



2025-2030

A collage of 18 photographs arranged in a map-like shape, illustrating various environmental and social activities. The images include: people participating in recycling and waste management; community events and exhibitions; water management and irrigation systems; and individuals engaged in outdoor activities and education. The collage is set against a light blue background with a repeating floral pattern.

Bangkok Waste and Wastewater Action Plan 2025–2030



Introduction

In recent years, Thailand has been in the process of considering a draft Climate Change Act. The country is working to strengthen its climate change policies and has upgraded its greenhouse gas (GHG) reduction targets from a Business As Usual (BAU) approach to an absolute emission reduction target, which refers to reducing GHG emissions from the actual emission levels in 2019 (the base year). This transition involves continuing GHG mitigation measures from NDC 2.0 to NDC 3.0, including both unconditional targets (actions implemented domestically) and conditional targets (those requiring international support). This shift must take into account the national context, implementation feasibility, as well as potential challenges and opportunities in order to maintain the country's competitiveness in the areas of economy, trade, and investment, both nationally and internationally.

Bangkok Metropolitan Administration (BMA), in collaboration with the Japan International Cooperation Agency (JICA), has implemented the Bangkok Climate Change Master Plan 2021–2030. The plan sets an ambitious target: Bangkok aims to reduce greenhouse gas emissions by 19% by 2030 compared to the Business As Usual (BAU) scenario, using 2018 as the base year. This ambitious target is part of a strategic approach aligned with Bangkok's long-term efforts and commitment to achieving net-zero greenhouse gas emissions by 2050.

In this regard, Bangkok Metropolitan Administration has received technical and academic support to promote the integration of efforts aimed at developing Bangkok into a net-zero greenhouse gas emission city. Bangkok has also participated in the City-to-City Collaboration Project (C2C Project), supported by the Ministry of the Environment, Japan (MOEJ), to formulate the Bangkok Energy Action Plan 2024–2030. In addition, further support has been provided to Bangkok under the “**Partnership to Strengthen Transparency for Co-Innovation (PaSTI)**” initiative. These collaborations and support are in line with the Bangkok Climate Change Master Plan 2021–2030, which aims to strengthen approaches for measuring, reporting, and verifying greenhouse gas emissions, as well as to promote the development and implementation of more efficient waste and wastewater management projects. At the same time, Bangkok has prioritized waste and wastewater management by shifting from a centralized treatment system to onsite treatment at the source, aiming to reduce waste generation at its origin. Local authorities, such as district offices, are now required to manage their own waste and wastewater. Moreover, current Bangkok policies encourage citizens to actively reduce and segregate waste at the source and utilize waste more effectively through initiatives such as the “**No Mixed Waste at This Home: Separate Waste to Reduce Fees**” project, enabling public participation in achieving sustainable environmental stewardship.

The development of the Bangkok Waste and Wastewater Management Action Plan 2025–2030 aligns with the strategic management framework for building a climate-friendly society, as well as the urban environmental and pollution management strategy outlined in the Environmental Quality Management Plan 2023–2027.

It also supports the objectives of the Bangkok Climate Change Master Plan 2021–2030, with technical and academic assistance from the PaSTI and C2C projects of the Ministry of the Environment, Japan, and the Japan International Cooperation Agency (JICA). This collaboration has led to the formulation of effective measures and operational strategies, which are crucial to achieving Bangkok’s greenhouse gas reduction targets.

To realize these goals, Bangkok must strengthen cooperation with government agencies, the private sector, and civil society to create and promote joint approaches for implementing comprehensive measures and activities that can effectively reduce greenhouse gas emissions in line with the Master Plan.

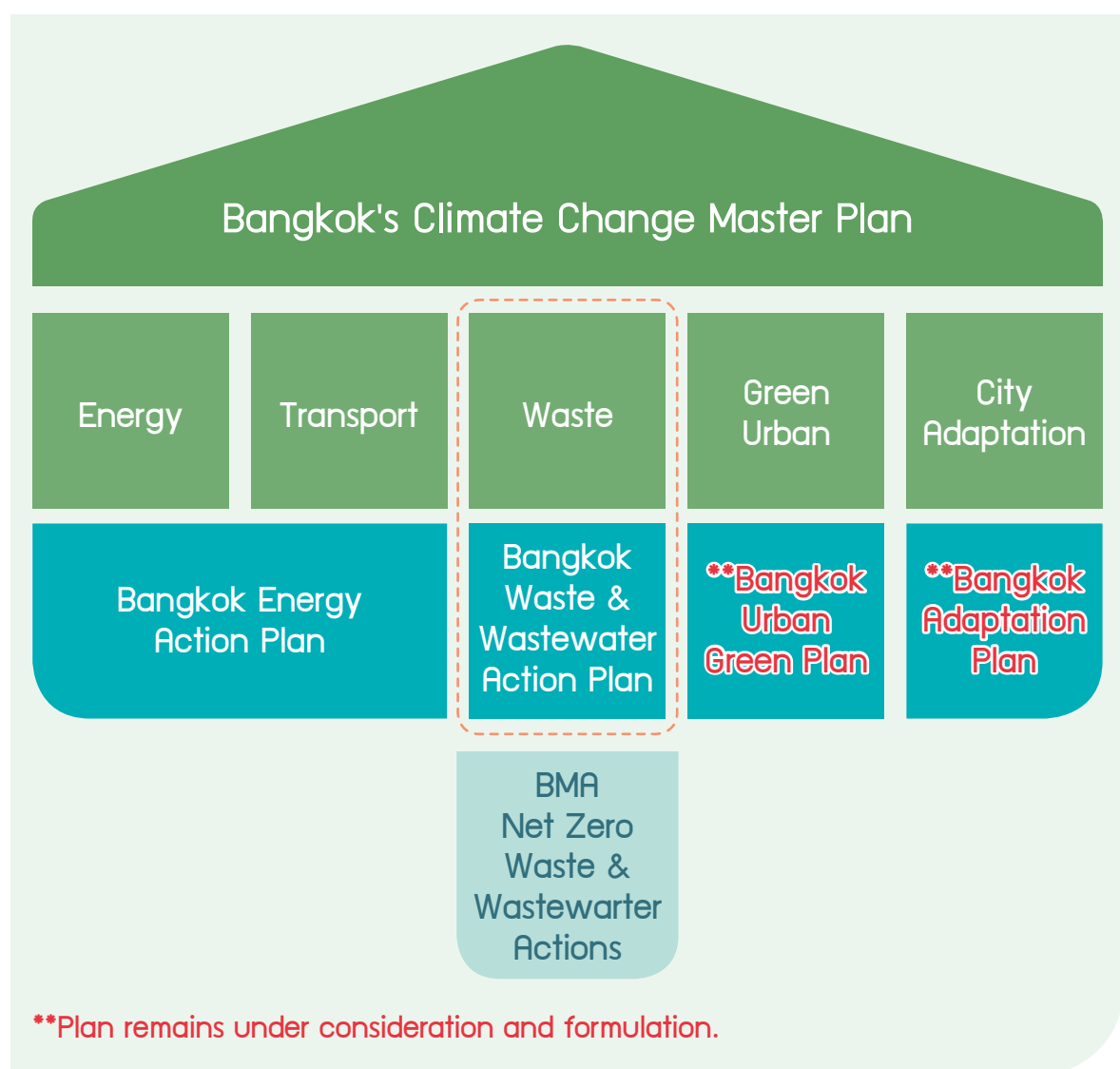


Figure 1 The hierarchy of Bangkok Waste and Wastewater Action Plan and its connection to Bangkok Master Plan on Climate Change 2021–2030.

2

Goals and Objectives of the Bangkok Waste and Wastewater Action Plan 2025-2030

The formulation of the Bangkok Waste and Wastewater Action Plan 2021-2030 is centered around a primary aim: translating the GHG reduction targets outlined in the Bangkok Master Plan on Climate Change 2021-2030, and measurement and reporting of GHG emission into tangible actions within both the waste and Wastewater sectors. This strategic and repetitive approach ensures a specific and practical roadmap, enabling BMA to effectively meet its GHG reduction objectives within the designated timeframe. The conceptualization of the Bangkok Waste and WasteWater Action Plan 2021-2030 can be succinctly outlined as follows:

1

Define GHG reduction targets for the Waste and Wastewater sectors, aligning seamlessly with the measures stipulated in the Bangkok Master Plan on Climate Change 2021-2030.

2

Define the concrete action for the measurement and reporting of GHG emission.

3

Establish a comprehensive framework and operational direction at the action plan level, ensuring a tangible reduction of GHG emissions in the waste and wastewater sectors throughout Bangkok.

4

Provide operational guidelines for various agencies under BMA, fostering consistency and alignment of efforts, thus contributing to the creation of a sustainable and continuous trajectory.

5

Actively encourage and facilitate the engagement of relevant agencies under the BMA, spanning the public, private, and governmental sectors.



3

Alignment with the Bangkok Master Plan on Climate Change 2021–2030

3.1 Sustainable Climate Change Vision for the Long Term

The Bangkok Master Plan on Climate Change 2021-2030 is considered a framework for Bangkok Metropolitan Administration to move towards becoming a Green City ready to cope with climate change and becoming a city that emits net zero greenhouse gas emissions according to the future vision of Bangkok.

Bangkok Metropolitan Administration has set a vision that is consistent with the global climate change goal. This vision is related to the net zero greenhouse gas emissions and the vision according to the 20-year Bangkok Development Plan, which aims for Bangkok to be elevated to a “Capital of Asian” which has a development strategy that is more related to climate change.

Bangkok’s vision has been developed for 2 periods; the interim vision in 2030 and the long-term vision in 2050 which is consistent with the global and national policies for climate change action. Aiming to achieve net-zero GHG emissions by 2050 is considered a strategic direction of Bangkok’s climate action in the long term

2030’s Vision

“Bangkok moves toward a green, livable and climate-resilient city, under the nationwide collaboration for sustainable development.”



2050’s Vision

“Bangkok as a livable and innovative city, pursuing efforts to achieve net-zero emissions and enhances resilience in all aspects.”



Bangkok Metropolitan Administration committed to reduce greenhouse gas emissions, focusing on developing an environmentally friendly public transportation system, increasing energy efficiency in buildings and promoting the use of alternative energy. Moreover, BMA continuously improves waste management technology to reduce the amount of waste sent to landfill or other end-of-pipe treatment units. There are efforts to absorb carbon dioxide and reduce city temperatures by increasing green space and also provides knowledge and creates awareness to publics in solving climate change problems. BMA continuously promotes cooperation between the government, private sector and civil society to jointly solve problems and develop the city sustainably.

3.2 GHG Emission Reduction Targets in the Waste and Wastewater Sectors

The Bangkok Master Plan on Climate Change 2021-2030 sets ambitious targets and creates important measures to cover the dimensions of (1) a sustainable and environmentally friendly transport sector (2) Energy efficiency and alternative energy use sector (3) Waste management sector and efficient wastewater treatment (4) Green city planning sector and (5) Guidelines for climate change resilience.

BMA has committed the city's greenhouse gas reduction target by 2030 is 19 percent (10.15 MtCO₂e), compared to Greenhouse gas emissions in the case of business as usual (BAU). The reduction of greenhouse gas emissions from the waste and wastewater treatment sector accounts for 10% (0.6 MtCO₂e) of the total greenhouse gas reduction target, shown in Table 1.

