

Technical Notes and Methodologies

NUS Environmental Disclosures 2025

Information on Baseline Years

For emissions and electricity targets, NUS' baseline year is 2019 – the most recent year before the COVID-19 pandemic. For NUS' waste targets, 2021 was selected as the baseline year as NUS has bin centre-level waste data from 2021, arising from the implementation of the smart waste and recycling collection system. 2019 and 2020 data were previously derived from the following: waste weight estimations based on number of bulk bins, actual waste weight from mobile compactors and campus-level aggregated weight of recyclables collected by the previous vendor. NUS is continuously enhancing the university's waste data collection approach to ensure reliability, such as using optical character recognition technology to read data from photos taken of the load cell readings.

GHG Emissions Calculation Methodology

NUS Scope 1, 2, 3 GHG (Greenhouse Gas) emissions are aligned to the requirements of these documents developed by World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD): a) GHG Protocol Corporate Accounting and Reporting Standard (2004), b) Corporate Value Chain (Scope 3) Accounting and Reporting Standard (2011) (GHG Protocol).

NUS' organisational boundary was determined using GHG Protocol's 'operational control' approach as the basis for consolidation, based on operations which it has full authority to introduce and implement operating policies. This covers NUS' three main campuses – Kent Ridge (including University Town), Bukit Timah and Outram (Duke-NUS Medical School) and the Data Centre at NUS High School & Tropical Marine Science Institute at St John's Island; and excludes the following: A*STAR and other non-NUS research institutes and centres located on any of the above-mentioned premises (e.g. Brenner Centre for Molecular Medicine, Temasek Life-science Lab, Defence Science Organization, CREATE, Singapore Wind Tunnel Facility, TCOMS, Institute of South Asian Studies, Middle East Institute, Energy Studies Institute), Kent Ridge Guild House, Residential Tenants (Kent Vale Residences, Pandan Valley, College Green), NSCC i4.0 Data Centre; and retail and dining tenants (e.g. canteens).

Emissions due to carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs) are accounted for, where applicable. Perfluorocarbons (PFCs), sulphur hexafluoride (SF₆) and nitrogen trifluoride (NF₃) are not reported due to their data unavailability and expected negligible use in our operations.

GHG Protocol Emissions Scopes	Emissions Calculation Methodology	
	Emission sources	Emission Factors
Scope 1 - Fuel and Refrigerants	Emission sources included: (i) Fugitive emissions from refrigerant use from chiller top-ups and servicing (ii) Diesel consumed by back-up generators across NUS' campuses (iii) Diesel and petrol used in company vehicles (iv) Town gas used by laboratory bunsen burners Emissions from all Scope 1 sources were calculated using the activity-based approach. Other greenhouse gases such as ozone-depleting gases perfluorocarbons, nitrogen trifluoride and sulphur hexafluoride were excluded, as their contribution to NUS' overall footprint is negligible.	Emissions from fuel combustion in 2025 were calculated using the combustion emission factors published by Singapore's National Environment Agency (NEA) Greenhouse Gas (GHG) Emissions Measurement and Reporting Guidelines (2025). Emissions from fuel combustion and fugitive emissions from refrigerant use in 2025 were converted to CO₂ equivalent (CO₂e) using the global warming potential (GWP₁₀₀) values from the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6).
Scope 2 - Electricity	Scope 2 emissions were calculated using the activity-based approach, representing indirect emissions from the generation of purchased electricity consumed by all entities within NUS' organisational boundary. Electricity used by tenants occupying NUS-owned properties is reported separately, under Scope 3 Category 13.	For 2025 Scope 2 emissions, the latest local grid emission factor published by Singapore's Energy Market Authority (EMA) at the time of reporting was used (i.e. 0.402 kgCO₂e/kWh). Onsite renewable electricity generation is treated as a zero-emission source. Where associated Renewable Energy Certificates (RECs) have been generated for sale or sold, NUS did not claim the corresponding emissions reduction when calculating Scope 2 emissions, as the environmental attributes have been transferred to the REC purchaser. Only renewable electricity generation for which RECs had not been sold were accounted for as zero-emission electricity consumed on campus.
Scope 3		
Category 1 and 2 - Purchased Goods &	Emissions associated with purchased goods and services and capital goods were calculated using the spend-based method, based on NUS' expenditure	Spend-based emissions factors from US Environmental Protection Agency (EPA) Supply Chain Greenhouse Gas Emission Factors v1.3 , were used to

