

Singapore

Carbon Neutrality policy and obligatory reporting systems

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National Environment Agency

Agenda

- National Circumstances
- Singapore Green Plan 2030
- Mitigation Efforts

National Circumstances

- Singapore Government facilitates the adoption of energy efficiency and emissions reduction technologies through grants and other policy tools to overcome high upfront capital investments and other non-market barriers.

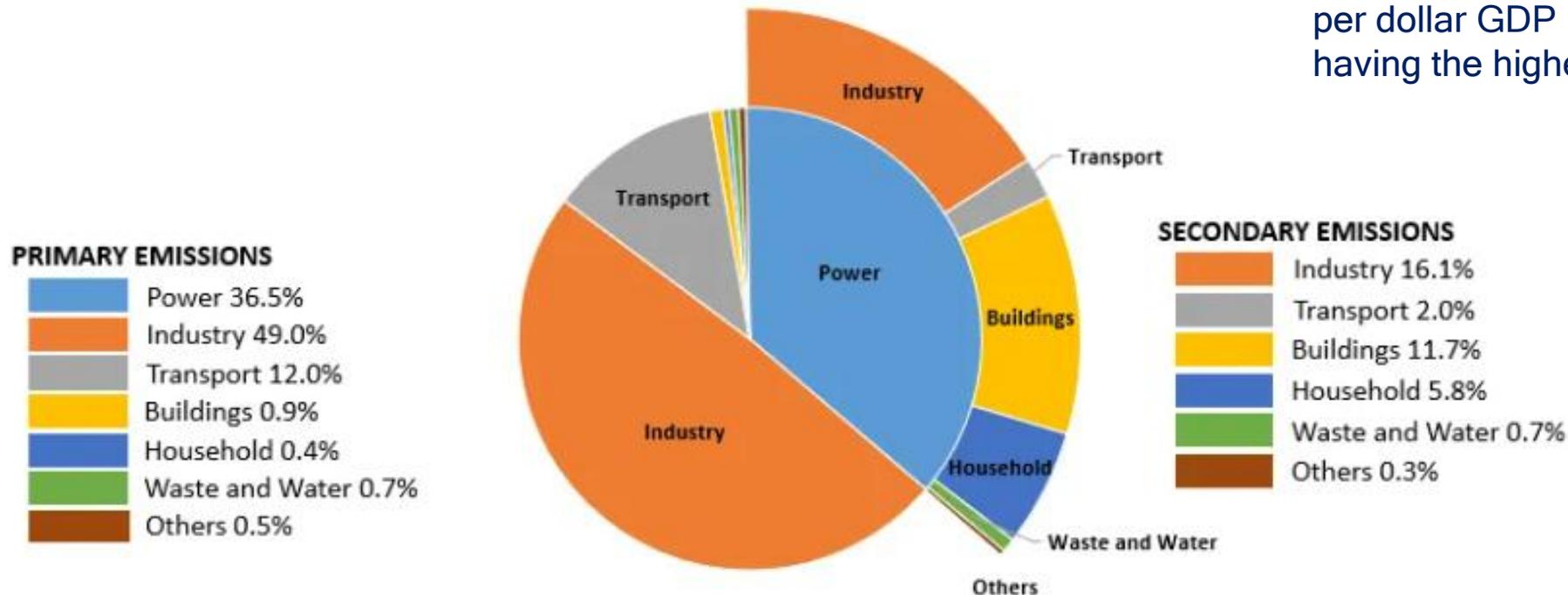
National Circumstances Overview

1. National actions on climate change and GHG emission reduction from early policy
 - Switching from fuel oil to natural gas (92% in 2022 vs 18% in 2000) for power generation
 - No subsidy for electricity, to ensure that households and businesses use energy judiciously
 - Imposing a vehicle quota system to cap vehicle growth and set a zero-growth rate for cars and motorcycles
2. Environmental blueprints, such as the Singapore Green Plan 2030, to achieve economic growth and a good living environment
3. Open economy and dependent on the global supply chain for food and energy
4. Dependent on effective international cooperation and early maturity of decarbonisation technologies

Singapore Emissions Profile

Emissions Profile (2022)

Emissions: 58.6 MtCO₂e



Singapore performs well in terms of carbon intensity globally - 134th of 153 countries/territories for CO₂ emissions per dollar GDP PPP in 2022, with the 1st having the highest carbon intensity.

Primary emissions refer to direct emissions from the sector's owned or controlled sources.

Secondary emissions refer to the sector's share of Power sector's emissions based on its share of electricity consumption.