Table 1 GHG reduction target by sector compared to GHG emissions in the no-action (BAU) case
Unit: MtCO₂e

Sector	GHG Inventory in 2018 (base year)	GHG inventory (BAU Scenario) in 2030	GHG reduction/absorption target under Bangkok Master Plan's mitigation measure in 2030	Reduction/absorption rate against BAU
Transportation	12.63	14.24	4.00	28%
Energy	25.73	33.88	5.55	16%
Waste and Wastewater	5.37	5.81	0.60	10%
Total (Emissions)	43.73	53.93	10.15	19%
AFOLU/ Green Urban Planning	NE*	NE	0.01**	NE

Remark:

NE = Not Estimated

* = GHG emission calculation is according to the Agriculture, Forestry and Other Land Use (AFOLU) sector, which is not estimated.

** = Calculated from the potential of GHG absorption of green urban planning measure which equals to 0.008 MtCO₂e approximately.

If Bangkok can achieve the greenhouse gas reduction goals successfully as planned by 2030, Bangkok will be able to reduce greenhouse gas emissions by approximately 23.15 MtCO₂e

Combined with the achievements from the implementation of the previous Bangkok Master Plan, which was able to reduce greenhouse gas emissions by approximately 13 MtCO₂e in 2020 (as shown in Figure 2), this will result in Bangkok's total greenhouse gas emission reductions exceeding 19% of the set target.

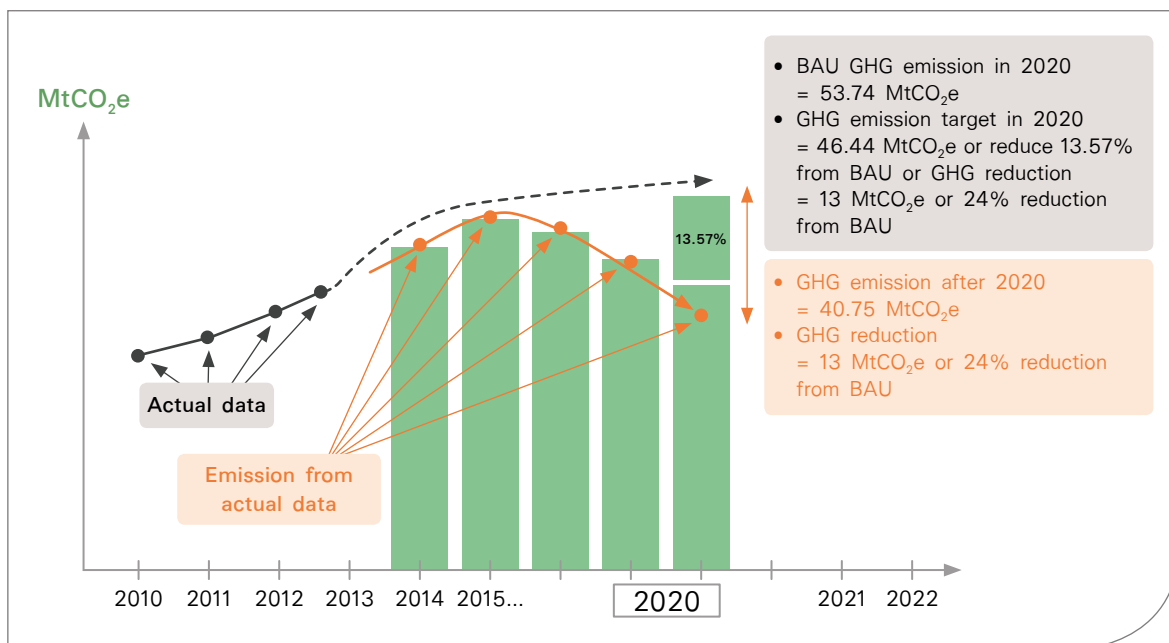


Figure 2 Actual GHG emission in 2020 compared with the emission reduction target in previous master plan.

3.3 GHG Emissions in Bangkok's Waste and Wastewater Sectors

Bangkok Master Plan on climate change 2021-2030 illustrates the greenhouse gas emissions of Bangkok city using activities data in 2018 as the base year. It was found that Bangkok emits overall greenhouse gases around 43.73 MTonCO₂e. For the waste and wastewater management sector, it is a sector that emits greenhouse gases ranked third after the energy and transportation sectors which is equivalent to 12.87 percent of the total amount of greenhouse gas emissions (as shown in Figure 3).

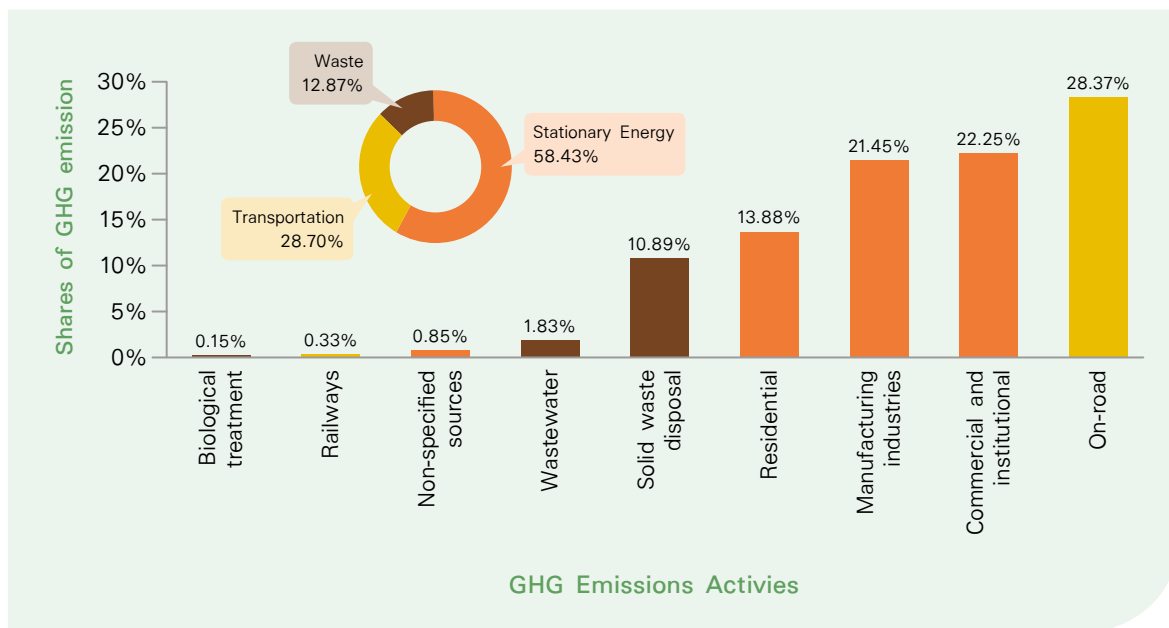
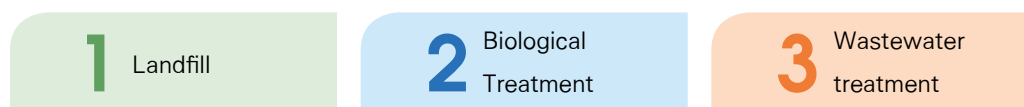


Figure 3 Shares of GHG emissions in 2018 by sub-activities

There are 2 sub-sectors for waste management sector; solid waste and wastewater. Greenhouse gases emission from both sub-sector are depended on the treatment process. The following lists are the treatment process that relates to the GHG emissions.



According to the Bangkok Master Plan 2021-2030, the GHG emission from waste management sector was around 5,365,732 tCO₂e which majority from solid waste management activities. The conventional solid waste management technology of Bangkok city is “**landfilling**” where Bangkok sends solid waste to be managed outside of its boundaries (Kamphaeng Saen District, Nakhon Pathom Province and Phanom Sarakham District, Chachoengsao Province) and be operated by private sector. There were greenhouse gas emissions from waste management using landfill methods at 4,407,912 tCO₂e. In addition, Bangkok uses biological methods or “**composting**” technique at the On Nut and Nong Khaem Waste Disposal Plant. As a result, the GHG emission from composting activities was 65,359 tCO₂e.

For wastewater management and discharge, greenhouse gas emissions are considered in 4 parts: septic tank, untreated wastewater, wastewater treatment system(discharged wastewater) and sludge digestion tank. With a total of 880,647 tCO₂e of greenhouse gas emissions from wastewater management, it can be seen that landfill waste management is the activity with the highest greenhouse gas emissions in the waste and wastewater management sector. Most of solid waste of Bangkok has been set to Landfill and its process has a potential to emit high greenhouse gas. In addition, municipal solid waste is also managed through waste-to-energy incineration and a Mechanical Biological Treatment (MBT) system, accounting for 11,814 tCO₂e, with these greenhouse gas emissions relevant to the energy sector.

Bangkok collected waste management data from 2018 to 2022 and calculated the actual greenhouse gas emissions compared to the baseline year. When compared with the national greenhouse gas emissions, it was found that in 2022, Thailand emitted 22,172,960 tCO₂e from the waste sector (as reported in the First Biennial Transparency Report), while Bangkok emitted 4,740,572 tCO₂e from the waste sector, accounting for 21.37% of the national total. Furthermore, when projecting greenhouse gas emissions from the waste sector up to 2030 under a Business-As-Usual (BAU) scenario, it is estimated that Bangkok would emit as much as 6,325,027 tCO₂e, as shown in **Figure 4**. The information of GHG emissions from waste sector in 2018-2023 is illustrated in the figure below.

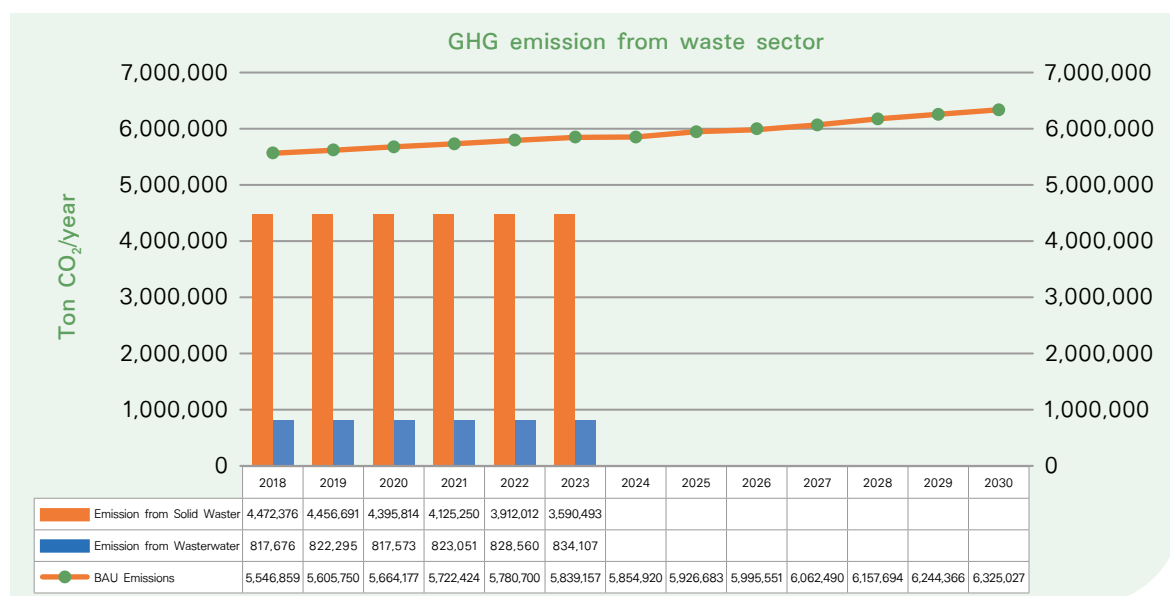


Figure 4 Actual GHG emissions from waste sector and BAU scenario to 2030

4

Current Landscape of Waste and Wastewater in Bangkok

Based on the waste composition data, waste volume, and greenhouse gas emissions in Bangkok from 2018 to 2023, it was found that food waste accounts for the largest proportion of the municipal waste. In 2023, food waste made up approximately 49.1% (Figure 5). Moreover, the overall amount of waste generated in Bangkok has shown a significant decreasing trend due to activities promoting waste reduction at the source, reuse and recycling, as well as campaigns for waste separation at the sources, as shown in Figure 6.