Services and Capital Goods	across 12 main procurement categories. Each category was mapped to the US North American Industry Classification System (NAICS), and adjusted for inflation (source: US Bureau of Labor Statistics) and country-specific currency exchange rates (source: Monetary Authority of Singapore).	calculate 2025 emissions from purchased goods and services and capital goods.
Category 3 - Fuel- and Energy-Related Activities (not included in Scope 1 or 2)	Emissions from fuel- and energy-related activities not included in Scope 1 or Scope 2, including the production, transmission and distribution of fuels and energy consumed by NUS were calculated using fuel and electricity data reported under Scope 1 and 2.	For 2025, upstream emissions from fuel- and energy-related activities not included in Scope 1 or Scope 2, were calculated using upstream well-to-tank (WTT) emission factors from the UK Department for Energy Security and Net Zero (DESNZ) GHG Conversion Factors for Company Reporting 2025 , together with Singapore's electricity transmission and distribution loss factor from the World Bank , based on the most recent available data (from 2023).
Category 4 - Upstream Transportation and Distribution	Scope 3 Category 4 is considered immaterial to NUS. Transportation and distribution of purchased goods is generally managed by suppliers prior to receipt, with minimal logistics services procured directly by the University.	-
Category 5 - Waste Generated in Operations	Emissions in this category were calculated using an activity-based approach. Waste quantities (tonnes) were consolidated across various waste streams, including general waste, horticultural waste, food waste, paper, plastic, metal, glass, and e-waste. Hazardous waste is collected and treated off-site by the appointed Toxic Industrial Waste Collector (TIWC) in accordance with the NEA Toxic Waste Control Regulations, Singapore Standard SS 603 Code of Practice for Hazardous Waste Management, and Singapore Standard SS 586 Specification for Hazard Communication for Hazardous Chemicals and	Where local factors from the Singapore Emissions Factors Registry (SEFR) exist, they were prioritised, followed by international sources - the US EPA, before UK DESNZ. NUS' assumed general waste composition is based on a waste composition study conducted across various campus locations in 2022. For general waste sent for incineration in 2025, waste incineration emission factors from the Singapore Emissions Factors Registry (SEFR) were applied. For emissions from composted horticultural and food waste in 2025, IPCC emission factors for CH₄ and N₂O

	Dangerous Goods. It was excluded as disposal records as reported to NEA are reported in varying units (e.g. kilograms, litres number of bottles), making aggregation into a consistent tonnage not feasible.	emissions from the biological treatment of waste were used. For emissions from recycled waste streams in 2025, emission factors from the US EPA Emission Factors for Greenhouse Gas Inventories 2025 for recycling were applied, except for e-waste, where the UK Department for Energy Security and Net Zero (DESNZ) GHG Conversion Factors for Company Reporting 2025 were used.
Category 6 - Business Travel	This category includes emissions from staff and student air travel. Other modes of transport (e.g. rail) were considered negligible. Emissions were calculated based on distance-based methods. For staff air travel, emissions were calculated based on estimated flight distance based on airport codes and cabin class. For student air travel, representative airports were used to estimate travel distances, as the exact travel routes taken by students are not available. These airports were selected as common transit hubs for travel to the respective regions. To avoid double counting, only outbound student air travel is included, as inbound travel is attributable to students' home universities.	For 2025, emissions from air travel were calculated using air travel emission factors from the UK Department for Energy Security and Net Zero (DESNZ) GHG Conversion Factors for Company Reporting 2025.
Category 7 - Employee Commuting	Emission sources included: • Actual mileage data for NUS' internal shuttle buses (ISBs). • Modal shares (public bus, motorcycle, private car, taxi, MRT) based on previous transportation survey. • Average trip distances by transport mode based on Singapore's data.gov.sg.	For 2025, commuting emissions were calculated using transport emission factors from the Singapore Emissions Factors Registry (SEFR). Where SEFR emission factors were unavailable (i.e. for motorcycles), emission factors from the UK Department for Energy Security and Net Zero (DESNZ) GHG Conversion Factors for Company Reporting 2025 were applied.

