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BRIHANMUMBAI MUNICIPAL CORPORATION

# CLIMATE BUDGET REPORT: FY 2025-26

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Photo by Satyajeet Mazumdar, Unsplash

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# Executive Summary

The Mumbai Climate Action Plan (MCAP), published on 13th March 2022, outlines a strategic roadmap to make Mumbai a net-zero and climate-resilient city by 2050. To achieve its climate goals and secure a resilient future, it is essential for Mumbai to make planned and strategic budgetary allocations towards these goals amidst a range of development priorities. As outlined in the MCAP, climate change poses increasing risks to the city's infrastructure, housing, public health, environment, economy and urban services. These risks are driven by five key climate challenges: urban heat, urban flooding, air pollution, coastal risk, and landslides.

Brihanmumbai Municipal Corporation (BMC) is leveraging climate budgeting to accelerate implementation of the MCAP. The climate budget process integrates the 24 action tracks, across six MCAP sectors- (i) Energy and Buildings, (ii) Integrated Mobility, (iii) Sustainable Waste Management, (iv) Urban Greening & Biodiversity, (v) Air Quality and (vi) Urban Flooding & Water Resource Management- within the budgeting framework. This ensures that public finances are incrementally and strategically directed to climate-responsive planning and action across the city.

Mumbai's inaugural Climate Budget Report FY 2024-25 was released on 5th June 2024. In its first year of climate budgeting, BMC focused on institutionalising the process within its budgeting system. It enabled cross-departmental conversations on integrating climate considerations in their planning and decision-making process. This report is the result of the second year of climate budgeting cycle which is carried out for FY 2025-26. The process in this cycle incorporates key lessons from the initial cycle and strengthens cross-departmental coordination, data collection, and impact assessment. Section 1.4, Chapter 1, details out the climate budgeting process for FY 2025-26.

This year, the scope of the Climate Budget has expanded through four key approaches:

1. Inclusion of parastatal agencies within the climate budgeting process. This approach resulted in Brihanmumbai Electric Supply and Transport (BEST) Undertaking being part of the Climate Budget Report FY 2025–26.

2. Integration of adaptation, resilience and equity indicators to report the impact of climate measures and prioritise resilience-building initiatives.

**Mumbai's climate budget, including allocations by the BMC and BEST, for the year 2025-26 is ₹ 17066.12 crore in capital expenditures and ₹ 3268.97 crore in revenue expenditures.**

Photo by Victor Jiang

3. Pilot of a monitoring, evaluation and reporting (MER) system, with an aim to systematically monitor MCAP progress through the climate budgeting process.

4. Inclusion of measures undertaken through external sources of funding, to report holistically on financial planning for climate projects in BMC.

According to Climate Budget Report FY 2024-25, out of BMC's total capital budget of ₹ 31,774.59 crore, ₹10,224.24 crore (32.18% of total capital budget) was climate-aligned. This climate-aligned capital budget has increased to ₹16,321.33 crore (37.81% of FY 2025-26 total capital budget of ₹43162.23 crore). In addition, for FY 2025-26, ₹5.63 crore from the revenue budget is climate-aligned.[i] In FY 2024-25, an additional ₹2,163.8 crore (6.81% of the total capital budget) was allocated towards capital works integrating some components of the MCAP, like rainwater harvesting, sewage treatment plants, etc., within larger construction projects. This allocation has increased to ₹3,074.08 crore (7.12% of total capital budget FY 2025-26). The increased amount this year is attributed to the addition of climate-relevant expenditures from seven new departments, an enhanced budget for the Environment and Climate Change Department, and new activities taken up by 20 original BMC departments.

The BEST Undertaking has allocated ₹744.79 crore (40%) of its ₹1,849.24 crore total capital works budget to climate-relevant activities. Additionally, ₹3,263.35 crore (43.25 %) of its ₹7544.39 crore revenue expenditure is climate-aligned. The climate budget allocation across the six MCAP sectors are detailed out in Chapter 4.

BMC achieved 86.26% financial progress on its FY 2024–25 Climate Budget and 79.96% on the additional budget incorporating MCAP components, with physical progress reported across 739 climate-linked budget activities. The details of the key outputs can be found in Chapter 5 of the report.

[i] This includes allocations only for procurement of biomedical waste bags and bins, and concession on bus fares for persons with disabilities. BMC will explore expanding the scope of the Climate Budget to integrate the revenue budget in the upcoming years.

Versova-Andheri-Ghatkopar Metro | Photo by Hari Mahidhar

# 1. Climate Budgeting in Mumbai

On 5th June 2024, World Environment Day, the Brihanmumbai Municipal Corporation (BMC) released Mumbai's first-ever Climate Budget Report, becoming the first Urban Local Body (ULB) in India—and the fourth globally after Oslo, London, and New York—to publish a dedicated Climate Budget. This milestone was achieved through a climate budgeting process anchored by BMC's Environment and Climate Change Department, with support from knowledge partners WRI India and C40 Cities. By integrating climate considerations and targets from the Mumbai Climate Action Plan into the municipal budgeting framework, Mumbai's climate budgeting process is a step towards strengthening the city's climate governance to mainstream on-ground climate action and build resilience.

## 1.1. Overview

The Brihanmumbai Municipal Corporation (BMC) published the Mumbai Climate Action Plan (MCAP) on 13th March 2022, committing to making Mumbai a net-zero and climate-resilient city by 2050. The MCAP outlines a strategic roadmap to align with the goals of the Paris Agreement by reducing greenhouse gas emissions and embedding adaptation measures to address increasing climate risks. BMC recognises that the climate crisis is currently affecting the citizens in varying ways and emphasises the urgency of action to secure a sustainable and equitable future.

Mumbai has been one of 13 global cities participating in C40 Cities' Climate Budgeting Programme[1] since September 2021. The objective of joining the programme was to explore, develop, implement, and improve the use of climate budgeting as a tool to operationalize the MCAP and mainstream climate action through existing governance processes. In 2024, BMC participated in working groups on adaptation and equity integration in climate budgeting for cross-city knowledge sharing, as part of the programme.

BMC aims to leverage climate budgeting as a governance system to allocate resources to climate-relevant measures and projects on an annual basis. Designed to be both collaborative and iterative, climate budgeting fosters institutional

**"A climate budget is a governance system that mainstreams climate commitments and considerations into decision-making on policies, actions and budget. This is done through integrating climate goals and targets from the Climate Action Plan (CAP) in the financial budget process and assigning responsibility for implementation, monitoring, evaluation and reporting across the government".**[2]

sensitisation, interdepartmental engagement, and deliberation. It enables the integration of climate priorities into the city's planning and budgeting cycles, embedding a 'green, climate lens' into municipal governance and advancing climate-forward implementation practices.

## 1.2. Objectives

The climate budget report aims to support the city's decision-makers, government authorities, climate professionals, community-based organisations, non-government organisations, researchers, businesses, commercial establishments, students, and citizens at large to understand Mumbai's climate priorities and activities for the upcoming financial year 2025-26. The report can also be useful for multilateral financial institutions, banks, and other external funders and financiers to understand if and how they can potentially extend climate funding and green financing support to help Mumbai achieve its climate goals.

**The key objectives for Mumbai's climate budgeting process are to:**

**1.** Disseminate Mumbai's climate commitments and priorities through an official governance-based process.

**2.** Ensure implementation of actions and recommendations highlighted in the Mumbai Climate Action Plan (MCAP) and identify current budget items that already align with the 24 action tracks across six MCAP sectors.

**3.** Understand existing municipal budgets using a 'climate lens' to assess opportunities for mainstreaming and gain practical insights on how existing budget items can be made more climate-friendly when implemented on the ground.