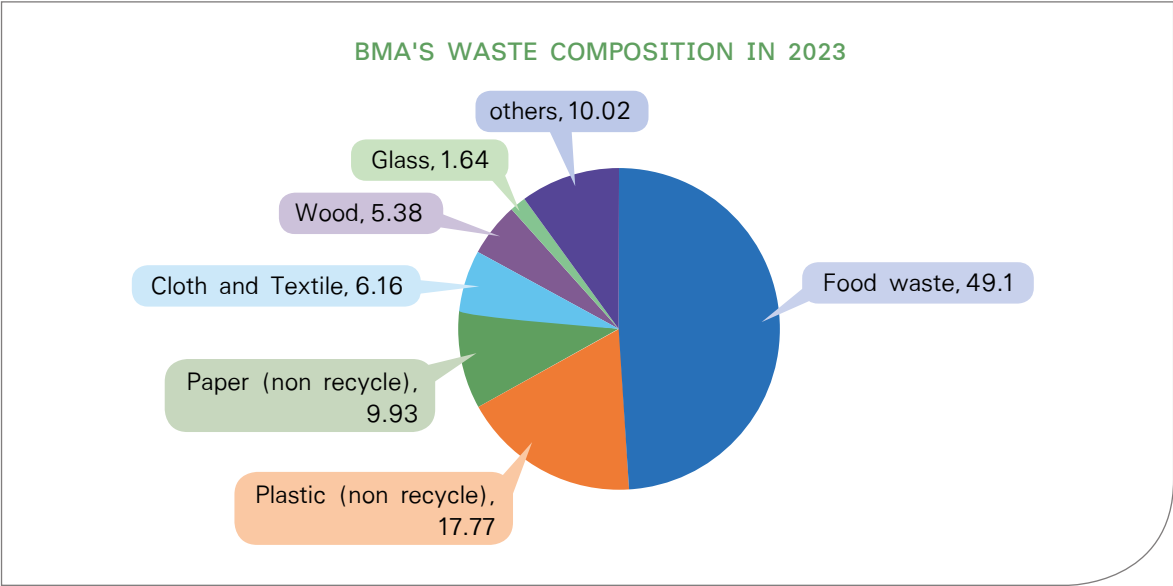


Figure 5 BMA's Solid waste composition (2023) from 3 solid waste transfer sites (source: Strategy and Innovation Unit Solid Waste Management Strategy office Environment Department)

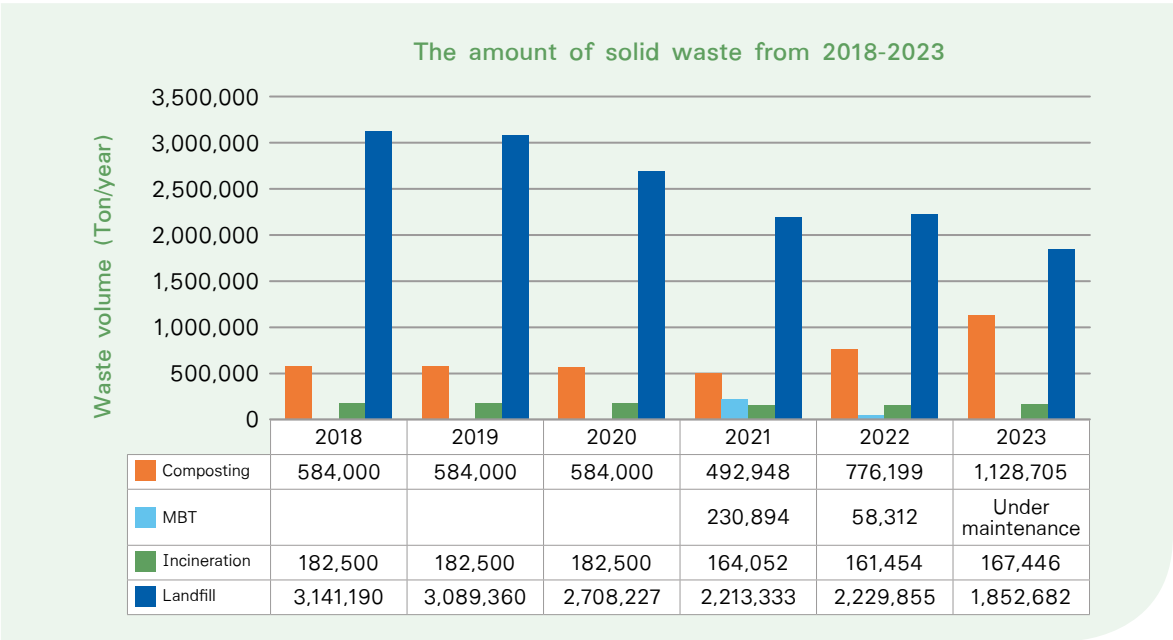


Figure 6 Solid waste volume from 2018-2023 (MBT is under maintenance since April 2022)

For the wastewater treatment plant(WWTP), there are currently in operation include 9 large scale WWTP and 12 small WWTP. Data on the amount of wastewater entering the large scale, water reuse and excess sludge volume from 2018-2023 are shown in Figure 7,8,9.

It can be seen that the amount of wastewater collected into the large wastewater treatment system in Bangkok is particularly constant because the new WWTP are under construction and has not yet been commissioned (Minburi and Thonburi). The greenhouse gas reduction activities of the wastewater management sector relevant to the collecting more wastewater into the treatment system, reusing treated wastewater (plantation and roads cleaning) and using excess sludge (soil improver). It can be seen that over the past 2-3 years, Bangkok has had related policies related to the mentioned activities

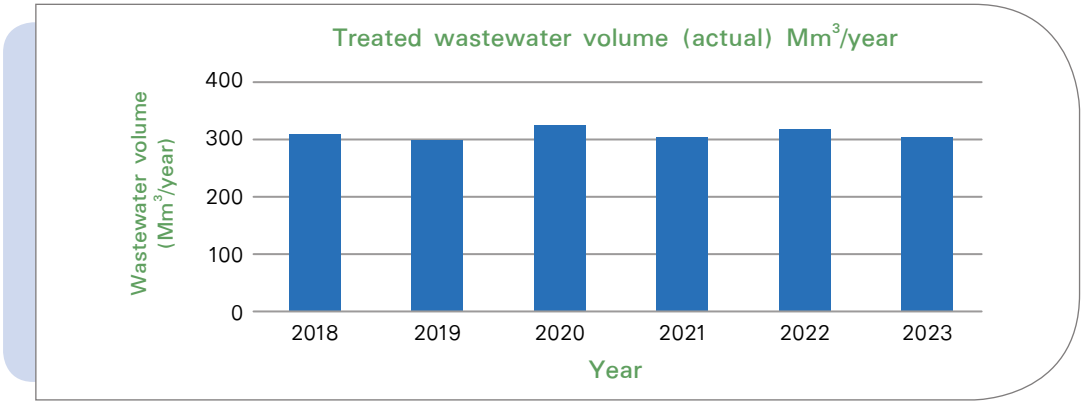


Figure 7 Wastewater volume from 2018-2023

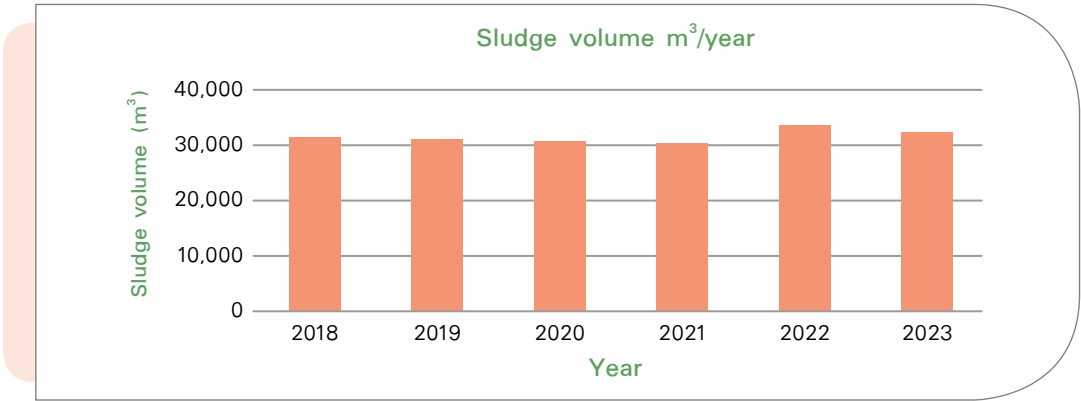


Figure 8 Excess sludge volume from 2018-2023

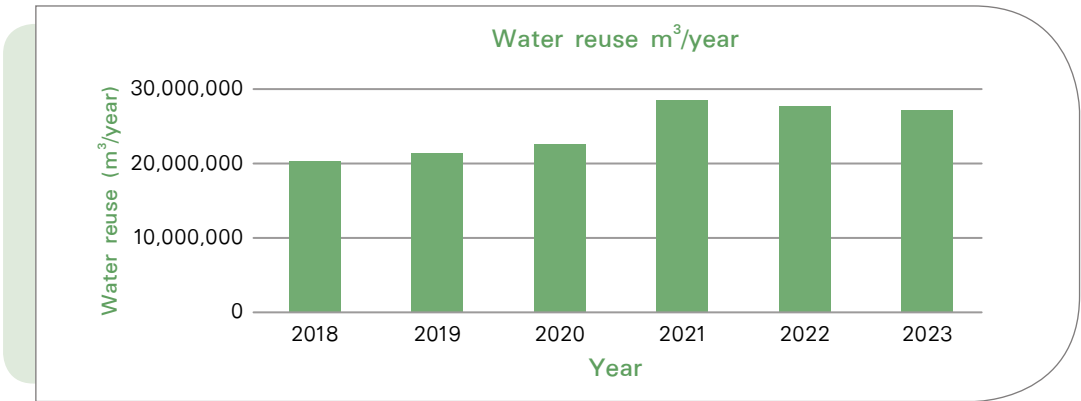


Figure 9 Volume of reuse water from 2018-2023



Key Strategies of the Bangkok Waste and Wastewater Action Plan 2025–2030

Strategy I

Data collection and MRV system

Systematic data collection on greenhouse gas (GHG) emissions in the waste sector is important for developing effective strategies to reach the net zero policy. By accurately measuring emissions from different waste processes such as landfills, composting, MBT, wastewater collection, water reuse and excess sludge disposal, stakeholders can establish a clear baseline and set realistic targets for reduction. This data-driven approach enables policymakers to prioritize high-impact areas, directing resources toward the most significant emission sources and ensuring efficient use of funds. Moreover, systematic data collection allows for ongoing monitoring of progress, making it possible to track and report reductions transparently, which is essential for accountability and maintaining public trust.