	Emissions from private car travel within the NUS campus were excluded as they were considered negligible. Annual travel assumptions of 175 school days (35 weeks) for students and 254 working days for staff were applied.	Emissions from NUS' electric ISBs were calculated in line with Scope 2, using the latest local grid emission factor published by Singapore's Energy Market Authority (EMA) at the time of reporting (0.402 kgCO ₂ e/kWh for 2025). For the minimal diesel ISBs that are deployed to manage demand, emissions were calculated using the actual diesel fuel efficiency (litres/km) together with the diesel combustion emission factor from the UK Department for Energy Security and Net Zero (DESNZ) GHG Conversion Factors for Company Reporting 2025 .
Category 8 - Upstream Leased Assets	Not applicable, as NUS does not have material upstream leased assets outside its Scope 1 and Scope 2 reporting boundary.	-
Category 9 - Downstream Transportation and Distribution	Not applicable as NUS does not sell any products that would incur emissions from product transportation and distribution.	-
Category 10 - Processing of Sold Products	Not applicable as NUS does not sell any products that would incur emissions from further product processing.	-
Category 11 - Use of Sold Products	Not applicable as NUS does not sell any products that would incur emissions from their use.	-
Category 12 - End of Life Treatment of Sold Products	Not applicable as NUS does not sell any products that would incur emissions from their end of life treatment.	-
Category 13 - Downstream Leased Assets	Emission sources included tenant operational emissions within NUS-owned properties and entities, including: - Electricity consumption (e.g. canteen stalls, retail stores) - Town gas consumption from dining halls	The 2025 electricity and town gas emission factors used were consistent with those applied in NUS' Scope 1 and Scope 2 inventory. Town gas: fuel combustion emission factors from Singapore's National Environment Agency (NEA)

		Greenhouse Gas (GHG) Emissions Measurement and Reporting Guidelines (2025) . Electricity consumption: The latest local grid emission factor published by Singapore's Energy Market Authority (EMA) for electricity consumed at the time of reporting was used (0.402 kgCO ₂ e/kWh for 2025).
Category 14 - Franchises	Not applicable as NUS does not have any franchises.	-
Category 15 - Investments	Not reported due to data unavailability. NUS adopts a responsible investment strategy with a focus on ensuring that its investments generate income to support our activities while closely aligning to principles of environmental sustainability and social responsibility.	-

Other Environmental Data Calculation Methodology

Data Category		Data Source
Energy Consumption	Grid electricity	Purchased electricity consumed by all entities within NUS' organisational boundary.
	Solar energy	On-site solar energy generated by rooftop photovoltaic (PV) systems installed on NUS buildings.
	Buildings Electricity Consumption	Electricity consumption of selected NUS buildings, regardless of source (i.e. grid electricity or on-site solar PV).
Scope 1 & 2 emissions	Business-as-usual projection to 2030	Calculated based on NUS 2021 Scope 1 and 2 emissions, with the projected business-as-usual (BAU) electricity consumption of all planned new buildings through 2030 added. 2021 was selected as the base year, as 2022 was the first year in which the projections were developed. The BAU electricity consumption of new buildings was based on the reference energy modelling scenario under the Green Mark (2021) framework, or where unavailable, estimated using the EUI of existing NUS buildings of similar typology. A constant grid emission factor of 0.4085 kgCO₂e/kWh was applied, based on the Green Mark (2021) Technical Guide. <u>Exclusions</u> The business-as-usual emissions estimate does not account for the following: • Changes in campus population • Changes in campus activities • Changes in space use or minor renovations
Intensity Ratios	Energy Usage Intensity (EUI)	Calculated using electricity consumption as the numerator and gross floor area as the denominator.
	Scope 2 Gross Carbon Emissions Intensity	Calculated as NUS Scope 2 emissions divided by the total campus gross floor area.
Waste	Incinerated / Waste directed to disposal	General waste generated from NUS' three main campuses – Kent Ridge (including University Town), Bukit Timah and Outram (Duke-NUS Medical School) that is sent for incineration.

	by disposal operation	General waste generated by tenants located within NUS' three main campuses are not excluded, as general waste is consolidated at shared bin centres.
	Recycled / Waste diverted from disposal by recycling operation	Recycled waste collected across NUS' three main campuses, Kent Ridge (including University Town), Bukit Timah and Outram (Duke-NUS Medical School), covering the following waste streams: paper, plastic, metal, glass, food waste, horticultural waste, e-waste and textile. Refer to the Environmental Disclosures 2025 – Annex for details on the sources of these recyclables and how they are currently recycled. Recycled waste generated by tenants located within NUS' three main campuses are not excluded, as general waste is consolidated at shared bin centres.
	Recycling rate	Calculated using total waste recycled as the numerator and total waste generated (total waste recycled + total waste disposed) as the denominator.
	Daily Waste Disposed per Capita	Calculated using total waste incinerated as the numerator, and the product of 365 days of campus operations and the 2025 NUS population (staff, students and visitors) as the denominator.
Number of Trees Planted		The total number of new trees planted in NUS since November 2018.
Water	Water Consumption	Potable and NEWater consumed by all entities within NUS' organisational boundary. NEWater is an ultra-clean, high-grade reclaimed water primarily used for operational activities such as cooling.
	Water Efficiency Index (WEI)	Calculated using water consumption as the numerator and gross floor area as the denominator.