**4.** Enable monitoring, tracking and evaluation of the MCAP's goals and targets on an annual basis to report progress.

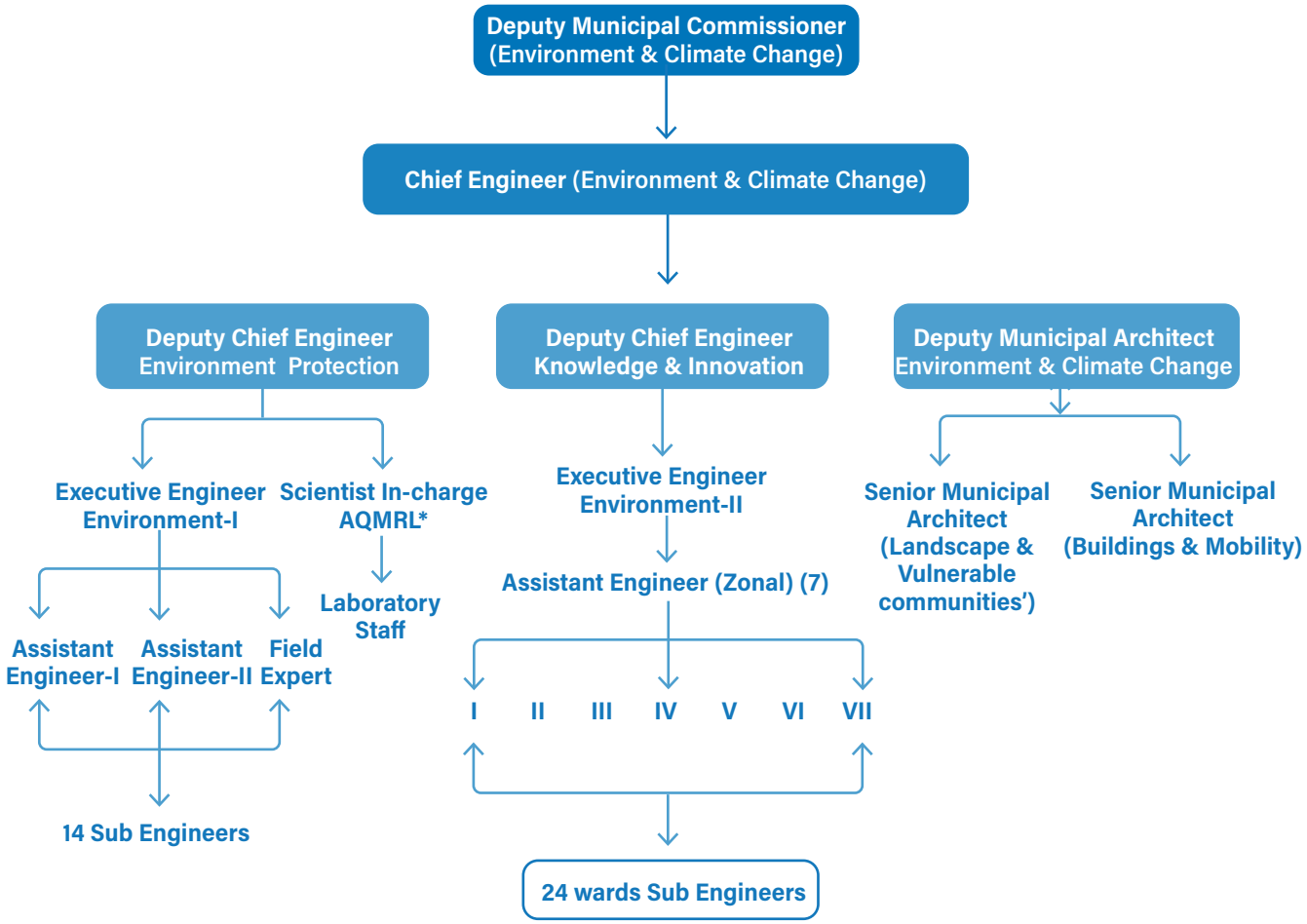
**5.** Identify potential climate projects and activities that can be cross financed through external financing mechanisms.

## 1.3. Strengthening governance for localized climate action

To effectively implement the Mumbai Climate Action Plan (MCAP), it is essential for the city to embed climate considerations into municipal governance functions, spanning from assessment and planning to implementation. Therefore, a key recommendation of the MCAP was to strengthen the city's climate governance through two pillars: 1) institutionalizing a city-level climate action cell and 2) undertaking climate budgeting.

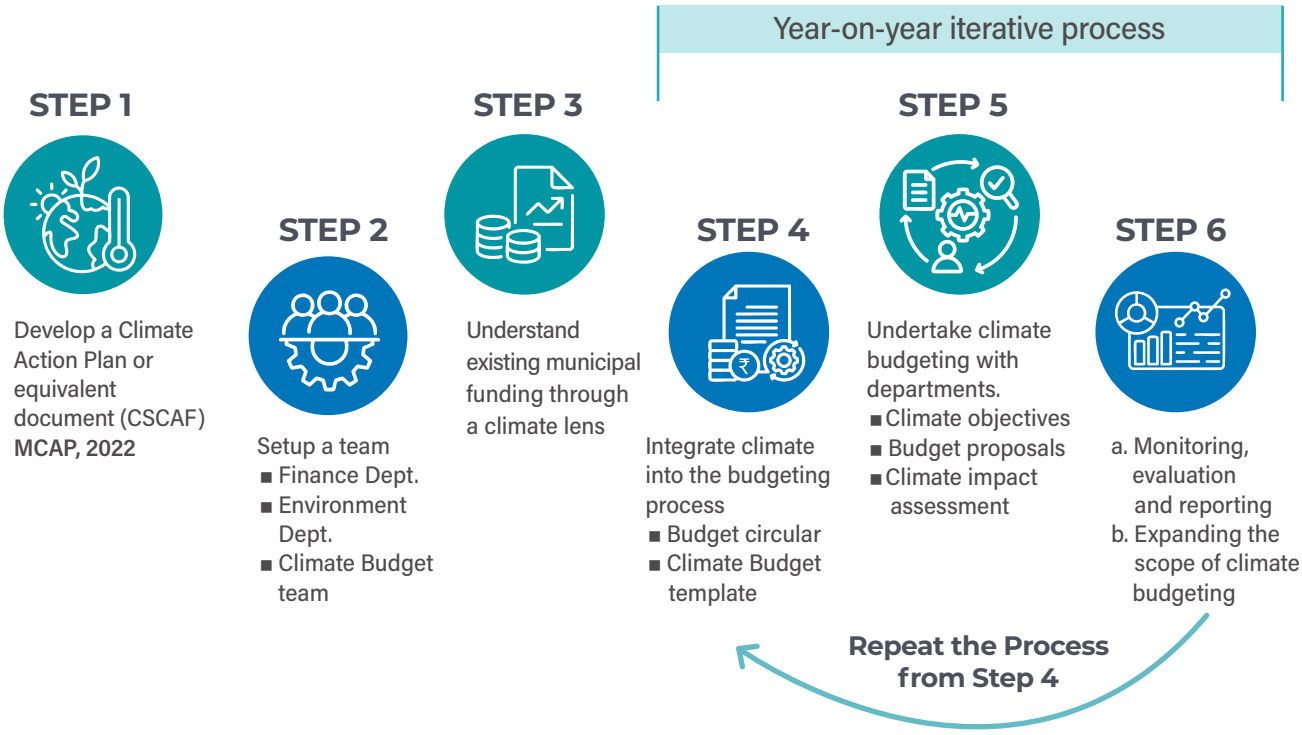
Following the launch of the MCAP, the BMC, in collaboration with WRI India as knowledge partners, began the process of institutionalizing a dedicated climate cell, which evolved into the independent Environment and Climate Change (Env. & C. C.) Department in March 2024. Forty-one new positions have been created, including a Chief Engineer (Env. & C. C.), two Deputy Chief Engineers (Env. & C. C.), one Deputy Municipal Architect, two Senior Architects, and 35 Sub Engineers (Env. & C. C.).

Fig 1 | **Organisation Structure of the Environment and Climate Change Department, BMC**




* Air Quality Monitoring and Research Laboratory

Fig 2 | **Climate Budgeting Process in Mumbai**




The BMC's Environment and Climate Change Department now serves as the nodal department for key initiatives such as the Mumbai Climate Action Plan, the National Clean Air Programme (NCAP), and sustainable development projects under the Fifteenth Finance Commission (XVFC), while also anchoring climate-focused implementations across the city. With sub-engineers deployed at the ward level, the department is expected to gradually build on-ground capacity to strengthen local climate action.

This growing commitment is reflected in municipal budget for 2025–26, which, for the first time, includes a dedicated budget of ₹141.45 crores (₹ 113.18 crores under capital budget & ₹ 28.27 crores under revenue expenditure) for the Environment and Climate Change Department. This allocation includes a range of interventions aimed at improving Mumbai's air quality, implementing nature-based solutions for climate risk mitigation, and enhancing air quality monitoring systems to enable proactive pollution prevention and control.

## 1.4. Process for Climate Budgeting 2025-26

Mumbai's climate budgeting process is anchored by the Brihanmumbai Municipal Corporation (BMC)'s Environment and Climate Change Department.

Beyond the 20 BMC departments engaged in the FY 2024–25 cycle, seven additional climate-relevant departments of BMC were identified and included in Mumbai's climate budgeting process for FY 2025–26. The cycle was launched in August 2024, with all BMC departments briefed on the MCAP's priorities and the FY 2024–25 Climate Budget Report. Each department also received a list of suggested climate measures and improvement areas for consideration in FY 2025-26. At the ward level,

Fig 3 | **Kick-off meeting for Climate Budgeting FY 2025-26**

officers were introduced to findings of Mumbai's Climate Risks and Vulnerability Assessment and encouraged to identify local vulnerabilities and align interventions accordingly. A quarterly monitoring system was also introduced at this stage.