The MRV(Measurement, Reporting, and Verification) system provides a reliable framework to measure and track emissions accurately across various sectors, including transportation, waste management, and energy. There are three main components: Measuring to collect data and calculate the amount of gas emissions, reporting (Reporting) to prepare data reports to meet international standards and verification (Verification). There is a unit that evaluates the accuracy of the information. This system plays an important role in ensuring transparency and support the policy planning and follow up on progress in projects related to greenhouse gas emission.

Strategy II

Emission reduction target

Setting greenhouse gas (GHG) emission reduction targets for solid waste and wastewater management sector involves a systematic process that begins with conducting a comprehensive baseline emissions inventory to assess current emissions across various activities, such as landfilling, composting, MBT, incineration, construction of new wastewater treatment plant, extension the service area for sewerage collection system, sludge digestion and etc. BMA should set greenhouse gas (GHG) emission reduction targets reflect to their priorities and capabilities(budget). Setting greenhouse gas (GHG) emission reduction targets at a challenging level is a tool for BMA to communicate the urgency of climate change. Challenging targets push BMA toward climate friendly technologies for solid waste and wastewater management. Additionally, ambitious targets signal commitment to climate action, building trust with the public, BMA and other stakeholders.

Strategy III

Practical and compliance with BMA's policies and Budget

A practical action plan and compliance with BMA's policies and budget are a key strategies for achieving sustainable development and climate resilience goals. Since, they translate high-level objectives into concrete, actionable steps. Unlike broad policy statements, a well-designed action plan breaks down complex goals into manageable tasks, assigns responsibilities, and sets timelines, which ensures that all stakeholders understand their roles in driving progress.

This level of detail is essential for monitoring progress, as it allows for clear indicators of success, making it easier to identify challenges, measure impacts, and adjust as needed. Moreover, a practical action plan provides transparency and accountability, as it lays out specific commitments and benchmarks that stakeholders, from government agencies to community members, can track. It also promotes resource efficiency by prioritizing actions based on feasibility and impact, helping organizations focus on initiatives that deliver the most significant results within available budgets. Ultimately, a practical action plan bridges the gap between vision and implementation, ensuring that ambitious goals are grounded in reality and progress is both achievable and measurable.

Complying with BMA's policies and aligning with BMA's budget constraints are key strategies for the success of any action plan, as they ensure that planned initiatives are both feasible and legally supported. Adhering to policy guidelines guarantees that actions align with existing regulations and broader BMA objectives, creating synergy and reducing the risk of non-compliance or conflicts that could delay progress. Additionally, working within a set budget is crucial to making the action plan sustainable; it allows planners to prioritize resources effectively and focus on initiatives that deliver maximum impact without overspending.

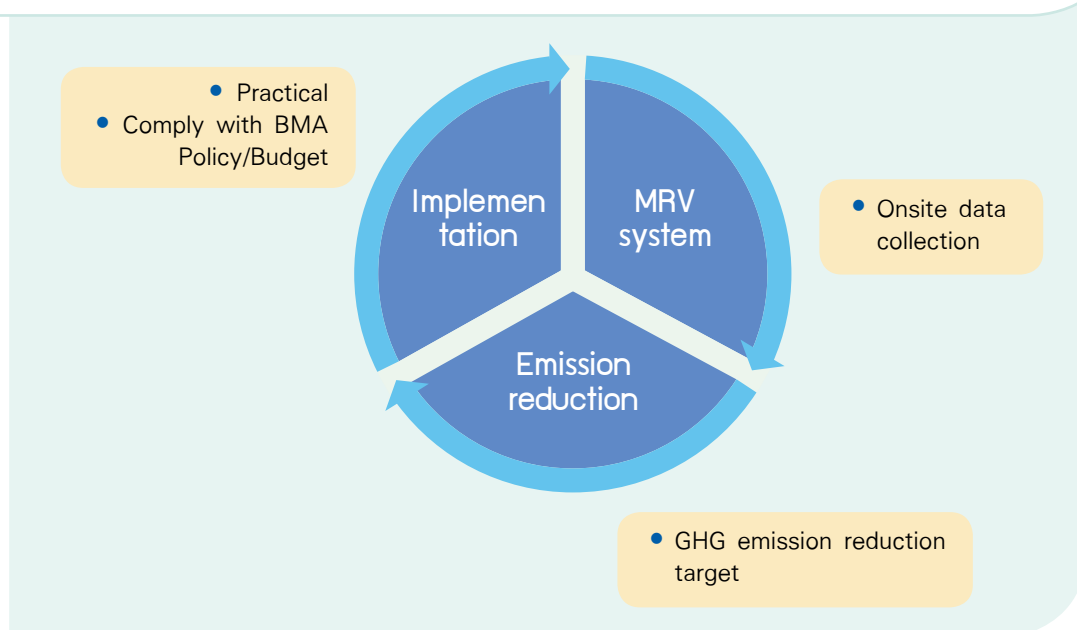


Figure 10 Action plan's strategies



Key Measures of the Bangkok Waste and WasteWater Action Plan 2025–2030

To enable Bangkok to effectively implement GHG reduction policies, operational measures should be established with consideration of:

- Indicators for measuring success or goal achievement

- Incremental target values for each activity



Solid waste management

1 Waste Reduction, Segregation at Source measurement and Reduce the amount of waste sent to final disposal(WM1):

Promote and raise public awareness to reduce waste generation at the source and to separate waste according to the Bangkok Governor's **"No Mixed Waste"** policy, applying the 3R principles with a focus on separating waste into four categories: food waste, recyclable waste, hazardous or toxic waste from communities, and general waste.

1.1

Waste reduction measures include minimizing the use of resources and materials that generate waste, reducing or eliminating the use of foam food containers and single-use plastics, and choosing reusable or recyclable packaging. Examples include reducing the use of plastic bags by using cloth bags instead, purchasing refill products to reduce single-use packaging and promoting online Loy Krathong (virtual Loy Krathong) to minimize waste.

1.2

Campaign to promote, raise awareness, and encourage the public to change their behavior to separate waste and reusable items for proper utilization and disposal: Sort recyclable materials to return as raw materials for circular production and re-consumption. Separate food waste for beneficial use, promoting resource circularity. Separate hazardous waste from general waste for proper disposal through specialized hazardous waste systems. Additionally, activities to encourage waste segregation may include initiatives such as exchanging waste for rewards or discount coupons, and organizing waste separation activities for targeted groups, particularly schools under the Bangkok Metropolitan Administration.



2

Measures to Reuse Waste as Resources at the Source:

To align with the Bangkok Governor's policy and emphasize utilizing waste at the source rather than sending it to the Bangkok Metropolitan Administration for disposal—especially food waste, which accounts for up to 50%—it is essential to promote waste utilization at the source by households and medium- to large-scale waste generators, as follows:

2.1

Utilization of organic waste

2.1.1

For households: Encourage households to separate organic waste and reuse it by making compost at the source (e.g., using OK compost bins, producing bio-fermented liquid). In cases where households cannot manage organic waste themselves, they should still separate and collect it for proper handling by the Bangkok Metropolitan Administration.

2.1.2

For medium- and large-scale waste generators such as shopping malls and hotels: Promote the separation of organic waste and its reuse by making compost at the source. Alternatively, organic waste can be sent to farmers for use as animal feed, provided that contamination risks are considered and the waste is sterilized with heat before being fed to animals.

2.2

Utilization of recyclable waste

2.2.1

Promote waste separation at the source for households, medium scale, and large-scale waste generators, focusing on recyclable materials such as glass, paper, plastic, metal, and non-metal materials. These materials should be utilized at the source, sold, or donated to organizations or public and private agencies that accept material donations for circulation in the recycling system and further utilization.

2.2.2

Develop a system for collecting recyclable waste for further utilization, implemented by district offices, public agencies, and private organizations. Examples include district offices designating specific days for recyclable waste collection, encouraging the private sector to operate vehicles for purchasing recyclable waste, and installing recyclable waste collection points in Bangkok Metropolitan Administration agencies, as well as in public and private sector offices.

3

Measures to Improve the Efficiency of the Solid Waste Collection System by Designing an Effective Waste Collection System

3.1

Develop a system for collecting organic waste for beneficial use. The district offices will provide dedicated vehicles for collecting organic waste from households, medium- and large-sized establishments, and deliver it to Bangkok's organic composting plants.

3.2

Optimize waste collection routes to match the vehicle load capacity, with a schedule to collect waste at least twice per week on average. Integrate the waste collection routes into a map (Google Maps) and use GPS to monitor operations along the designated routes. (GHG emissions from this activity are not included in the calculations.)

3.3

Improve the waste collection system by using low-emission collection and transport vehicles. (GHG emissions from this activity are not included in the calculations.)

4

Waste Management Measures Using Environmentally Friendly Technologies

These measures focus on managing waste at disposal centers using technologies that are environmentally friendly, with pollution control systems to prevent impacts on the environment and the public. Examples include waste incineration for energy recovery, converting organic waste into compost, and managing waste through Mechanical-Biological Treatment (MBT) to transform waste into energy or reusable resources, thereby reducing the amount of waste sent to landfills.

4.1

Waste Management through Incineration (WM2)

- Nong Khaem Waste Disposal Center: 1,000 tons/day
- On Nut Waste Disposal Center: 1,000 tons/day

4.2

Waste Management Using Mechanical-Biological Technology (WM3)

- Mechanical-Biological Treatment (MBT) Plant at On Nut: 300 tons/day

4.3

Measures for Composting (WM4)

- Project for food waste processing machinery at On Nut: 30 tons/day
- Project for food waste processing machinery at Nong Khaem: 30 tons/day

5

Legal and Economic Measures

These measures involve using legal frameworks to drive waste reduction and segregation at the source. They encourage the public to reduce and separate waste by registering through the **BKK Waste Pay** application to receive discounts on waste management fees.

5.1

Develop and enforce laws that promote waste reduction and segregation at the source, as well as the reuse or recycling of segregated waste to maximize resource recovery. The laws will specify the types of waste that must be segregated according to the source category, with clear legal penalties for non-compliance.

5.2

Implement legal measures in conjunction with economic measures through the Bangkok Metropolitan Regulation on Service Fees for the Management of Wastewater and Solid Waste under the Public Health Law B.E. 2568 (2025), which is divided into **three groups**.

Group 1

For buildings or locations generating no more than 20 liters of waste per day, applying the principle of reducing and segregating waste into four categories. A lower service fee will be applied compared to those that do not separate waste. Residents must register through designated channels, and the waste segregation practices will be inspected.

Group 2 and Group 3

For sources generating more than 20 liters up to 1,000 liters, and those generating more than 1 cubic meter of waste, the PAYT (Pay As You Throw) principle will be applied—those generating more waste will pay higher fees. These sources are encouraged to separate organic and recyclable waste for sale or reuse, and send only the minimal remaining waste to Bangkok Metropolitan Administration for management, thereby reducing the unit service fee.

5.3

Provide awards or organize competitions for waste sources that manage waste at the origin effectively, following the Zero Waste principles.





Wastewater Management

1

Construction of Wastewater Treatment Systems

Expand the service area of wastewater treatment systems with projects that establish both centralized and decentralized treatment facilities to cover the entire Bangkok Metropolitan area. This aims to manage approximately 2.6 million cubic meters of wastewater per day efficiently (currently, only 45% of total wastewater is being treated).

