from the national power grid

²¹ The electricity consumption figures for NEA facilities for FY2020 and FY2021 have been restated to 156,497,189 KWh (from 156,258,000 KWh), and 129,069,198 KWh (from 129,081,000 KWh) respectively, to correct calculation errors and include the electricity consumption of our air pollution and weather monitoring stations

²² NEA uses the average of FY2019 to FY2020 levels as our baseline to track our EUI performance. This is in line with the MSE Family's overall baseline

²³ EUI is only calculated for offices and facilities, and excludes non-standard infrastructure, such as Tuas South Incineration Plant, cremators at Mandai Crematorium, the Mosquito Production Facility, and our air pollution and weather monitoring stations

Electricity generated from waste incineration adds to NEA's pool of energy sources, powering the operations in the incineration plant and Tuas Marine Transfer Station. Any excess electricity from the incineration plant will be exported to the power grid. In FY2022, 309,122 MWh of electricity, which was equivalent to the average annual electricity consumed by about 72,000²⁴ Singapore households, was exported to the power grid.

Water

The water consumption at our offices and facilities is tracked using the two indicators:

- Total water consumption
- Water Efficiency Index (WEI) – amount of water used per person per day

In FY2022, the water consumption at NEA facilities decreased by 22.2 per cent as compared to FY2021, partly due to the decommissioning of Tuas Incineration Plant. Conversely, water consumption at our offices had increased by 24.2 per cent, as employees return to the office post-COVID-19. In total, the combined water consumption at offices and facilities in FY2022 decreased by 13.1 per cent compared to FY2021, which led to an improvement in WEI by 21.6 per cent.

NEA has implemented water reduction measures at our premises, such as switching to 3-tick Water Efficiency Labelling Scheme (WELS) rating water fittings during repair and redecoration works. Our facility managers also increased inspections in various premises, to ensure leaks are detected early and faulty hardware replaced promptly.

Water Consumed at NEA Offices and Facilities²⁵

	FY20	FY21	FY22
Total Water Consumed (L)	89,423,470	94,243,390	81,900,071
Offices (L)	19,304,770	18,473,390	22,935,171
Facilities (L)	70,118,700	75,770,000	58,964,900

²⁴ Based on 2019 average monthly electricity consumption for four-room households of 359.1 kWh/month (www.ema.gov.sg/cmsmedia/8RSU.xlsx)

²⁵ The water consumption and WEI figures for FY2020 and FY2021 have been restated to be consistent with GreenGov.SG records

²⁶ Similar to the EUI, NEA uses the average of FY2019 to FY2020 levels as our baseline to track our WEI performance

²⁷ Similar to the EUI, the WEI is only calculated for offices and facilities, and excludes non-standard infrastructure

	Baseline ²⁶	FY20	FY21	FY22
Overall WEI (L/person/day) ²⁷	58.4	58.4	63.4	49.7
Offices (L/person/day)	N.A.	10.0	12.1	16.1
Facilities (L/person/day)	N.A.	111.7	98.8	64.9

At NEA's facilities, NEWater and harvested rainwater are alternative water sources used for operational and general cleaning purposes.

In FY2022, Tuas South Incineration Plant consumed 230,813,000 L of NEWater for purposes such as producing demineralised water for boiler usage, suppressing dust at the waste bunkers and general washing.

As part of NEA's water conservation efforts, NEA set up rain harvesting systems at several NEA premises. The rainwater collected is used to support NEA's operations, such as suppressing of dust at Tuas South Incineration Plant and Tuas Marine Transfer Station. At Tuas Marine Transfer Station, we enlarged the collection tank to increase its capacity to harvest more rainwater. In FY2022, the total volume of rainwater collected at the two facilities was 55,566,000 L.

Waste

Beyond initiatives to improve Singapore's waste management, NEA is committed to do our part to lengthen the lifespan of our only landfill at Semakau Island.

We track the waste disposed of at our offices and facilities using the two indicators:

- Total waste disposed of
- Waste Disposal Index (WDI) – amount of waste disposed of per person per day

In FY2022, NEA collected waste data for more premises than in FY2021, including all the remaining standalone offices and facilities such as regional offices.

Waste from after-death facilities contributed to 75.7 per cent of the total amount of waste disposed of in FY2022, partly due to offerings left behind by visitors. To reduce waste, NEA has since incorporated messages encouraging visitors to bring back their offerings, into our existing notices.

To tackle the amount of waste generated from offices, staff are reminded to use paper mindfully. In addition, all printers are default set to printing on both pages. Furniture and office supplies like files are reused to minimise wastage. Recycling bins are conveniently located at printing rooms and pantries.

Overall, we collected 30,186 kg of recyclables at our offices and facilities.

Beyond policies and initiatives to drive better waste management for the nation, NEA is committed to do our part to lengthen the lifespan of our only landfill at Semakau.

Waste disposed of at NEA Offices and Facilities²⁸

	FY22
Total waste disposed of (kg)	518,587
Offices (kg)	111,552
Facilities (kg)	407,035

	Baseline (FY22)
Overall WDI (kg/person/day) ²⁹	0.6
Offices (kg/person/day)	0.4
Facilities (kg/person/day)	0.7

OVERSEEING BIOHAZARDOUS WASTE DISPOSAL

In FY2022, 50,160L of biohazardous waste was generated from EHI's laboratory work. While this could not be recycled, NEA has put in place strict disposal processes to prevent contaminating the environment. The biohazardous waste was stored in purpose-built waste bins before collection by licensed biohazardous waste collectors – Asia Medical Enviro Services Pte Ltd in FY2022. The biohazardous waste was then transported to a dedicated incinerator for incineration.

²⁸ The waste data is provided by the Public Waste Collectors

²⁹ Similar to the EU and WEI, the WDI is only calculated for offices and facilities, and excludes non-standard infrastructure



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