In September 2024, like in the FY 2024–25 cycle, the BMC's Finance Department integrated the "climate budget template" into the official budget circular for FY 2025–26. Departments were asked to refer to the MCAP's 24 action tracks (see Annexure 1) while planning new projects for the upcoming year, and to map relevant budget items to these tracks, specifying implementation details such as quantity, timelines, phases, locations, and expected impacts. A rigorous data collection process was followed, involving three rounds of interdepartmental meetings and three rounds of one-on-one consultations. These engagements supported departments in understanding the climate budgeting framework, resolving queries, completing the templates and reporting on previous years' allocations. Data related to adaptation and resilience impacts was also collected.

To further collaborative efforts towards on-ground climate action and strengthen climate governance within the BMC, a sensitization session titled, "Introduction to Climate Change: Developing a Green Lens", was conducted on 24th September 2024. This session was chaired by Hon. Municipal Commissioner of BMC and facilitated by the Deputy Municipal Commissioner (Environment & Climate Change) under the leadership of Additional Municipal Commissioner (City), with support from WRI India. All the BMC's Deputy Municipal Commissioners and Chief Engineers of all departments and Assistant Commissioners of all wards participated in this workshop.

Fig 4 | **Climate sensitization session conducted on 24th September 2024**

To expand the scope of this year's climate budget, four key approaches were adopted:

**1. Inclusion of Mumbai's parastatal agencies:** In August 2024, the Brihanmumbai Municipal Corporation (BMC) reached out to 16 other governing agencies working across the city to initiate collaboration on citywide climate budgeting. This effort culminated in a workshop held in December 2024 with key parastatal agencies, where participants were introduced to the Mumbai Climate Action Plan (MCAP) sectors, priorities, and commitments. An interactive session helped map each agency's work relevant to MCAP's action tracks and build a shared understanding of climate priorities. As a first step emerging from this process, the Brihanmumbai Electric Supply and Transport (BEST) Undertaking's budget has been included in the FY 2025–26 Climate

Fig 5 | **Meeting with parastatal agencies at Env & C. C. department**

Budget Report. This has marked a foundational step toward enabling other agencies to begin their own climate budgeting journey and deepen collaboration on climate action in the coming years.

**2. Integration of adaptation, resilience and equity considerations to report the impact of climate measures and prioritize resilience-building initiatives:**

the FY 2025–26 Climate Budget Report, the impacts of Direct Actions – Not Quantified are presented in terms of benefits to People, Nature, and Climate. This approach is inspired from the Intergovernmental Panel on Climate Change's Sixth Assessment Report (AR6)[3], particularly the Working Group II contribution, which emphasizes the interconnectedness of climate, ecosystems and biodiversity, and human societies.

**3. Introduction of a monitoring, evaluation and reporting system pilot**

The BMC aims to leverage the climate budgeting process to systematically monitor its progress toward the goals and targets outlined in the Mumbai Climate Action Plan (MCAP). To this end, the BMC has piloted a Monitoring, Evaluation, and Reporting (MER) process during the current financial year, aiming to integrate climate-relevant monitoring into its existing budget performance tracking systems. The physical and financial progress, as well as key MCAP outputs, and key completed projects in vulnerable wards are elaborated in Chapter 4.

**4. Including measures undertaken through external sources of funding:**

The BMC also utilises external funding sources such as the XV Finance Commission (XVFC), District Planning and Development Committee (DPDC) grants, and Corporate Social Responsibility (CSR) funds to implement several climate-relevant projects. Such initiatives are included within the climate budgeting reporting framework to provide a holistic view of climate-related projects undertaken at the BMC.

Fig 6 | **Framework for Adaptation, Resilience and Equity-focused measures**

**PEOPLE**

Includes enhanced access to water supply, sanitation, and public services.

**NATURE**

Includes increased green cover, expanded permeable surfaces, and improved wastewater treatment.

**CLIMATE**

Focuses on measures with long-term mitigation co-benefits, such as improved urban cooling, reduction in energy demands, carbon sequestration, etc.

This enhanced approach was adopted to provide a clearer, more structured understanding of how adaptation and resilience measures contribute to the city's climate goals. These complement the co-benefits identified for every measure, which convey the long-term social, economic and environmental benefits to citizens.

# 2. MCAP Overview

The MCAP provides a detailed understanding of Mumbai's context; climate risks and vulnerabilities; greenhouse gas inventory; future emission scenarios and pathways to a 1.5°C scenario for Mumbai; sectoral priorities, goals, actions, and implementation strategies; governance and institutional structures; and how to track progress[2]. This section focuses on and summarises Mumbai's climate baseline, future emission scenarios and 24 key action tracks as highlighted in the MCAP.

## 2.1. Climate Risks and Vulnerability Assessment (CRVA)

The Climate & Air Pollution Risks and Vulnerability Assessment, March 2022 evaluates the city's climate risks based on historic data and serves as a knowledge base for the strategies in MCAP. It uses a comprehensive framework of indicators to quantify and map differential risk exposure and vulnerabilities in poor and underdeveloped neighbourhoods, based on socioeconomic, demographic characteristics and service accessibility factors, with findings aggregated and presented at the ward level.

The MCAP 2022 identifies five key climate risks in the context of Mumbai, (i). Urban Heat, (ii). Urban Flooding, (iii). Landslides, (iv). Coastal Risks, and (v). Air Pollution..