1.1

Centralized Wastewater Treatment Systems

- Thonburi Wastewater Treatment Project: Covers the Thonburi area, serving Bangkok Noi District, Bangkok Yai District, Bang Phlat District, and parts of Taling Chan District, with a total capacity of 160,000 m³/day.
- Bueng Nong Bon Wastewater Treatment Project: Covers Prawet District, Suan Luang District, and nearby areas with a total capacity of 135,000 m³/day.
- Khlong Toei Wastewater Treatment Project: Covers Khlong Toei District, Phra Khanong District, and parts of Watthana District, Bang Na District, and Suan Luang District, with a total capacity of 332,000 m³/day.
- Min Buri Wastewater Treatment Project Phase 2: Covers parts of Min Buri District, Khlong Sam Wa District, Khan Na Yao District, and Saphan Sung District, with a total capacity of 42,000 m³/day.

1.2

Onsite Wastewater Treatment Systems

These systems are constructed or installed to treat wastewater from individual buildings or small groups of buildings, such as residential houses, condominiums, schools, and other facilities. This approach manages wastewater at the source with the objective of reducing pollution levels before discharge into the environment. Common systems include grease traps, septic tanks, and anaerobic filters. In the future, there are 53 designated locations in Bangkok that are suitable for the construction of onsite wastewater treatment systems.

1.3

Cluster Wastewater Treatment Systems

These systems are designed for areas larger than a typical community, serving a group or cluster of wastewater sources. Selected locations for future cluster wastewater treatment projects are determined based on key criteria, including: areas outside existing service zones, areas distant from planned centralized wastewater treatment facilities and areas that are already developed and generate high volumes of wastewater. Based on the analysis of drainage areas and pipeline layouts, 10 locations have been identified as suitable for future construction of cluster wastewater treatment systems.

2

Measures to Improve and Expand the Wastewater Collection System

These measures aim to collect as much wastewater as possible into the treatment systems.

2.1

Development of relevant laws and regulations

2.2

Construction and improvement projects for the wastewater collection system, including:

2.2.1

Construction of an additional wastewater collection system in Huai Khwang District, connecting to the Din Daeng Water Quality Control Plant.

2.2.2

Construction of an additional wastewater collection system along Khlong Saen Saep, from Witthayu Road to Khlong Tan, connecting to the Din Daeng Water Quality Control Plant.

2.2.3

Construction of the wastewater collection system and Thonburi Wastewater Treatment Plant, Contract 2, covering the northern area (Bang Phlat District and parts of Taling Chan and Bangkok Noi Districts).

2.2.4

Construction of the wastewater collection system and Thonburi Wastewater Treatment Plant, Contract 3, covering the southern area (Bangkok Noi District and Bangkok Yai District).

2.2.5

Construction of the wastewater collection system around Khlong Lot Wat Ratchanatdaram and Khlong Lot Wat Ratchabophit, under the Rattanakosin Water Quality Control Plant area.

2.2.6

Construction of an additional wastewater collection pipeline around Khlong Suan Luang and Sitaram Community, connecting to the Din Daeng Water Quality Control Plant.

2.2.7

Construction and improvement of additional wastewater collection pipelines along Narathiwat Ratchanakarin Road, Ratchadaphisek Road, and Khlong Phiphat, connecting to the Chong Nonsi Water Quality Control Plant.



3

Measures for Resource Recovery

Promote the beneficial reuse of products obtained after wastewater treatment, such as sewage sludge and treated water, including:

3.1

Construction of a treated wastewater pipeline from the Bang Sue Environmental Education and Conservation Center to discharge into the Vibhavadi Canal.

3.2

Construction of a treated water pipeline from the Chatuchak Water Quality Control Plant to discharge into the Vibhavadi Canal.

3.3

Construction of a treated water pipeline from the Din Daeng Water Quality Control Plant to discharge into the Vibhavadi Canal.

3.4

Promotion of research studies to explore the feasibility of utilizing sewage sludge.

4

Measures for Collecting Wastewater Treatment Fees

Campaigns are conducted to raise awareness and indirectly reduce wastewater generation at the source, while managing the collected fees to support wastewater treatment operations. BMA will begin collecting wastewater treatment fees based on the “Polluter-Pay Principle”, meaning that those who cause pollution are responsible for the costs of managing that pollution. This is according to the Bangkok Metropolitan Regulation on Wastewater Treatment Fee Collection B.E. 2547 (2004) and its amendment (No. 2) B.E. 2562 (2019), which include two regulations and five announcements published in the Government Gazette, effective from August 12, 2025.

The fee is calculated based on 80% of water consumption, starting with wastewater sources of type 3, including hotels, factories under the Factory Act, and establishments with water usage exceeding 2,000 cubic meters per month.

Details of each measure, responsible agencies, budgets, and implementation frameworks are shown in [Table 2](#).

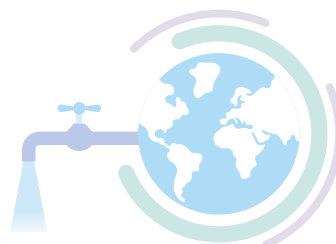


Table 2 The measures and detail information of solid waste and wastewater management

Measure (and the alignment with BMA master plan)	Responsible unit	Budget	Duration
Solid waste management			
1. Measures to Reduce and Segregate Waste at the Source to Decrease Waste Sent for Final Disposal (WM1) 1.1 Including reducing the use of resources and materials that generate waste, reducing or eliminating the use of foam food containers and single-use plastics, and choosing reusable or recyclable packaging. Examples include reducing the use of plastic bags by using cloth bags instead, purchasing refill products to reduce single-use packaging, and opting for online Loy Krathong celebrations. 1.2 Conduct campaigns to promote, raise awareness, and encourage the public to separate waste and reusable items for utilization and proper disposal by category. Examples include separating recyclable materials to be returned as raw materials for circular production and reintroduced into consumption, separating food waste for beneficial use to support circular resource use processes, and separating hazardous waste from general waste for proper hazardous waste disposal systems. In addition, activities may be organized to encourage waste separation, such as exchanging waste for rewards or discount coupons, and organizing waste separation activities for specific target groups, particularly educational institutions under the Bangkok Metropolitan Administration (BMA). ● Projects to develop the capacity of district office personnel and relevant BMA agencies. ● District offices to campaign and promote waste reduction and separation in their areas. ● The Environment Department to campaign and promote waste reduction and separation for various target groups, such as educational institutions, markets, communities, high-rise buildings, and others.	Main Agencies: Environment Department/ District Offices Supporting Agencies: All departments		2025-2030

Table 2 The measures and detail information of solid waste and wastewater management (Continue)

Measure (and the alignment with BMA master plan)	Responsible unit	Budget	Duration
- Seminars and study visits on comprehensive waste segregation without mixing. The “No Mixing” project. - Collaboration projects between government and private sectors to install electronic waste collection points across Bangkok. - Collaborative projects between Bangkok Metropolitan Administration and the private sector to manage and reduce food waste. - Collaborative projects between Bangkok Metropolitan Administration and government agencies (e.g., Office of Natural Resources and Environmental Policy and Planning - ONEP) to reduce food waste, including: - Green Office Project Bangkok Carbon Footprint Project			
2. Measures for Utilizing Waste as a Resource from the Source 2.1 Utilization of Organic Waste 2.1.1 Promote household separation of organic waste for utilization by producing compost at the source. 2.1.2 Encourage medium- and large-scale waste generators, such as department stores and hotels, to separate organic waste for utilization by producing compost at the source or by providing it to farmers for use as animal feed. 2.2 Utilization of Recyclable Waste (an indirect measure for reducing greenhouse gas emissions, not included in the calculation)	Main Agencies: Environment Department/ District Offices Supporting Agencies: All departments		2025-2030

Table 2 The measures and detail information of solid waste and wastewater management (Continue)

Measure (and the alignment with BMA master plan)	Responsible unit	Budget	Duration
2.2.1 Promote waste separation at the source among households, as well as medium- and large-scale waste generators, for recyclable materials such as glass, paper, plastic, metal, and non-metal materials. These materials should be utilized at the source, sold, or donated to organizations or public and private agencies that accept material donations for circulation in the recycling system and further utilization. 2.2.2 Develop a recyclable waste collection system for further utilization through district offices, public agencies, and private organizations. Examples include district offices designating specific days for recyclable waste collection, encouraging the private sector to operate vehicles for purchasing recyclable waste, and installing recyclable waste collection points in Bangkok Metropolitan Administration agencies, as well as in other public and private sector offices, related activities Include: • “Magic Hands” campaign x “No Mixing” project • “Separate, Exchange, Return” project (No Mixing) • Bangkok “Magic Hands” project for waste separation - “Pee Mai Kuat” (Brother Broom) • Recycling separation activities such as recycling markets, “Sap Thawee Recycling” (Waste Bank), and recycling donation ceremonies • Old calendar collection campaigns • Wacoal Bra Day - collecting old bras <i>(Every 1 kilogram of organic waste utilized reduces greenhouse gas emissions by 1.104 kg CO₂, calculated over a -10 year cumulative period.)</i>			

Table 2 The measures and detail information of solid waste and wastewater management (Continue)

Measure (and the alignment with BMA master plan)	Responsible unit	Budget	Duration
3. Measures to Improve the Efficiency of the Waste Collection System by Designing an Effective Waste Collection System 3.1 Develop an organic waste collection system for utilization by having district offices provide dedicated vehicles to collect organic waste from households, as well as medium- and large-scale establishments, and deliver it to the Bangkok Metropolitan Administration's organic composting facilities. 3.2 Optimize waste collection routes to match vehicle load capacity, with a plan to collect waste at least twice per week on average. Incorporate waste collection routes into maps (Google Maps) and use GPS to monitor operations along designated routes. (GHG emissions from this activity are not included in the calculations.) 3.3 Improve the waste collection system by using low-emission collection and transport vehicles. (GHG emissions from this activity are not included in the calculations.)	Main Agencies: Department of Environment/ District Offices Supporting Agencies: All departments		2025-2030
4. Measures for Waste Management Using Environmentally Friendly Technologies 4.1 Waste Management through Incineration (WM2) - Nong Khaem Waste Disposal Center: 1,000 tons/day - On Nut Waste Disposal Center: 1,000 tons/day 4.2 Waste Management Using Mechanical-Biological Technology (WM3) - Mechanical-Biological Treatment (MBT) Plant at On Nut Waste Disposal Center: 300 tons/day 4.3 Measures for Converting Organic Waste into Compost (WM4) - Installation project for food waste processing machinery at On Nut Waste Disposal Center: 30 tons/day - Installation project for food waste processing machinery at Nong Khaem Waste Disposal Center: 30 tons/day	Department of Environment		2025-2030

Table 2 The measures and detail information of solid waste and wastewater management (Continue)

Measure (and the alignment with BMA master plan)	Responsible unit	Budget	Duration
5. Legal and Economic Measures 5.1 Develop and enforce laws that encourage the public to reduce and segregate waste at the source, as well as maximize the beneficial use or recycling of segregated waste. The laws specify the types of waste that must be separated according to the waste source category, with clear penalties for non-compliance. 5.2 Implement legal measures in conjunction with economic measures through the Bangkok Metropolitan Regulation on Service Fees for Wastewater and Solid Waste Management under the Public Health Law, B.E. 2568 (2025). 5.3 Provide awards or organize competitions for waste sources that effectively manage waste at the source, following the principles of Zero Waste.	Department of Environment/ District Offices		2025-2030
Wastewater Management			
1. Construction of Wastewater Treatment Systems (WM5) 1.1 Centralized Wastewater Treatment Systems Includes the Thonburi Wastewater Treatment System, Khlong Toei Wastewater Treatment System, Bueng Nong Bon Wastewater Treatment System, and Min Buri Wastewater Treatment System Phase 2. 1.2 Onsite Wastewater Treatment Systems 1.3 Cluster Wastewater Treatment Systems <i>(Every 1 cubic meter of treated wastewater helps reduce greenhouse gas emissions by 82.125 kg CO₂)</i>	DDS	Construction Cost: 2,419,370 million Baht Operating Cost: 600 million Baht per year	2025-2030
2. Measures to Improve Wastewater Collection System and Expand Service Areas (WM6) 2.1 Development of laws and regulations. 2.2 Construction of additional wastewater collection systems.	DDS/District	Construction Cost: 7,352,508,000 million Baht	2025-2030
3. Measures for Resource Recovery 3.1 Utilization of Sewage Sludge (WM7) <i>(Every 1 kilogram of sludge reused reduces greenhouse gas emissions by 25 kg CO₂)</i> 3.2 Reuse of Treated Wastewater (WM8) <i>(Every 1 cubic meter of treated wastewater reused reduces greenhouse gas emissions by 0.5081 kg CO₂)</i>	DDS		2025-2030
4. Measures for Collecting Wastewater Fees	DDS		2025-2030

7

Monitoring and Evaluation

7.1 Monitoring and Evaluation Mechanism

The process of monitoring and evaluating the Bangkok Waste and Wastewater Management Action Plan 2025–2030 will follow the guidelines set out in the Bangkok Climate Change Master Plan 2021–2030 to ensure consistency in data collection.