Approach To Alternative Energy

- 1) As a small, resource-constrained country, Singapore imports almost all its energy needs, and has limited renewable energy options, like wind power, tidal power and hydroelectric power generation; geothermal energy sources
- 2) Small physical size (734 km²), high population density (8,058 persons/km²) and land scarcity limits potential for sustainably-grown domestic biomass and solar photovoltaics (PV) deployment and constrains the safe deployment of nuclear power

Approaches to alternative energy

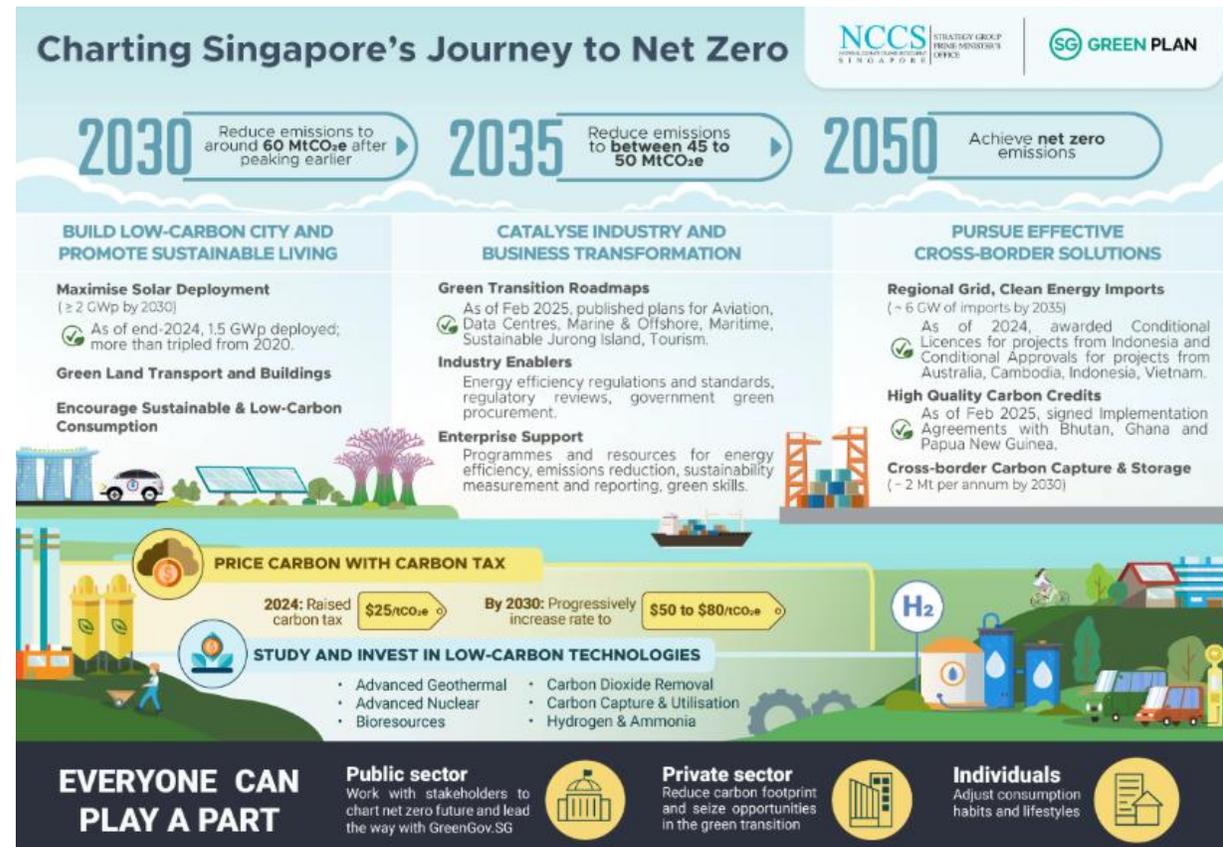
- Investing in research and development as well as test-bedding to improve the performance of solar PV systems and develop innovative ways of integrating solar energy systems with the aim to deploy at least 2 gigawatt-peak of solar energy by 2030
- Exploring a variety of different options, including regional power grids, and emerging low-carbon alternatives such as low-carbon hydrogen and carbon capture, utilisation and storage (CCUS)

Singapore's Climate Targets

- Reduce emissions to around 60 million tonnes (Mt) CO₂e by 2030, after peaking emissions earlier.
- Further reduce emissions to between 45 to 50 MtCO₂e in 2035
- Long-Term Low-Emissions Development Strategy (LEDS) is to achieve net-zero emissions by 2050.