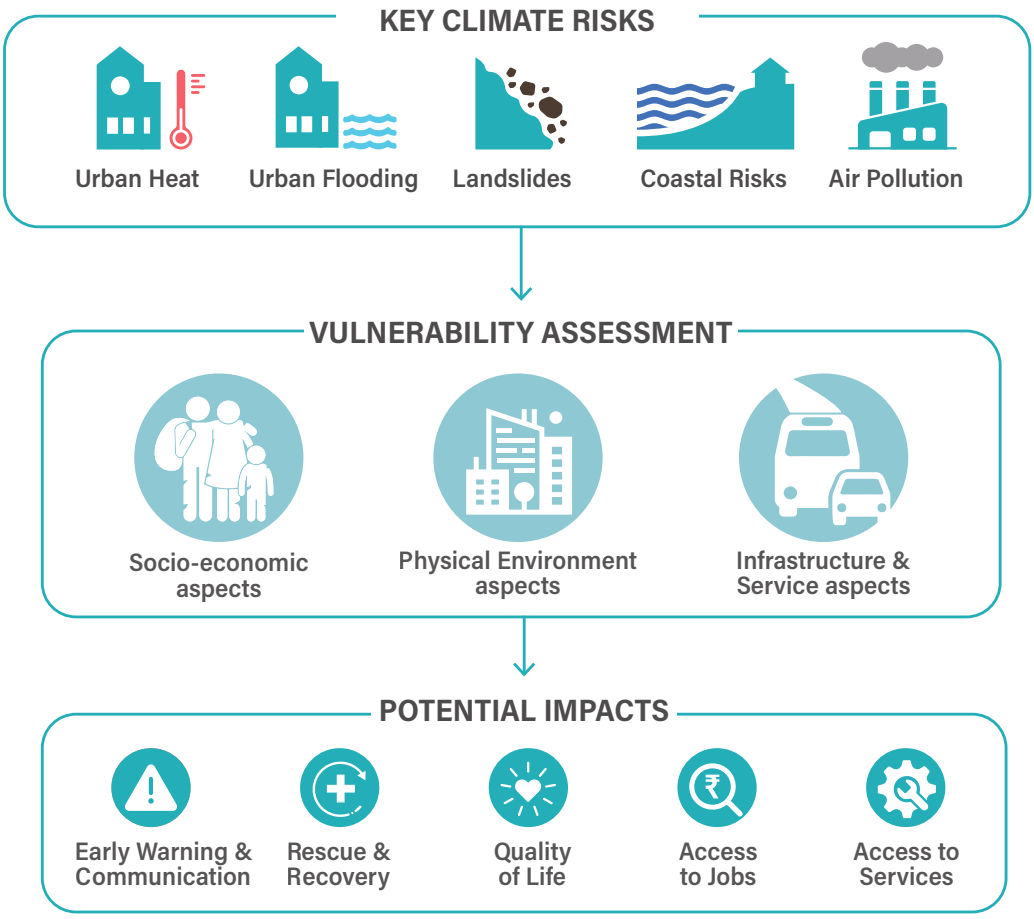


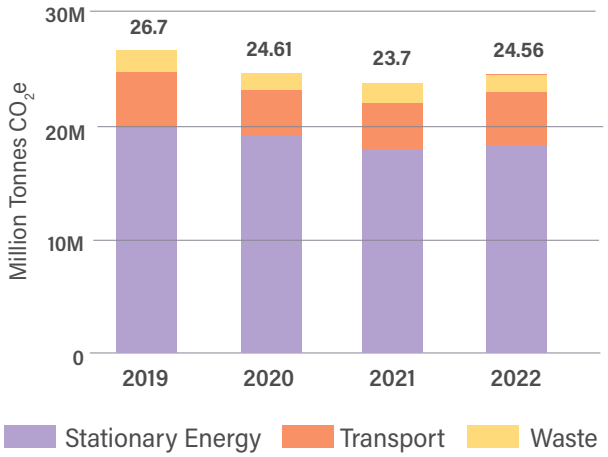

Fig 7 | **Mumbai's Climate Risks and Vulnerability Assessment framework**

## 2.2. Greenhouse Gas Inventory

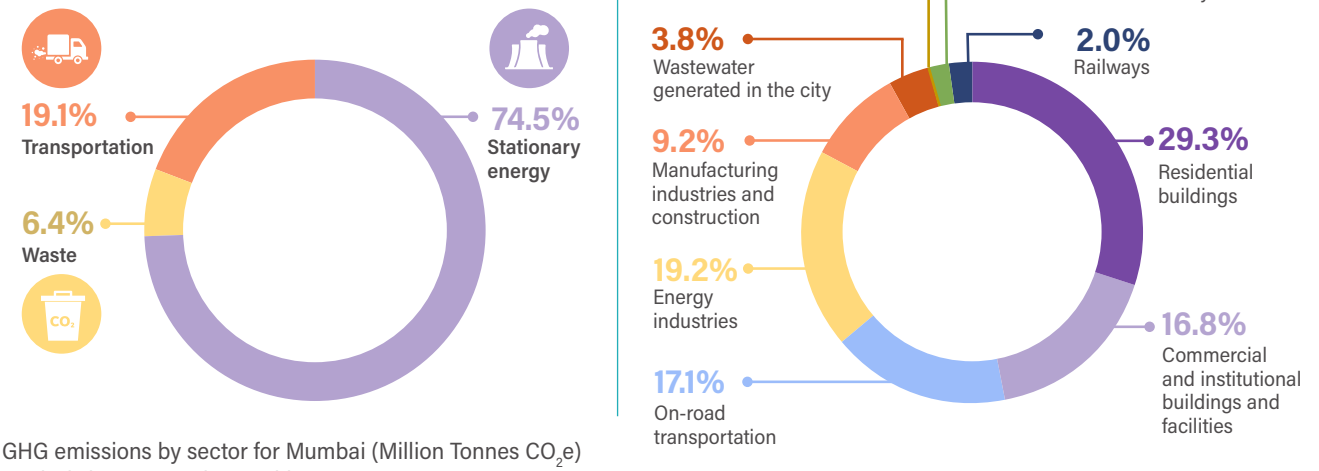
The Greenhouse Gas (GHG) Inventory for Mumbai includes an analysis of sectors and sources that emit carbon dioxide, methane and nitrous oxide. It enables the city to build evidence-based mitigation actions and policies and to monitor progress. Aligned with the Global Protocol for Community-Scale Greenhouse Gas Inventories (GPC) BASIC standards, the GHG Inventory provides a comprehensive emissions profile for Mumbai, serving as a critical knowledge base for the Mumbai Climate Action Plan and its implementation.

Mumbai's 2019–20 GHG Inventory served as the baseline for the MCAP. The city has now completed its first update for 2022–23, along with the update of 2019-20 baseline, using the latest available data. This update was undertaken entirely by BMC's internal team, with capacity strengthened through technical guidance from C40 Cities, and data collected from 15 agencies.[ii]

Fig 8 | **Mumbai's GHG emissions for 2019, 2020, 2021, and 2022[ ]**




The update process helped build institutional capacity and resolve data gaps identified in the previous inventory. Newly available datasets—especially updated fuel consumption data from oil companies and refineries—were included. The process showed enhanced clarity about activities




GHG emissions by sector for Mumbai (Million Tonnes $CO_2e$)
Analysis by BMC and C40 Cities

Fig 9 | **GHG Emissions for 2023 and emissions from sub sectors**

[ii] These included electricity DISCOMs- Adani, TATA Power, Maharashtra State Electricity Development Corporation Limited, BEST Undertaking, Mumbai Metro One Pvt Ltd, Monorail - MMRDA, Western Railways, Central Railways, state level coordinator at Bharat Petroleum Corporation Ltd. (for all Oils Marketing Companies and energy industries), Mahanagar Gas Limited, Ration Controller - Food, Civil Supplies and Consumer Protection Department and relevant BMC departments.

and energy consumption across the city especially from various private and parastatal and national agencies operating in the city. As an outcome, Mumbai's 2019–20 baseline has been revised, and the 2022–23 inventory developed, resulting in a more accurate reflection of Mumbai's emissions profile. This will help to maintain consistency across the inventories for better comparison and tracking progress.

Following these updates, Mumbai's revised total emissions for the 2019-20 baseline is now 26.75 million tonnes $CO_2e$, more than the earlier estimate of 23.42 million tonnes $CO_2e$ used during the MCAP development.

The 2022-23 GHG inventory records total emissions of 24.56 million tonnes $CO_2e$, with per capita emissions of 1.86 tonnes $CO_2e$. This reflects Mumbai's role as a major commercial and financial hub, where industrial processes, energy consumption, and transportation drive emissions. The city's high population density further amplifies energy use in buildings, mobility needs, and waste generation.

**Analysis of Emissions Trends**

• **Declining trend:** Compared to the 2019 baseline emissions of 26.75 million tonnes $CO_2e$, emissions declined by approximately 2.15 million tonnes $CO_2e$ by 2022-23. Between 2019 and 2021, Mumbai's emissions steadily fell, reaching their lowest point in 2021, largely due to pandemic-induced economic slowdowns, before rising again post-2021.

• **Stationary Energy remains dominant:** The sector continues to account for the largest share (74.5% — 18.30 million tonnes $CO_2e$), highlighting the ongoing dependence on fossil fuels for electricity and thermal energy. There are reductions are observed in commercial, institutional buildings and facilities sector (by 26.6%) and residential buildings sector (by 11.36%).

• **Transportation emissions are relatively stable:** At 19.1% (4.69 million tonnes $CO_2e$), transport emissions have remained a major contributor, reflecting Mumbai's high vehicle density and mobility demands. There is a slight decline in emissions from on-road transport (by 5.18%).

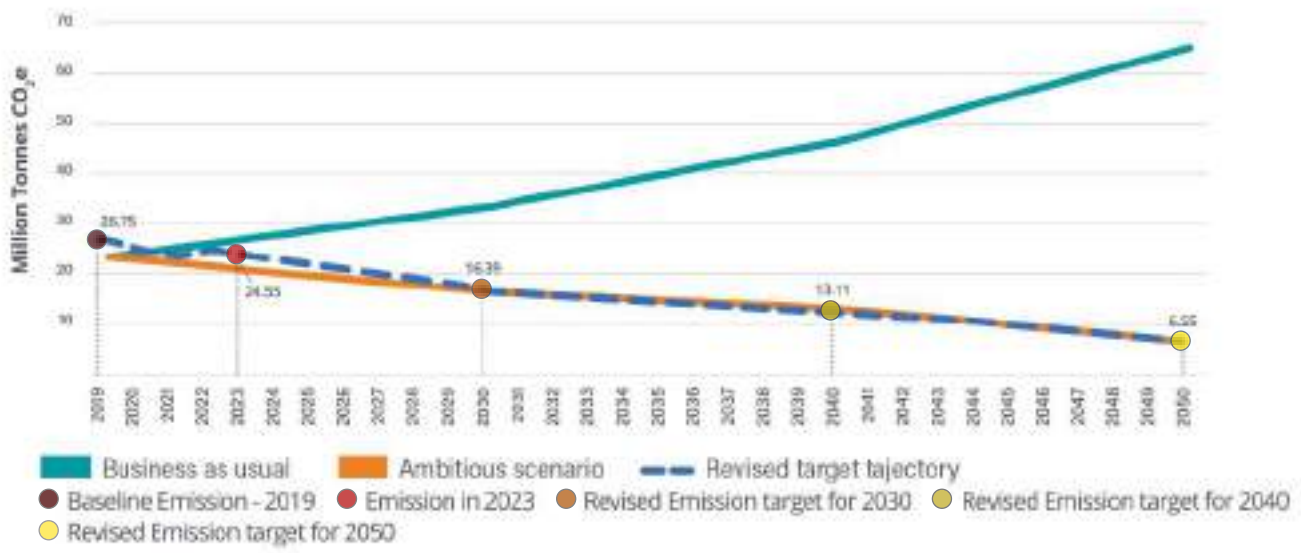
• **Waste sector shows a slight overall reduction:** With a 6.4% share (1.57 million tonnes $CO_2e$), emissions from the waste sector have shown a slight decrease, especially due to reduced emissions from solid waste generated in the city which may be attributed to improved centralised waste processing and monitoring.

The inventory update process showcased the value of institutional ownership and direct engagement with data owners. It enabled access to more granular, refined datasets—especially in the energy sector—and helped mature and standardise the inventory methods. Regular GHG inventory updates will be crucial for tracking emission trends, refining mitigation strategies, and informing policy decisions.