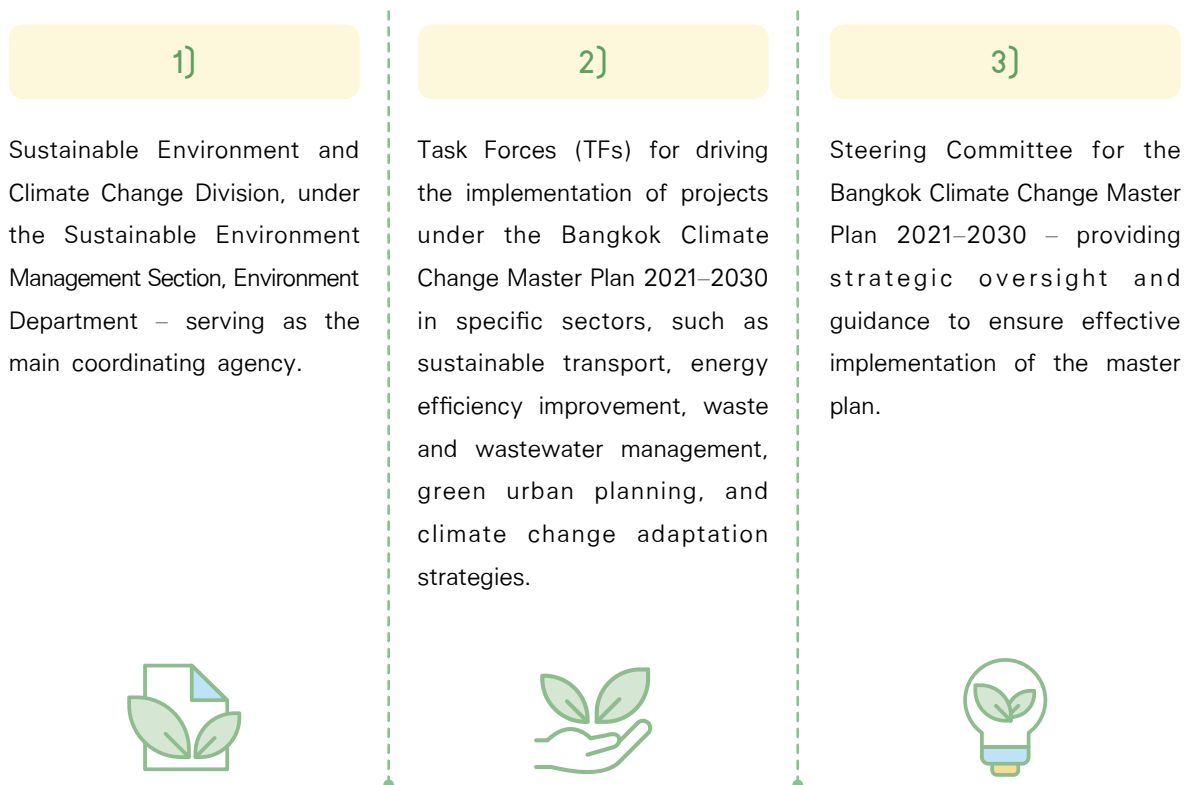
This process will adopt the PDCA (Plan-Do-Check-Act) cycle, starting from planning, implementation, evaluation, and subsequent improvement and development. This cyclical approach is essential for continuously improving and upgrading the action plan.

Since the Bangkok Waste and Wastewater Management Action Plan 2025–2030 is a short-term program, monitoring and evaluation will be conducted annually or biennially to closely track progress. The insights gained from this process will be used in annual or biennial reviews to further enhance the overall effectiveness of the action plan.

The monitoring and evaluation framework will be integrated into the organizational and administrative structure of the Bangkok Metropolitan Administration, with the aim of supporting the implementation of the Bangkok Climate Change Master Plan. The Bangkok Environment Department and the Drainage and Sewerage Department will be responsible for implementing the plan.

In addition, other agencies will play a key supporting role by providing teams and experts to offer policy advice on environmental matters to Bangkok.

The organizational structure supporting the implementation of the Bangkok Climate Change Master Plan consists of:



7.2 Indicators for Monitoring and Evaluating the Action Plan

To effectively monitor and evaluate the reduction of greenhouse gas emissions from the Bangkok Waste and Wastewater Management Action Plan 2025–2030, clear annual targets have been set for each measure (see Table 3). These targets play a crucial role in achieving Bangkok's main objective of reducing greenhouse gas emissions in the waste and wastewater sectors.

Table 3 Measures and Greenhouse Gas (GHG) Reduction Targets from Bangkok's Waste and Wastewater Management

Measures	[in metric tons of CO ₂ equivalent: tCO ₂ e]					
	2025	2026	2027	2028	2029	2030
Waste Management						
1. Waste reduction and segregation at source (WM1)	154,525	166,397	176,836	186,385	194,860	201,660
1.1 Including reducing the use of resources and materials that generate waste, reducing or eliminating the use of foam food containers and single-use plastics, and choosing reusable or recyclable packaging.						
1.2 Conduct campaigns to promote, raise awareness, and encourage the public to separate waste and reusable items for utilization and proper disposal by category.						
2. Measures for Utilizing Waste as a Resource from the Source	-					
2.1 Organic waste utilization	-					
2.1.1 Promote household separation of organic waste for utilization by producing compost at the source.						
2.1.2 Encourage medium- and large-scale waste generators, such as department stores and hotels, to separate organic waste for utilization by producing compost at the source or by providing it to farmers for use as animal feed.						

Table 3 Measures and Greenhouse Gas (GHG) Reduction Targets from Bangkok's Waste and Wastewater Management (Continue)

Measures	[in metric tons of CO ₂ equivalent: tCO ₂ e]					
	2025	2026	2027	2028	2029	2030
2.2 Utilization of Recyclable Waste 2.2.1 Promote waste separation at the source among households, as well as medium- and large-scale waste generators, for recyclable materials. 2.2.1 Develop recyclable waste collection systems	-					
3. Measures to Improve the Efficiency of the Waste Collection System by Designing an Effective Waste Collection System	-					
3.1 Develop organic waste collection systems	-					
3.2 Optimize waste collection routes to match vehicle load capacity, with a plan to collect waste	-					
3.3 Improve the waste collection system by using low-emission collection and transport vehicles	-					
4. Measures for Waste Management Using Environmentally Friendly Technologies						
4.1 Waste-to-energy incineration (WM2).	873,421	1,046,752	1,169,723	1,256,965	1,318,859	1,362,769
4.2 Mechanical-biological treatment (MBT) (WM3)	325,032	387,198	431,303	462,593	484,792	500,541
4.3 Composting of organic waste (WM4).	547,941	649,615	721,748	772,923	809,230	834,987
5. Legal and economic instruments	-					
5.1 Develop/enforce regulations promoting waste reduction & segregation	-					
5.2 Combine legal and economic measures	-					
5.3 Awards/competitions for zero-waste practices	-					

Table 3 Measures and Greenhouse Gas (GHG) Reduction Targets from Bangkok's Waste and Wastewater Management (Continue)

Measures	[in metric tons of CO ₂ equivalent: tCO ₂ e]					
	2025	2026	2027	2028	2029	2030
Wastewater Management						
1. Construction of wastewater treatment systems (WM5) (Target: 665,000 m ³ /day treated)	54,613	54,613	54,613	54,613	54,613	54,613
1.1 Centralized treatment systems (Thonburi, Khlong Toei, Bueng Nong Bon, Minburi Phase 2)						
1.2 Onsite systems (300–1,000 m ³ /day)						
1.3 Cluster systems (21,065 m ³ /day)						
2. Expanding wastewater collection coverage (WM6)	65,064	65,500	65,939	66,380	66,825	67,273
2.1 Construction of additional wastewater collection networks						
2.2 Development of legal frameworks/regulations						
3. Resource recovery	-					
3.1 Utilization of sewage sludge (WM7) (Target: 62,050 m ³ /year – 25 kgCO ₂ reduction per kg sludge reused)	1,551	1,551	1,551	1,551	1,551	1,551
3.2 Reuse of treated wastewater (WM8) (Target: %15 of treated water reused – 0.5081 kgCO ₂ reduction per m ³)	554	592	630	668	675	706
4. Measures for Collecting Wastewater Fees	-					

7.3 Review and Revision of the Bangkok Waste and Wastewater Management Action Plan (2025–2030)

To ensure consistency with the Bangkok Climate Change Master Plan (2021–2030), the Bangkok Waste and Wastewater Management Action Plan (2025–2030) is designed to evolve in response to changing dynamics. Therefore, periodic review and revision of the action plan is essential to maintain its relevance and effectiveness. This revision process involves: Comprehensive assessment of the waste and wastewater management situation. Updating and refining measures and activities specified in the action plan. Engagement of stakeholders, who play a key role in the revision process by providing feedback and relevant information to improve the plan.



Current Status of Bangkok's Waste Incineration Policy

The Bangkok Climate Change Master Plan (2021–2030) originally projected the construction of three new waste incinerators, each with a capacity of 1,000 tons/day.

However, due to various constraints, the policy was revised to include only two new incinerators. This change directly impacts the projected greenhouse gas reduction targets, which are now revised accordingly as shown in Table 4.

Table 4. Greenhouse Gas Reduction Targets Potentially Affected by the Current Situation

Year	2023	2024	2025	2026	2027	2028	2029	2030
Planned GHG Reduction under the Master Plan (tCO ₂ e)	284,733 (2 inc.)	629,105 (3 inc.)	873,421 (3 inc.)	1,046,752 (3 inc.)	1,169,723 (3 inc.)	1,256,965 (3 inc.)	1,318,859 (3 inc.)	1,362,769 (3 inc.)
Actual Reduction (tCO ₂ e)			284,733 (2 inc.)	486,739 (2 inc.)	630,052 (2 inc.)	731,726 (2 inc.)	803,860 (2 inc.)	855,035 (2 inc.)