- Despite the challenging circumstances and geographical constraints faced, Singapore is committed to effective climate action through these key thrusts:

- Build low-carbon city and promote sustainable living
- Catalyse industry and business transformation;
- Pursue effective cross-border solutions



Singapore Green Plan 2030

- The Green Plan is a whole-of-nation movement to advance Singapore's national agenda on sustainable development

<https://youtu.be/oTrwdqIRVKI>

Singapore Green Plan 2030

- Launched in February 2021, the Singapore Green Plan 2030 seeks to galvanize a whole-of-nation movement and advance Singapore's national agenda on sustainable development.
- The Green Plan charts ambitious and concrete targets to advance Singapore's national agenda on sustainable development.

Five key pillars under the Green Plan are:

- City in Nature
- **Energy Reset**
- Green Economy
- Resilient Future
- Sustainability Living

The Green Plan's key targets are:

- Plant 1 million more trees
- Quadruple solar energy deployment by 2025
- Reduce waste sent to landfill by 30% by 2030
- ≥20% of schools to be carbon neutral by 2030
- All newly registered cars to be cleaner-energy models from 2030

The Green Plan Pillar: Energy Reset

<Green Energy>

- 1) ≥ 2 GWp of solar energy by 2030 ~3% of Singapore's total projected electricity demand, will meet ~10% of projected electricity demand in 2050
 - Achieved target of 2025 of deploying 1.92 GWp (as end of Q3 2025) of solar, including 60 MWp inland floating solar PV system at Tengeh Reservoir
 - Deployed first utility-scale energy storage system (ESS) at a substation in Oct 2020 and the largest ESS in Southeast Asia with 285 MWh in Feb 2023.
- 2) To import up to 4 GW of low-carbon electricity by 2035, ~ 30% of Singapore's projected electricity supply
- 3) To increase the efficiency and $\geq 30\%$ vol H₂-ready of new installed combined cycle gas turbines (CCGT) power plants and study viability of low or zero carbon ammonia solution for power generation and bunkering
- 4) To explore emerging low-carbon alternatives such as hydrogen, geothermal and carbon capture, utilisation and storage



The Green Plan Pillar: Energy Reset

<Green Transport>

- 1) All vehicles run on cleaner-energy by 2040. New diesel car and taxi registrations are to cease from 2025, with all new car and tax registrations to be of cleaner-energy models from 2030, such as
 - Targeting for 60,000 electric vehicle (EV) charging points by 2030
- 2) Domestic aviation emissions from airport operations will be reduced by 20% from 2019 levels in 2030 and achieve net zero domestic and international aviation carbon emissions by 2050
 - From 2026 starting with a 1% target, all flights from Singapore will be required to use Sustainable Aviation Fuels
- 3) Sea hub is moving decisively to develop various net-zero fuel pathways to achieve net-zero emissions by 2050
 - All new harbour craft operating will be fully electric, be capable of using B100 biofuels, or be compatible with net zero fuels from 2030

The Green Plan Pillar: Energy Reset

<Green Buildings> Singapore Green Building Masterplan: “80-80-80 in 2030” targets

1. Stepping up the pace to green 80% of our buildings (by gross floor area) by 2030 and as of 2022
 - ~ 55% of Singapore’s buildings have been greened
 - Mandatory environmental sustainability standards for new buildings and existing buildings undergo major retrofit
 - Updated the Green Mark scheme to raise energy performance standards
2. Having 80% of new developments (by gross floor area) to be Super Low Energy (SLE) buildings from 2030
 - All new and existing government buildings are to achieve Green Mark (GM) Platinum SLE standards or equivalent
 - Developed a new SLE standard for residential buildings
3. Achieving 80% improvement in energy performance for best-in-class green buildings by 2030
 - Green Buildings Innovation Cluster (GBIC) program to support the development and demonstration of innovative energy efficient technologies and solutions

Mitigation Efforts

- Singapore is committed to effective climate action and we will find innovative ways to move towards a low-carbon future for industry, economy, and society through Build Low-carbon City and Promote Sustainable Living; Catalyse Industry and Business Transformation; Pursue Effective Cross-Border Solutions

Mitigation Efforts: Clean & Renewable Energy

Power generation is one of the major sources of Singapore's carbon emissions and accounts for about 40% of emissions today.