## 2.3. GHG emission scenarios

The pathways scenario exercise provides the evidence based on which the city has set strategies for the energy, transport, and waste sectors in MCAP. Mumbai has an overarching mitigation target of reaching net-zero emissions by 2050. Interim and long-term commitments include a 30% emission reduction by 2030, a 44% by 2040 and net zero by 2050 against base year emissions (2019). If no actions are taken, emissions are expected to increase 170%

Fig 10 | **MCAP Emission Scenarios-Revised Target Trajectory**[iii]




Analysis by BMC and C40 Cities

between 2019 and 2050. The most 'ambitious yet achievable' trajectory for Mumbai forecasts a 27% reduction in emissions to by 2030 and a 72% by 2050, as highlighted in the MCAP. Figure 10 shows the various scenarios, including the updated target trajectory based on the recent GHG update.

## 2.4 Priority Sectors and Action Tracks

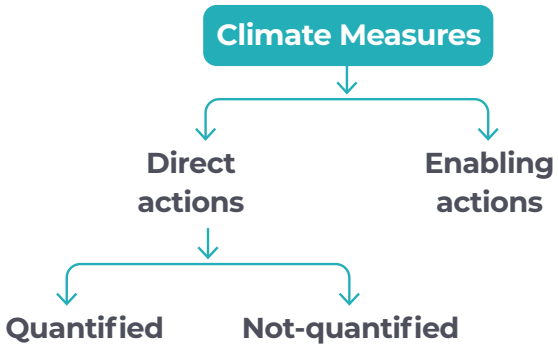
The MCAP identified 6 priority sectors and 24 action tracks to focus on addressing the impacts and causes of climate change in Mumbai. The six sectoral action tracks include: (i) Energy and Buildings, (ii) Integrated Mobility, (iii) Sustainable Waste Management, (iv) Urban Greening & Biodiversity, (v) Air Quality and (vi) Urban Flooding & Water Resource Management. The list of sectors and action tracks is provided in Annexure 1. These priority sectors and action tracks have served as a basis in the BMC's budget circular and templates, to anchor and identify climate measures by departments throughout the climate budgeting process.

**Energy & Buildings** | **Integrated Mobility** | **Sustainable Waste Management** | **Urban Greening and Biodiversity** | **Air Quality** | **Urban Flooding & Water Resource Management**

[iii] Note- While the Business-as-Usual and Ambitious scenarios are based on baseline emissions, the revised target trajectory reflects actual emissions from updated GHG inventories

# 3. Climate measures for FY 2025-26

The Environment and Climate Change Department undertook a timely, systematic, and collaborative approach to formulate Mumbai's climate budget. Climate impact of mapped budget activities submitted by various departments, linked to the 24 MCAP action tracks across six priority sectors were assessed, grouped, and categorised into the following types of actions: –




*How to read climate measures under Climate Budget FY 2025-26*

This chapter presents a list of the climate measures undertaken by the Brihanmumbai Municipal Corporation (BMC) and the Brihanmumbai Electric Supply and Transport (BEST) Undertaking, as outlined in the FY 2025-26 budget.

**Categorization of Climate Measures:** The climate measures in this chapter are classified into three categories: Direct Actions-Quantified, Direct Actions-Not Quantified, and Enabling Actions-each represented by separate tables. The rationale and definitions for each category are further elaborated in the sub-chapters dedicated to them.

**New, ongoing and recurring activities in the climate budget:** New climate initiatives and projects undertaken in FY 2025-26 are highlighted and indicated with a star (★). These are entirely new projects or activities planned and budgeted for implementation in this year. The non-highlighted activities are ongoing projects or activities, phased out year on year, with allocations in FY 2025-26 for a specific phase. The list also includes activities under recurring budget heads that are undertaken annually by departments. These may involve implementing similar initiatives in new locations, using updated technologies, introducing upgrades, or advancing through new phases of ongoing work. By clearly distinguishing between new and ongoing activities, this chapter aims to provide a transparent view of the city's climate efforts and their financial allocations.

## 3.1. Direct Actions – Quantified

*Direct Action - Quantified* encompasses the planned measures and activities, directly leading to greenhouse gas emission reduction. Based on the data and specifications available through consultations with the departments, the table below includes the activities for which it has been possible to estimate quantified potential greenhouse gas emission reductions using methodologies highlighted in Greenhouse Gas Protocol for Cities (GPC), CIRIS tool and Intergovernmental Panel on Climate Change (IPCC) emission factor database.

### 3.1.1. BMC Budget

Table 1 includes direct actions that can be quantified, their alignment with the MCAP action tracks and associated emission reduction potential.

Table 1 | **Direct Actions – Quantified**

| Sr. No. | Activity | Alignment with MCAP | Potential Emission Reduction Metric tonne $tCO_2e$/ year [iv] |
|---|---|---|---|
| **Solid Waste Management (SWM) Department** | | | |
| 1. ★ | XVFC-Installation of Bio methanation plant at various locations in BMC | 3.2 Decentralized waste management, Recycle/Compost at the local level | 2,154.96 |
| 2. ★ | Technological Upgradation of Mahalaxmi Refuse Transfer Station | 3.1 Reducing landfill waste | 30,660 |
| 3. ★ | Setting up dry waste collection sheds in wards | 3.1 Reducing landfill waste | 438 |
| 4. | Solid Waste Management at Deonar Dumping Ground<br>- XVFC- Development of Waste to Energy (WTE) Project at the Deonar Dumping Ground (DDG)<br>- Biomining project at Deonar Dumping Ground | 3.3. Remediation and scientific management of landfills | 1,87,096.08<br><br>1.106 per MT of landfill waste bio-mined*<br><br>* Over the complete lifecycle of a biomining project. |
| 5. | Dumpsite Reclamation Project at Mulund Dumping Ground (MDG) | 3.3. Remediation and scientific management of landfills | 51,66,000**<br><br>** Calculated for the complete lifecycle of the dumpsite reclamation project |

★ Indicates new climate measures

[iv] *"$tCO_2e$" represents metric tons of carbon dioxide equivalent, a unit measuring greenhouse gas emissions. It enables comparison of various gases' global warming potentials by equating them to the amount of $CO_2$ that would cause equivalent warming over a standard timeframe, often 100 years.*

| Sr. No. | Activity | Alignment with MCAP | Potential Emission Reduction Metric tonne $tCO_2e$/ year |
|---|---|---|---|
| **Mechanical and Electrical (M&E) Department** | | | |
| 1. ★ | XVFC-Installation of PNG-based crematorium | 5.1. Curb the pollution concentration level by 20-30% by 2030 | 982 |
| 2. ★ | Providing PNG Gas connections in Mahalakshmi Dhobighat | | 150 |
| 3. | Upgradation of the High Mast System | 1.2. Transition To Clean Fuels And Resource Efficiency | 1273.7 |
| 4. | Installation Of Solar Panel Systems At Various Peripheral Hospitals | | 817.29 |
| 5. | Carbon Cutter system | 5.1. Curb the pollution concentration level by 20-30% by 2030 | 903.18 |
| 6. | Replacing existing AC units with comparatively more energy efficient AC units | 1.2. Transition to clean fuels and resource efficiency | 45.6 |
| **Markets** | | | |
| 1. | Fitting LED lights in municipal markets | 1.2. Transition to clean fuels and resource efficiency in buildings | Incandescent bulb with LED- 0.11 $tCO_2e$ per bulb CFL bulb with LED- 0.014 $tCO_2e$ per bulb |
| 2. | Installation of solar panels on rooftop of two market buildings | 1.1. Decarbonizing Mumbai's electricity generation mix | 212.28 |

| Sr. No. | Activity | Alignment with MCAP | Potential Emission Reduction Metric tonne $tCO_2e$/ year |
|---|---|---|---|
| **Water Supply Projects (WSP) Department** | | | |
| 1. | Development of Renewable Hybrid Energy Project Facilities at HSBT Middle Vaitarna Dam | 1.1. Decarbonizing Mumbai's electricity generation mix | 53.707.85 |
| **Transport Department** | | | |
| 1. ★ | Procurement of 3 EV Sedan cars | 2.3. 100% municipal and private zero emission vehicles by 2050 | 3.16 |
| **Hydraulic Engineers (HE) Department** | | | |
| 1. ★ | Installing solar panels at various Chowkies | 1.1. Decarbonizing Mumbai's electricity generation mix | 286.58 |
| 2. | Setting up of Solar Power Generation Plant on the Rooftop of New Master Balancing Reservoir (MBR) at Bhandup Complex | 1.1. Decarbonizing Mumbai's electricity generation mix | 1061.42 |
| **City Engineers Department[v]** | | | |
| 1. | Solar power generation at various new municipal building constructions | 1.1. Decarbonizing Mumbai's electricity generation mix | 865.33 |
| 2. | Replacement of conventional lighting with LED lighting in various reconstruction projects | 1.2. Transition to clean fuels and resource efficiency in buildings | 469.09 |
| 3. ★ | Installation of a Building Management System in proposed redevelopment of Material Testing Laboratory | 1.2. Transition to clean fuels and resource efficiency in buildings | 45.11 |