*inc. = Incinerator with capacity 1,000 Ton/day each

Implications

Since Bangkok can only proceed with 2 waste incinerators (1,000 tons/day each) instead of the originally planned 3 incinerators, the actual GHG reduction potential is lower than the target set in the Bangkok Climate Change **Master Plan (2021–2030)**. Therefore, to achieve the original GHG reduction targets, Bangkok should: Enhance upstream waste reduction measures, Promote waste separation and recycling at the source, Reduce the amount of waste sent to landfills, which are a significant source of methane emissions.

8

Financial Options

To achieve the strategies for reducing greenhouse gas emissions as previously mentioned, it is necessary to explore funding mechanisms due to the budget limitations of Bangkok Metropolitan Administration (BMA). Therefore, issuing Green Bonds or Sustainability-Linked Bonds for environmentally friendly projects could be another viable option. In addition to bond issuance, BMA may also consider Public-Private Partnerships (PPP). An overview of the PPP process is as follows:

8.1 Public-Private Partnerships under the Environmental Infrastructure Development Master Plan

Public-Private Partnership (PPP) is a collaborative approach where the government and private companies work together to develop environmental infrastructure and public services.

A key characteristic of PPP projects is that private companies bear part or all of the initial investment costs for infrastructure construction, which helps reduce the government's financial burden. Moreover, adopting efficient management methods from the private sector can lower overall costs and improve the quality of public services.

For private companies, covering the initial investment costs comes with opportunities to participate in the project and operate public services, such as collecting service fees and generating profits.

However, implementing PPP projects involves several risks, including investment risk, construction risk, and operational and management risks. Therefore, it is necessary to discuss and determine approaches to mitigate or manage these risks with relevant stakeholders.

To address these challenges, international development organizations such as the Japan International Cooperation Agency (JICA), International Finance Corporation (IFC), and Asian Development Bank (ADB) provide support for PPP projects by reducing fundraising costs and mitigating risks through low-interest loans, investments, and guarantees for private companies participating in PPPs.

8.2 Examples of PPP projects in waste management (solid waste and wastewater)

In the waste management sector, there are several cases where PPP has been considered a funding option for constructing and operating projects in collaboration with the private sector. Such partnerships not only help reduce initial investment costs but also enable private companies to develop appropriate technologies and management approaches for effective waste treatment. However, large-scale projects related to waste management often face risks regarding investment recovery and operational costs. Therefore, when preparing technical cooperation information, considerations should include risk-sharing arrangements and the adjustment of operational approaches.

In addition, technical advice may be sought from international development organizations to ensure sustainable and efficient project implementation.

Case-1: Development of waste treatment facilities

- (i) Waste treatment facilities (landfills, intermediate treatment facilities, incineration facilities, etc.) are constructed with private funds, and the treatment costs (tipping fees) are paid to the private sector. The private sector is responsible for design, construction, operation, maintenance, etc.
- (ii) It is implemented as a measure to promote proper waste treatment and reduce GHG (methane gas).
- (iii) For the private sector, there are benefits from profits from the development of disposal sites and the introduction of large-scale facilities, and, depending on the scope of the contract, from the possibility of receiving long-term service fees for waste treatment from local governments, etc.
- (iv) When introducing PPP, the challenge is whether or not sufficient tipping fees (and the amount of waste that is the source of these fees) can be secured to recoup the costs of introducing the facilities.



Case-2: Development of waste treatment and waste-to-energy facilities

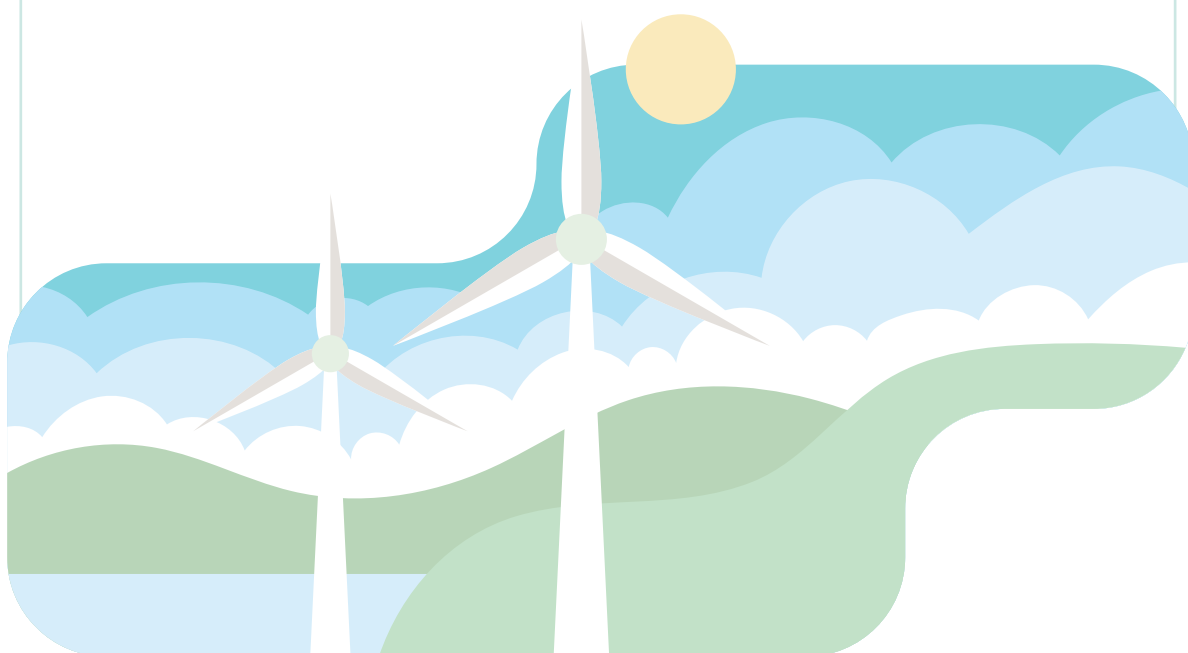
- (i) Waste treatment facilities are built with private funds, and the treatment costs (tipping fees) are paid to the private sector. In addition, profitability is increased by selling the electricity generated. The private sector is responsible for design, construction, operation, maintenance, etc.
- (ii) If there is a waste management master plan or a higher-level plan or policy for climate change measures, it is also implemented as a measure to promote proper waste treatment and reduce GHG (methane gas).
- (iii) Private companies can earn profits from the development of disposal sites and the introduction of large-scale equipment, as well as tipping fees and electricity sales over the long term.
- (iv) When introducing PPP, the challenge is whether or not sufficient tipping fees (and the amount of waste that is the source of these fees) can be secured to recoup the costs of introducing the equipment.



On the other hand, there are also cases where **PPPs** are used in the installation of facilities in the fields of water supply and sewerage. **PPPs** are seen as particularly promising for urban infrastructure, which is large-scale and places a large financial burden on local governments in developing countries, but as funds are sourced from fees paid by users such as the general public, there is a risk that funds will not be fully recovered if there are issues with collecting fees.

Case-3: i. Development of water purification plants or wastewater treatment plants

- (i) Private funds are used when introducing or improving water supply and sewage treatment facilities.
- (ii) When there is a policy such as a water supply master plan or a sewerage development plan, the use of **PPP** is considered as an option under those plans. When equipment improvements are made, measures such as saving electricity and preventing water leakage are implemented, which has a significant effect on GHG reduction and energy conservation.
- (iii) By introducing treatment plant facilities (pumps, etc.), private companies can sell the equipment and, depending on the scope of the contract, can earn long-term service income.
- (iv) The source of funds is the collection of fees from users, but there is a risk that users will not pay.



9

Future Considerations

9.1 Waste Management

To reduce greenhouse gas emissions from waste management, Bangkok should focus on waste separation at the source, waste collection data management, and coordination among relevant agencies. Promoting waste separation is crucial for reducing the amount of waste sent to landfills, thereby decreasing methane emissions. Bangkok should implement public awareness campaigns, provide financial incentives, and establish strict regulations to encourage and support waste segregation at the source. Policies requiring households, businesses, and institutions to separate waste will help increase recycling rates.

Establishing a waste collection database by tracking waste volumes, collection routes, and landfill diversion rates will improve BMA's operational efficiency. Moreover, data-driven strategies to optimize waste transport can reduce fuel consumption and greenhouse gas emissions. Monitoring waste routes through digital systems can also identify high-waste areas, enabling targeted measures to reduce waste and increase recycling rates.

Strengthening networks among government agencies can improve coordination between local governments, environmental agencies, and private waste management companies. Such collaboration will enhance policy implementation, support the integration of waste-to-energy projects, and promote circular economy approaches, such as composting and recycling. In addition, it can facilitate funding, technology exchange, and research on waste management methods with lower greenhouse gas emissions.

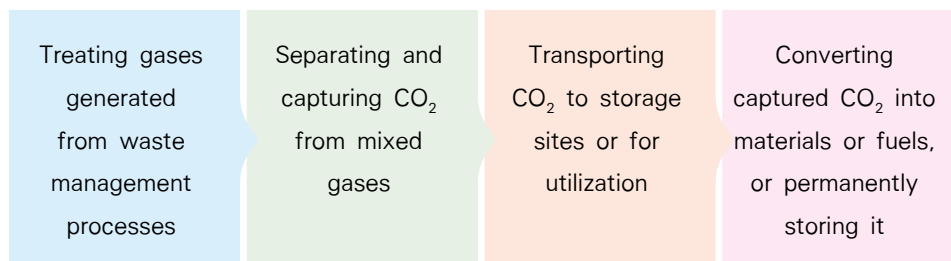
Bangkok could also adopt advanced waste-related greenhouse gas reduction technologies, such as:

1)

Waste-to-Energy (WtE) technologies that use waste as fuel.

2)

Carbon Capture, Utilization, and Storage (CCUS) technologies in waste management processes, including:



3)

Energy recovery from waste incineration, where heat from waste combustion is used to produce steam, which then drives turbines to generate electricity.

Since over 50% of Bangkok's waste is organic, it is essential to reduce the volume of organic waste. However, methane gas generated from the decomposition of organic matter can be managed through two main approaches:

- Utilizing methane gas produced from the decomposition of organic waste.

- Adopting semi-aerobic landfill technology, which introduces natural airflow into landfills to stimulate microbial activity in waste. This enhances the decomposition of organic matter more efficiently and reduces methane generation.

9.2 Wastewater Management

To reduce greenhouse gas emissions from the wastewater sector, Bangkok focuses on comprehensive wastewater management. The Bangkok Wastewater Master Plan 2024 was reviewed to ensure wastewater is collected and treated throughout the city. The study found that future construction of centralized wastewater treatment systems is necessary to accommodate all wastewater. By 2058 (B.E. 2601), Bangkok plans to build and operate a total of 29 treatment plants, divided as follows:

- 1) Nine existing water quality control plants currently in operation
- 2) Four treatment projects currently under construction
- 3) Sixteen planned future projects

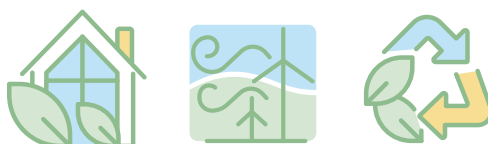
These plants will provide wastewater treatment services across all 50 administrative districts of Bangkok, expanding the service area to 1,202.28 square kilometers. In addition to centralized systems, Bangkok will implement onsite wastewater treatment systems at 15 locations, serving single buildings or building groups, and cluster systems at 10 locations, which collect and treat wastewater from two or more nearby buildings outside the centralized system coverage area. These approaches aim to cover the entire Bangkok metropolitan area.