1) Solar Power

- Initiatives such as [the SolarNova programme](#), [JTC's SolarLand](#) and [SolarRoof programme](#) and PUB's floating solar farms.
- Longer-term strategies for maximising solar power and investing in R&D and test-bedding to increase efficiency and optimize space utilisation.

2) Regional Power Grids

- To import a capacity of 4 GW of low-carbon electricity by 2035
- Importing up to 100 MW of renewable hydropower from the Lao People's Democratic Republic (PDR)
- Two small-scale trial imports of electricity: 100 MW from Peninsular Malaysia and 100 MW from a solar farm in Pulau Bulan, Indonesia.

Mitigation Efforts: Low-Carbon Alternatives

1) Emerging Low-Carbon Alternatives

- a. Singapore is studying emerging low-carbon technologies like hydrogen, carbon capture utilisation and storage (CCUS)
- b. Low-Carbon Energy Research (LCER) Funding Initiative, a S\$55 million-research fund to support 12 projects

2) Low-Carbon Hydrogen has emerged as a key potential decarbonisation pathway for Singapore with five key thrusts:

- a. Experimenting with the use of advanced hydrogen technologies at the cusp of commercial readiness through pathfinder projects;
- b. Investing in research and development (R&D) to unlock key technological bottlenecks;
- c. Pursuing international collaboration to enable supply chains for low-carbon hydrogen;
- d. Undertaking long-term land and infrastructure planning; and
- e. Supporting workforce training and development of a broader hydrogen economy

Mitigation Efforts: Carbon Capture, Utilization and Storage

Singapore is exploring possible CCUS deployment pathways.

Carbon dioxide captured could be sequestered in suitable sub-surface geological formations, utilised as feedstock for synthetic fuels or as building materials through mineralization.

- To realise ≥ 2 MtCO_{2e} of carbon capture potential per year by 2030 and achieve more than 6 MtCO_{2e} of carbon abatement per annum by 2050 in Jurong Island.
- To Work with S Hub, a consortium of Shell and ExxonMobil, to develop a cross-border carbon capture and storage (CCS) project that permanently stores ≥ 2.5 MtCO_{2e} per year by 2030 .
- The Energy Market Authority (EMA) has issued a Grant Call to select participants to co-fund and conduct site-specific CCS feasibility studies for the power sector.

Mitigation Efforts: Energy Efficiency Obligations

The Energy Conservation Act (ECA) and the Energy Conservation (Energy Management Practices) Regulations were enacted in 2012 and 2013, respectively, which mandatorily included:

- Appointing a certified energy manager ;
- Monitoring and reporting energy use annually; and
- Submitting energy efficiency improvement plans annually.

The ECA was enhanced in 2017 to stipulate more energy management practices:

- To implement energy management systems, undertake regular energy efficiency opportunity assessments or implement energy performance monitoring;
- To introduce minimum energy efficiency standards; and
- To review the new energy-intensive facilities for energy efficiency opportunities, and to monitor and report energy use and performance indicators based on measured data

Singapore enhanced energy conservation in 2024 which introduces the Mandatory Energy Improvement regime, the enhancement of the Climate Friendly Households Programme and the amendment of ECA.

Mitigation Efforts: Carbon Tax

Singapore's comprehensive suite of mitigation measures to support the transition to a low-carbon economy.

It steers producers and consumers away from carbon-intensive goods and services, hold businesses accountable for their emissions, and enhance the business case for the development of low-carbon solutions

- ❖ About 80% of our total greenhouse gas (GHG) emissions are covered by carbon tax and fuel excise duties on our transport fuels
- ❖ Around 70% are covered by the carbon tax levied on about 50 facilities in the manufacturing, power, waste, and water sectors
- ❖ The carbon tax was raised to S\$25/tCO₂e from 2024, will be raised to S\$45/tCO₂e in 2026 - 2027, estimate to S\$50-80/tCO₂e by 2030



Mitigation Efforts: Grants & Capability Building

Energy efficiency measures provide the economic benefits of lowering energy costs while reducing carbon emissions with following supports from the government:

- ❖ Resource Efficiency Grant for Emissions (REG(E))
- ❖ Energy Efficiency Grant (EEG)
- ❖ Investment Allowance for Emissions Reduction

Initiatives to build capability in industrial energy efficiency

- ❖ The Energy Services Company (ESCO) Accreditation Scheme and Singapore Certified Energy Manager (SCEM) Programme
- ❖ The Energy Efficiency National Partnership (EENP) Programme
- ❖ The Energy Efficiency Technology Centre (EETC)
- ❖ The Energy Efficiency Promotion Centre (EEPC),

Thank you!

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