[v] Individual budget activities of this department are elaborated in Section 3.2 - budgeted works of City Engineers Department, Mumbai Fire Brigade, Markets Department, Improvement Schemes

| Sr. No. | Activity | Alignment with MCAP | Potential Emission Reduction Metric tonne $tCO_2e$/ year |
|---|---|---|---|
| **Health Infrastructure Cell (HIC) (Part of Public Health Department)** | | | |
| 1. ★ | Various solar installations in hospital construction- solar panels, solar water heaters, solar lighting | 1.1. Decarbonizing Mumbai's electricity generation mix | 122.65 |
| 2. ★ | Water cooled screwed chiller systems in hospital construction projects | 1.2. Transition to clean fuels and resource efficiency in buildings | 1224.85 |
| 3. ★ | Replacement of conventional lighting to LED lighting in hospital reconstruction projects | 1.2. Transition to clean fuels and resource efficiency in buildings | 172.26 |
| **Deonar Abattoir** | | | |
| 1. ★ | Piped Natural Gas-based Incinerators at slaughterhouse premises | 5.1. Curb the pollution concentration level by 20-30% by 2030 | 184 |
| 2. ★ | Upgradation of Bio-methanation Plant | 3.1. Reducing landfilled waste | 446.34 |
| 3. ★ | Replacement of one existing pump with energy efficient water pump | 1.2. Transition to clean fuels and resource efficiency in buildings | 7.27 |
| **School Infrastructure Cell (SIC) (Part of Education Department)** | | | |
| 1. ★ | Replacement of conventional lighting to LED lighting at municipal schools | 1.2. Transition to clean fuels and resource efficiency in buildings | 5764.64 |

## 3.1.2. BEST Budget

| Sr. No. | Activity | Alignment with MCAP | Potential Emission Reduction Metric tonne $tCO_2e$/ year |
|---|---|---|---|
| **Electric Supply Section** | | | |
| 1. ★ | Procurement of renewable energy for the electricity supply mix | 1.1. Decarbonizing Mumbai's electricity generation mix | 1217.41 |
| 2. ★ | Rooftop Solar Installations by Consumers | | 581.31 |
| **Transport Section** | | | |
| 1. ★ | Procurement of Electric Buses | 2.3. 100% municipal and private zero emission vehicles by 2050 | 14803.14 |
| 2. ★ | Wet leasing of Electric Motor Vehicles | | 114.32 |

**The detailed description of the climate measures and activities in Table 2 | Direct Actions - Quantified can be found in Annexure 2. Calculations of potential emission reductions for the Direct Actions- Quantified can be found in Annexure 3.**

Eco-STP (Sewage Treatment Plant) at Marol Urban Foresh | Photo by Sayali Lokare, WRI India

## 3.2. Direct Actions – Not Quantified

*Direct Action – Not quantified* encompasses measures and activities vital for reinforcing climate initiatives within the city. These planned actions over the next year shall contribute to long-term climate action by strengthening the city's infrastructure and service distribution systems, thereby bolstering resilience to climate risks, and laying the groundwork for future emission reductions. Table 2 outlines the budgeted activities, their alignment with the MCAP action tracks, reported indicators for adaptation and resilience, data quality classification, and the potential co-benefits of these initiatives. Co-benefits have been identified using the United Nations' 17 Sustainable Development Goals (SDGs) framework and internal expertise..

**Key for Table 2 | Direct Action – Not quantified**

**Data quality classification:**

| Up to 25% **Low** | 25%- 75% **Medium** | 75%-95% **High** |
|---|---|---|

100%-Complete

P/F stage- Project is in a planning/ feasibility stage

# Indicates that data is used as proxy to report impact on People, Nature, & Climate.

**Impact categories**

| | People | Nature | Climate |
|---|---|---|---|
| Direct Impact | P | N | C |
| Indirect/possible Impact | P | N | C |

★ Indicates new climate measure

## 3.2.1. BMC Municipal Budget

Table 2 | Direct Actions – Not Quantified

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality<br>Co-benefits |
|---|---|---|---|---|
| **Disaster Management Department** | | | | |
| 1. | Setting up and operating Viewing Centre in 24 Wards<br>P | 6.6. Disaster risk and impact reduction | No. of disaster management initiatives planned: **2**#<br><br>Existing viewing centres: **24**<br><br>*Number of people benefitted* | M<br><br>Sustainable communities and city, disaster preparedness |
| **Solid Waste Management (SWM)** | | | | |
| 1. ★ | XVFC - Installation of Outdoor Dust Mitigation Unit and Dust Monitoring Systems<br>P | 5.1. Curb the pollution concentration level by 20-30% by 2030 | No. of machine installation locations planned: **5**#<br><br>*Improved air quality at locations*<br><br>*No. of people benefitted* | L<br><br>Good health and wellbeing & better quality of life |
| 2. ★ | XVFC- Procurement, operation and maintenance of E-Sweepers<br>P | 5.1. Curb the pollution concentration level by 20-30% by 2030 | No. of machines: **9**#<br><br>*Improved air quality at locations*<br><br>*No. of people benefitted* | L<br><br>Dust pollution mitigation, good health and wellbeing |
| 3. ★ | Construction of prefabricated toilets in all wards<br>P | 6.5. Clean, safe and accessible toilets | *No. of toilets planned*<br><br>*No. of people with increased access to sanitation* | P/F stage<br><br>Good health and wellbeing, gender equality |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Solid Waste Management (SWM)** | | | | |
| 4. ★ | Procurement of new vehicles for segregated waste collection (C) | 3.1 Reducing landfilled waste | *No. of vehicles to be procurement*<br><br>*Quantity of segregated waste collected* | P/F stage<br><br>Sustainable communities and cities |
| 5. ★ | Installation of sanitary napkin vending machines and incinerators in public toilets (P) (C) | 6.5. Clean, safe and accessible toilets | No. of vending machines planned: **1800 units**[#]<br><br>*No. of people with increased access to sanitation* | L<br><br>Gender equality, good health and wellbeing, & sustainable waste management |
| 6. ★ | Capital Receipts (SBM) -Construction of new toilets (P) | 6.5. Clean, safe and accessible toilets | No. of toilets (community and private) planned: **4500 (1500 IIHLs and 3000 CTs)**[#]<br><br>*No. of people with increased access to sanitation*<br><br>*Availability of an operating and maintenance plan* | M<br><br>Good health and wellbeing, gender equality |
| 7. ★ | Construction of community toilets in all wards (P) | 6.5. Clean, safe and accessible toilets | No. of toilets planned: **559 toilets with 14166 seats**<br><br>No. of people with increased access to sanitation: **estimated 7,08,300**[vii] | H<br><br>Good health and wellbeing, gender equality |

[vii] *Calculated considering 50 users per toilet seat as per Mumbai Slum Sanitation Programme standard https://documents.worldbank.org/curated/en/620841468041130033/pdf/384560IN0Mumbai0slum01PUBLIC1.pdf*

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Solid Waste Management (SWM)** | | | | |
| 8. | Provision of community toilets in all wards<br>P | 6.5. Clean, safe and accessible toilets | No. of wards planned: **9 prioritised**[#]<br><br>*No. of people with increased access to sanitation* | L<br><br>Good health and wellbeing, gender equality |
| 9. | Synthetic vinyl sheet pilling at Deonar Dumping Ground<br>N C | 6.3. Reducing pollution and restoring aquatic ecosystems | *Amount of leachate expected to be diverted from water bodies*<br><br>*Length of planned vinyl sheets* | P/F stage<br><br>Clean water, improved health |
| 10. | Measures to ensure survival of mangroves within Kanjurmarg Dumping Ground<br>N C | 4.4. Restore and enhance biodiversity in the city | Estimated area of mangrove forest that will be impacted (possibly): **264.87 ha**[8]<br><br>*Improved survival rate of mangroves forest* | L<br><br>Flood resilience and protecting forest ecosystem |
| **Mechanical and Electrical Department** | | | | |
| 1. ★ | XVFC-Retrofitting Pollution Control Systems for diesel generator sets<br>P | 5.1. Curb the pollution concentration level by 20-30% by 2030 | *Improved air quality at locations* | P/F stage<br><br>Sustainable cities |
| 2. ★ | Installation of Sewage Treatment Plants at peripheral hospitals<br>N | 6.3. Reducing pollution and restoring aquatic ecosystems | No. of STPs planned: **2**<br><br>Volume of wastewater treated by decentralized systems: **50 KLD** | M<br><br>Sustainable building and communities |

[viii] Panditrao (2020). Management Plan for Thane Creek Flamingo Sanctuary, Maharashtra, India (pg 116)