Investment in centralized wastewater treatment requires significant capital, which poses challenges in budget allocation and land acquisition for construction. Therefore, Public-Private Partnerships (PPP) are suitable options to attract private sector investment for these centralized treatment systems.

Moreover, it is recommended to promote research and collaboration with domestic and international academic institutions to explore the feasibility of reusing wastewater sludge to reduce greenhouse gas emissions and utilize resources efficiently and sustainably, in line with the principles of the circular economy.

Rainwater Harvesting (RWH) can also help Bangkok reduce greenhouse gas emissions by lowering energy demand for water supply systems, mitigating urban flooding, and enhancing climate resilience. Cities can implement RWH in buildings, public infrastructure, and flood management systems to increase water retention capacity and reduce stormwater runoff into drainage systems, including green infrastructure and best management practices for stormwater.

Collected rainwater can substitute for tap water in non-potable uses such as toilet flushing, cooling systems, and irrigation. Integrating water quality control systems with rainwater harvesting is essential to ensure safe and sustainable use.





APPENDIX

Table A Solid waste data collection at Saimai transfer site

Location	Saimai				
Year	2021	2022		2023	
Unit: Ton	Landfill	Landfill	Composting	Landfill	Composting
January	54,341	52,190	-	32,177	30,279
February	52,016	48,777	-	50,096	32,645
March	60,240	53,522	-	55,667	36,656
April	57,894	50,336	-	52,144	34,588
May	60,019	39,198	16,846	58,318	38,991
June	55,359	36,627	22,158	59,558	39,703
July	54,250	35,403	21,825	67,117	49,452
August	53,701	30,213	27,699	59,331	39,176
September	54,439	31,165	27,232	60,280	40,691
October	53,844	29,535	26,635	58,253	39,525
November	51,204	33,970	29,978	37,087	30,325
December	51,267	32,057	30,427	35,248	30,303
Total	658,574	472,992	202,801	625,275	442,333

Table B Solid waste data collection at Nongkham transfer site

Location	Nongkham						
Year	2021		2022		2023		
Unit: Ton	Landfill	Incineration	Landfill	Incineration	Landfill	Incineration	Composting
January	78,673	16,741	89,650	10,480	92,613	13,711	-
February	81,120	14,042	84,497	12,746	88,027	13,731	-
March	98,901	6,639	94,440	9,485	98,113	15,499	-
April	88,150	13,383	84,225	13,641	98,466	9,858	-
May	92,341	15,560	95,365	12,591	102,987	12,535	-
June	87,236	15,069	93,156	15,318	98,184	15,040	-
July	89,257	15,646	89,620	16,939	89,460	15,523	-
August	91,256	15,576	92,493	15,501	104,088	15,517	-
September	93,515	10,320	94,675	11,054	92,323	15,057	15,379
October	94,501	13,891	90,944	15,090	90,625	15,547	18,968
November	92,636	12,185	90,408	14,998	80,919	13,050	18,203
December	85,996	15,001	91,577	13,612	82,785	12,378	18,203
Total	1,073,582	164,052	1,091,050	161,454	1,118,590	167,446	70,753

Table C Solid waste data collection at Onnut transfer site

Location	Onnut								
Year	2021			2022			2023		
Unit: Ton	Landfill	Composting	MBT	Landfill	Composting	MBT	Landfill	Composting	MBT
January	36,459	40,161	19,472	42,781	37,644	18,547	29,035	51,006	-
February	36,205	39,725	18,899	40,782	36,907	20,505	1,215	46,834	-
March	43,663	46,042	17,491	46,531	42,792	19,260	-	52,731	-
April	43,167	43,305	14,846	45,102	41,534	-	-	49,958	-
May	42,504	43,511	19,971	63,245	55,235	-	-	53,466	-
June	40,263	37,831	22,166	70,993	51,512	-	-	52,809	-
July	40,513	37,952	23,022	75,385	50,371	-	-	54,375	-
August	43,684	44,015	11,457	68,863	53,170	-	-	52,197	-
September	38,149	39,160	23,157	65,372	56,138	-	-	52,603	-
October	41,805	39,277	21,822	65,915	49,681	-	3,394	52,923	-
November	36,845	43,846	17,142	40,762	50,116	-	35,791	48,502	-
December	37,922	38,123	21,449	40,082	48,298	-	39,382	48,216	-
Total	481,177	492,948	230,894	665,812	573,398		108,817	615,619	

Table D Wastewater Treatment Plant Capacity

Wastewater Treatment Plant	Capacity	2021	2022	2023
	m ³ /day	m ³ /day	m ³ /day	m ³ /day
Rattanakosin	40,000	23,394	22,012	15,733
Si Praya	30,000	11,109	10,965	13,877
Chongnonsi	200,000	138,645	126,088	120,349
Chatuchak	150,000	128,602	148,179	147,139
DIndang	350,000	207,893	235,724	233,133
Nongkham	157,000	135,708	138,125	128,233
Thungkru	65,000	62,484	61,415	51,906
Bangsue	120,000	126,672	125,766	125,830
Total	1,112,000	834,507	868,275	836,200
Water Supply Consumption 50 District (m ³ /day)		2,386,850	2,905,167	2,390,802
Comparison ratio of treated Wastewater and water supply (Percentage)		34.96	29.89	34.98
Water reuse (m ³ /day)		77,054	74,598	73,121
Excess sludge volume (m ³ /day)		82.79	90.98	88.24



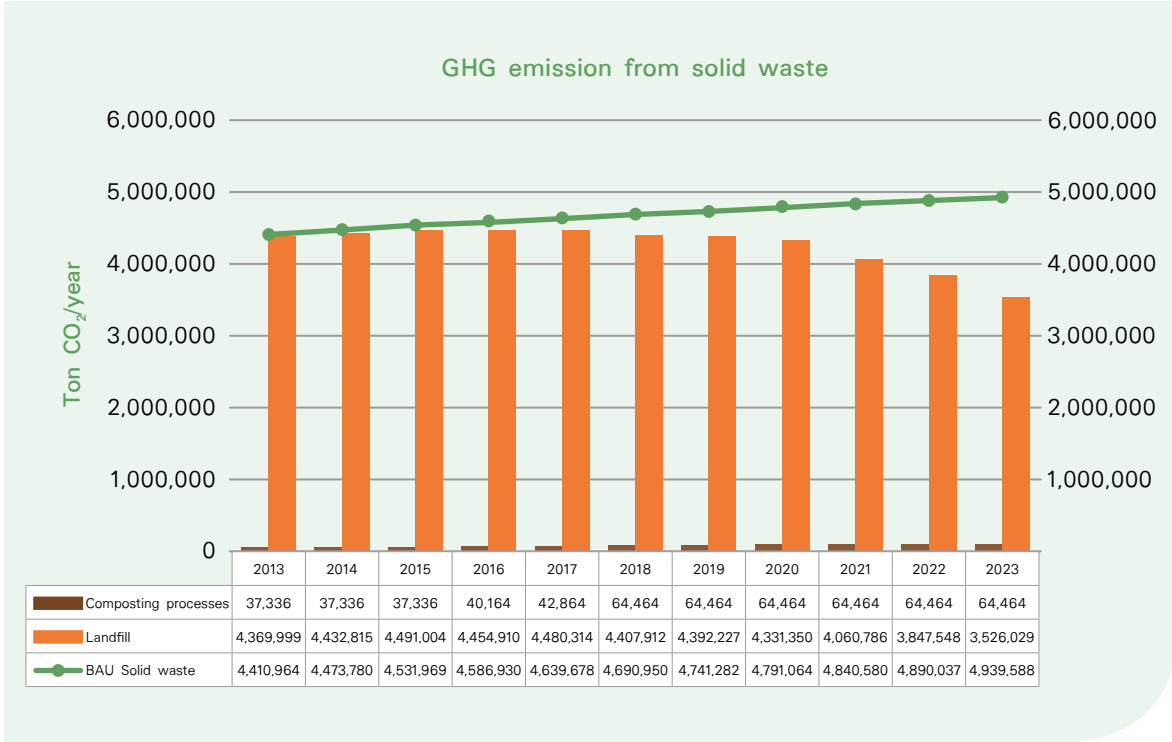


Figure A GHG emission from solid waste (2013-2023),
calculation from the actual data and comprehensive review report

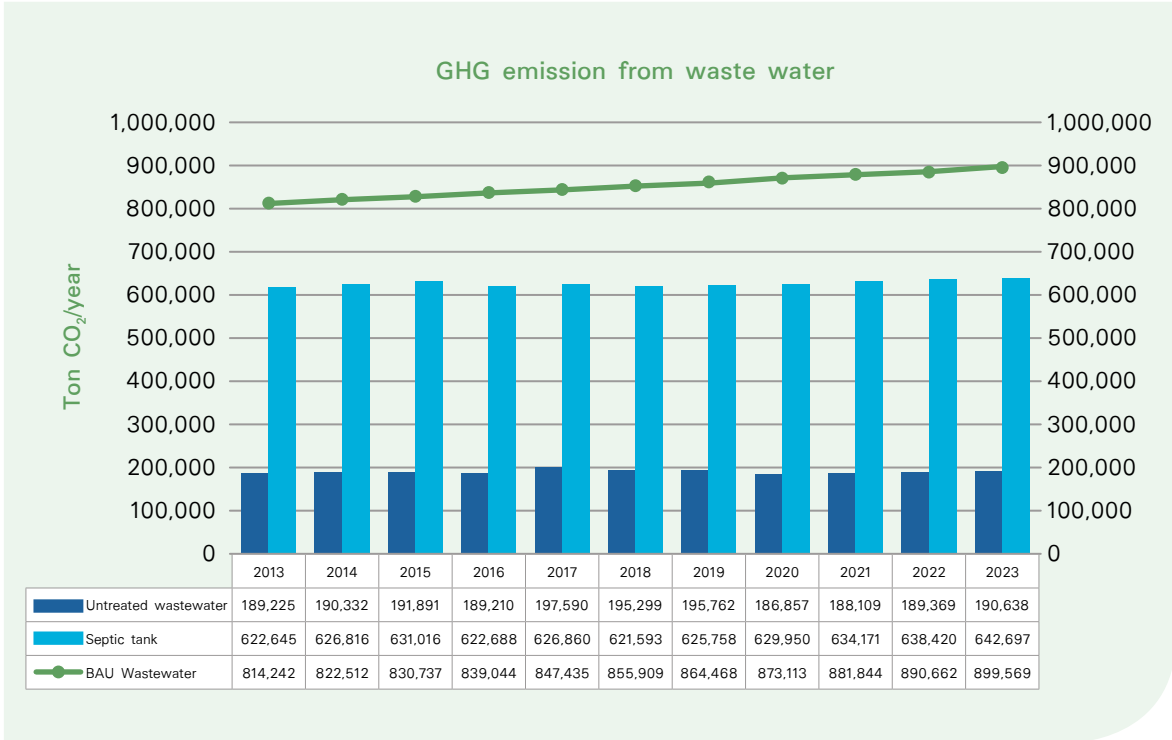


Figure B GHG emission from wastewater (2013-2023),
calculation from the actual data and comprehensive review report



Bangkok,

pursuing efforts to achieve net-zero emission



Sustainable Environment and Climate Change Mobilization Unit
Sustainable Environmental Management Division, Sustainable Environment Office
Environment Department, Bangkok Metropolitan Administration

123 Mitmaitri Road, Din Daeng Subdistrict, Din Daeng District, Bangkok 10400

Tel. 0 2203 2921, Fax. 0 2203 2920 Email : seccm.bkk@gmail.com