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Mechanical and Electrical Department** | | | | |
| 3. | Setting up of Sewage Treatment Plant/ Effluent Treatment Plant at major hospitals and various speciality hospitals N C | 6.3. Reducing pollution and restoring aquatic ecosystems | *Volume of wastewater treated by decentralized systems* | P/F stage<br>Improved hygiene, prevent spread of diseases |
| **Hydraulic Engineering (HE)** | | | | |
| 1. ★ | XVFC-Improvement of water supply P | 6.4. Safe and affordable drinking water | No. of wards expected to receive said benefits: **3 (R/S, R/N, H/W)#**<br>Total length of all pipes planned: **6,237 meters#**<br>*No. of people with improved access to water* | M<br>Improved access to public services |
| 2. ★ | Hill slope stabilisation and allied works in the Western and Eastern Suburban areas P | 6.6. Disaster risk and impact reduction | No. of people with improved water security**: 23.5 lakhs**<br>No. of locations identified for stabilization: **6 hill reservoirs and 10 interventions** | M<br>Reduction in externalities to livelihoods, employment, homes |
| 3. ★ | Replacement of defective sluice valves P C | 6.4. Safe and affordable drinking water | *Estimated volume of water conserved* | P/F stage<br>Reduction in externalities to livelihoods, employment, homes |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality<br>Co-benefits |
|---|---|---|---|---|
| **Hydraulic Engineering (HE)** | | | | |
| 4. ★ | Safety measures for water supply network<br>P C | 6.4. Safe and affordable drinking water | *Length of water mains protected*<br><br>*No. of people with increased water security* | P/F stage<br><br>Reduction in wastage of fresh water and water loss |
| 5. | Laying/ replacing water mains at various locations across the city<br>P | 6.4. Safe and affordable drinking water | No. of wards expected to benefit: **18**#<br><br>No. of people expected to benefit: **more than 15000***<br><br>**Estimate only available for Madam Cama Road in A ward* | L<br><br>Reduction in wastage of fresh water, prevention of water-borne diseases |
| 6. | Construction of storage tanks with pumping arrangements<br>P | 6.4. Safe and affordable drinking water | *No. of people with improved access to water* | P/F stage<br><br>Improved access to public services, & better quality of life |
| 7. | Work of attending to leakages and contamination within the water distribution system<br>P C | 6.4. Safe and affordable drinking water | *No. of people with improved access to water* | P/F stage<br><br>Improved health, reduction in water loss, & better quality of life |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Hydraulic Engineering (HE)** | | | | |
| 8. | Improvement and plantation in various garden plots at Bhandup complex and along Trunk Mains (P N C) | 4.1. Increase vegetation cover and permeable surface | Area under plantation: **87,266 sqm**<br><br>*No. of native species planted*<br><br>*Scientific approach to greening* | M<br><br>Enhanced biodiversity, quality of life, improved health |
| 9. | Hill slope stabilization and construction of retaining walls at various locations (P) | 6.6. Disaster risk and impact reduction | No. of locations expected to be stabilised: **4 hills and 7 interventions**<br><br>Area of slope expected to be stabilised: **3,02,500.09 sqms**<br><br>Expected no of people served with improved water security: **9.44 lakhs***<br><br>**Approximate from 3 locations* | H<br><br>Reduction in externalities to livelihoods, employment, homes |
| 10. | Providing LED streetlights in pumping station premises | 1.2 Transition to clean fuels and resource efficiency. | *No. of LED streetlights planned* | P/F stage<br><br>Sustainable cities |
| **Planning Department** | | | | |
| 1★. | OPEX- 100% concession on BEST ticket fares for persons with disabilities (P C) | 2.1. Improve public transport ridership | No. of trips: **4.67 lakh trips per month on average (**Estimate based on no. of trips between 2022 and 2024) | H<br><br>Sustainable communities and city & universal access |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality<br>Co-benefits |
|---|---|---|---|---|
| **Sewerage Project** | | | | |
| 1. ★ | XVFC-Rejuvenation of water bodies<br>N C | 6.3. Reducing pollution and restoring aquatic ecosystems | No. of water bodies planned to be rejuvenated: **3 lakes**<br><br>*Area of the lakes being rejuvenated* | M<br>Climate resilience & enhanced biodiversity |
| 2. | Diversion of dry weather flow<br>N C | 6.3. Reducing pollution and restoring aquatic ecosystems | *Volume of wastewater from stormwater drains diverted to sewer lines* | P/F stage<br>Avoid waterborne diseases, better health |
| 3. | Providing and laying of sewer lines<br>N | 6.3. Reducing pollution and restoring aquatic ecosystems | Expected Length of all sewer lines to be provided: **37.41 km**[#]<br><br>No. of ongoing budget works: **96**<br><br>*Increased capacity of city's sewerage network* | M<br>Avoid waterborne diseases, better health |
| 4. | Planning of sewer line network and STPs at various locations in Mumbai<br>C | 6.3. Reducing pollution and restoring aquatic ecosystems | *Length of sewer lines planned*<br><br>*Volume of wastewater treated* | P/F stage<br>Avoid waterborne diseases, better health |
| 5. | Rejuvenation of Poisar, Dahisar, Walbhat and Oshiwara rivers<br>N | 6.3. Reducing pollution and restoring aquatic ecosystems | No. of rivers planned to be rejuvenated: **4**<br><br>*Volume of water undergoing treatment* | L<br>Avoid waterborne diseases, better health |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Gardens** | | | | |
| 1. ★ | XVFC-Greening of public and residential areas in Mumbai<br>P N C | 4.1. Increase vegetation cover and permeable surface | *Total area restored through greening*<br><br>*No. of people with access to green open spaces*<br><br>*Scientific greening* | P/F stage<br><br>Better air quality, enhancing groundwater, good health |
| 2. ★ | Beautification of spaces below flyovers through greening/ placemaking<br>P N | 4.3. Equitable access to green open spaces | No. of spaces: **26**<br><br>Total area of all spaces planned: **51954 sqmt**<br><br>*No. of people with access to green open spaces*<br><br>*Scientific greening approach adopted* | L<br><br>Sustainable Cities |
| 3. | Development of new gardens<br>P N C | 4.1. Increase vegetation cover and permeable surface | No. of gardens being planned for development: **1**<br><br>Area of gardens planned for development: **1677.91 sqmt**<br><br>*Scientific greening approach adopted* | P/F stage<br><br>Better air quality, enhancing groundwater, good health |
| 4. | Beautification of central medians & traffic islands<br>P | 4.1. Increase vegetation cover and permeable surface | No. of central medians considered for greening: **272**<br><br>No. of wards planned to receive benefits: **20**<br><br>*Total area of all central medians planned*<br><br>*Scientific greening approach adopted* | L<br><br>Better air quality, enhancing groundwater, good health |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Gardens** | | | | |
| 5. | Upgradation of existing gardens- repairs and horticulture<br>P N C | 4.3. Equitable access to green open spaces | No. of playgrounds to be upgraded: **359**<br><br>Total area of all playgrounds to be upgraded: **1815801 sqm**<br><br>No. of wards to receive benefits: **24**#<br><br>*No. of people with improved access to green open spaces* | M<br><br>Sustainable Cities, Good health and wellbeing |
| 6. | Open Space Management Scheme<br>P | 4.3. Equitable access to green open spaces | No. of wards to recieve benefits: **22**#<br><br>*No. of people with improved access green open spaces with sports facilities* | L<br><br>Sustainable Cities, Good health and wellbeing |
| **Garden Infrastructure Cell (GIC)** | | | | |
| 1. ★ | Development and upgradation of various Recreational Ground (RG), Playground (PG), and Garden plots<br>P N | 4.3. Equitable access to green open spaces | No. of R.G., P.G., and gardens plots to be upgraded: **47**#<br><br>Area planned to be upgraded: **268440.7 sqm**<br><br>*No. of people with improved access to green open spaces* | M<br><br>Sustainable Cities, Good health and wellbeing |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Public Health Department** | | | | |
| 1. ★ | OPEX- Procurement of biomedical waste bags and bins (C) | 3.1 Reducing landfilled waste | No. of bags to be procured- **22,000**#<br><br>No. of bins to be procured- **1760 bins, 30 ltr. each**#<br><br>*Quantity of biomedical waste segregated, and safely disposed* | M<br><br>Improved hygiene, prevent spread of diseases |
| 2. ★ | Climate change and pollution related health risk training (P) | 5.3. Community health resilience through decentralized planning and awareness | No. of health professionals trained: **476**<br><br>Frequency of training for monsoon and air pollution related health risks: **2 –3 per year** | M<br><br>Increased awareness, good health and wellbeing |
| 3. ★ | Provisions for air-conditioned rooms in Apla Davakhana dispensaries as cooling/ heat relief centres (P) | 6.6. Disaster risk and impact reduction | *No. of heat relief centres*<br><br>*No. of people with access to heat relief centres* | P/F stage<br><br>Heat resilience, good health and wellbeing |
| **Health Infrastructure Cell (under Public Health Department)** | | | | |
| 1. ★ | Construction of new healthcare facilities (N) (C) | 3.2 Decentralized waste management, Recycle/Compost at the local level<br><br>6.2 Localise water conservation and efficiency. | *Volume of wastewater treated through decentralized systems*<br><br>*Volume of water reused*<br><br>*Waste treated at hospital premises* | P/F stage<br><br>Sustainable buildings and cities, resource efficiency |
| 2. ★ | Redevelopment of several healthcare facilities across the city (N) (C) | | | |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality<br>Co-benefits |
|---|---|---|---|---|
| **Water Supply Projects (WSP)** | | | | |
| 1. ★ | Construction of tertiary treated water conveyance tunnels<br>N C | 6.2. Localized water conservation and efficiency | *Volume of treated water reused* | P/F stage<br>Resource efficiency |
| 2. | Recycling/ reuse of wastewater to potable water at Colaba Wastewater Treatment Plant<br>N C | 6.2. Localized water conservation and efficiency | Volume of wastewater projected to be recycled: **12 MLD** |  <br>Resource efficiency |
| 3. | Construction of tunnels for drinking water conveyance<br>P | 6.4. Safe and affordable drinking water | Length of tunnel planned to be constructed: **8.797km**<br><br>No. of wards planned to receive improved water supply: **6**[#]<br><br>*No. of people with improved access to water* |  <br>Reduction in wastage of fresh water, prevention of water-borne diseases |
| 4. | Replacement of old mains<br>P | 6.4. Safe and affordable drinking water | No. of location planned to receive improved water supply: **2**<br><br>*No. of people with improved access to water* |  <br>Reduction in wastage of fresh water, prevention of water-borne diseases |
| 5. | Development of new Water Treatment Plant at Bhandup Complex<br>P | 6.4. Safe and affordable drinking water | Expected capacity of the new WTP: **2000 MLD**<br><br>*No. of people expected to benefit* |  <br>Good health, and overall well-being |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Water Supply Projects (WSP)** | | | | |
| 6. | Re-engineering & reconstruction of Tulsi Water Treatment Plant (P) | 6.4. Safe and affordable drinking water | *Volume of water treated*<br><br>*No. of people expected to benefit* | P/F stage<br><br>Good health, and overall well-being |
| 7. | Desalination Plant for augmentation of Mumbai's water supply (P) | 6.4. Safe and affordable drinking water | Volume of water projected to be supplied from the plant: **400 MLD**[#]<br><br>*No of people expected to benefit* | L<br><br>Reduction in use of fresh water sources, improved access to basic service |
| 8. | Construction of pumping station to transfer Vihar overflow to Bhandup Complex Water Treatment Plant (N) | 6.2. Localized water conservation and efficiency | Volume of water expected to be transferred- **7200 ML***<br><br>**Tentatively depending on the amount of rainfall* | M<br><br>Reduction in wastage of fresh water |
| **Storm Water Drain (SWD) Department** | | | | |
| 1. ★ | Widening and training of Mithi River and other Nalla systems (P) | 6.1. Build flood resilient systems and infrastructure | *Expected increase in river and nalla capacities*<br><br>*No. of neighbourhoods and people safeguarded* | P/F stage<br><br>Reduction in externalities to livelihoods, employment, homes |
| 2. ★ | XVFC-Construction of Sewage Treatment Plant near Dahisar River (N) (C) | 6.3. Reducing pollution and restoring aquatic ecosystems | No. of STPs: **2**<br><br>Amount of wastewater projected to be treated: **6.5 MLD** | M<br><br>Better ecosystem |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Storm Water Drain (SWD) Department** | | | | |
| 3. | Design and construction of modernized and fully automated package/ Modular Sewerage Treatment plants based on MBR technology along Dahisar, Poisar and Oshiwara-Walbhat rivers. N C | 6.3. Reducing pollution and restoring aquatic ecosystems | *Volume of wastewater treated* | P/F stage<br>Better ecosystem |
| 4. | Widening and training of the stormwater drains, and operation and maintenance of the SWD network across the city P | 6.1. Build flood resilient systems and infrastructure | No. of projects planned for drain improvement: **~24**<br>*No. of neighbourhood and people expected to be safeguarded* | L<br>Reduction in externalities to livelihoods, employment, homes |
| 5. | Augmentation of box drain to abate flooding at various locations P | 6.1. Build flood resilient systems and infrastructure | No. of box drain projects planned: **~22** | L<br>Reduction in externalities to livelihoods, employment, homes |
| 6. | Planning and construction of balance stretches P | 6.1. Build flood resilient systems and infrastructure | No. of projects planned for balance stretches improvement: **~8** | L<br>Reduction in externalities to livelihoods, employment, homes |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Storm Water Drain (SWD) Department** | | | | |
| 7. | Construction of holding tanks<br>P | 6.1. Build flood resilient systems and infrastructure | No. of tanks constructed: **3**<br><br>Estimated capacity of the holding tanks: **94,000 cubic meters** |  <br>Reduction in externalities to livelihoods, employment, |
| 8. | Diversion/Loop construction in various drains<br>P | 6.1. Build flood resilient systems and infrastructure | No. of projects planned to enhance flood resilience **~4** |  <br>Reduction in externalities to livelihoods, employment, homes |
| 9. | Improvement and upgradation work in existing stormwater drainage network<br>P | 6.1. Build flood resilient systems and infrastructure | No. of projects planned to enhance flood resilience: **~61** |  <br>Reduction in externalities to livelihoods, employment, homes |
| 10. | Laying of box drains at various locations, expanding the drainage network<br>P | 6.1. Build flood resilient systems and infrastructure | No. of projects planned to enhance flood resilience: **~18** |  <br>Reduction in externalities to livelihoods, employment, homes |
| 11. | Treatment of Storm Water Drains using N-Treat technology<br>N | 6.1. Build flood resilient systems and infrastructure | *No. of drains planned to be treated* | P/F stage<br>Reduction in externalities to livelihoods, employment, homes |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality<br>Co-benefits |
|---|---|---|---|---|
| **Storm Water Drain (SWD) Department** | | | | |
| 12. | Construction of nalla retaining walls<br>P | 6.1. Build flood resilient systems and infrastructure | No. of projects planned: **~34** | L<br>Reduction in externalities to livelihoods, employment, homes |
| **Roads and Traffic Department** | | | | |
| 1. ★ | Provision for walkable footpaths<br>P | 2.2 Access to non-motorized transport (NMT) and infrastructure | *Length of footpaths improved*<br>*No. of people with improved access to pedestrain friendly footpaths* | P/F stage<br>Road safety, universal access, quality of life |
| 2. | Improvement of footpaths<br>P | 2.2 Access to non-motorized transport (NMT) and infrastructure | *Length of footpaths improved*<br>*No. of people with improved access to pedestrain friendly footpaths* | P/F stage<br>Road safety, universal access, quality of life |
| **Bridges Department-** | | | | |
| 1. | Construction, reconstruction, repairs and maintenance of Foot Over-bridges on roads and Railways, Pedestrian Subways and skywalks<br>P | 2.2 Access to non-motorized transport (NMT) and infrastructure | Total length of all infrastructural units planned: **4.37 km** (using data available for 14 projects)<br>No. of locations planned: **23 Wards**<br>*No. of people with improved access to pedestrian- friendly footpaths* | L<br>Road safety, universal access, quality of life |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Deonar Abattoir** | | | | |
| 1. ★ | Modernisation and upgradation of Deonar Abattoir<br>• Energy-efficient refrigeration and cold storage systems<br>• Rainwater harvesting and wastewater treatment<br>• Solar energy integration<br>• Bio methanation plant<br>• Water efficiency measures<br>N C | 1.1 Transitioning Mumbai's electricity generation mix to renewable sources<br><br>1.2. Transition to clean fuels and resource efficiency in buildings<br><br>3.1 Reducing landfilled waste<br><br>6.2 Localized water conservation and efficiency | *Volume of rainwater harvested*<br><br>*Volume of recycled water reused in the premises*<br><br>*Capacity of solar panels planned to be installed*<br><br>*Quantity of animal waste treated and repurposed on-site* | P/F stage<br><br>Sustainable buildings, resource efficiency, improved hygiene |
| 2. ★ | Refurbishments to the Effluent Treatment Plant at Deonar Abattoir<br>N C | 6.3. Reducing pollution and restoring aquatic ecosystems | Amount of wastewater that will be diverted from water bodies and repurposed: **1.3 MLD** | H<br><br>Resource efficiency, improved hygiene, prevent spread of diseases |
| 3. ★ | Modern technology slaughter line with blood coagulator<br>C | 3.1 Reducing landfilled waste | Amount byproduct (blood) repurposed: **20000 litres** | Complete<br><br>Resource efficiency, improved hygiene |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality<br>Co-benefits |
|---|---|---|---|---|
| **Education Department** | | | | |
| 1. | Provision of sanitary napkin vending machines with incinerators at municipal schools<br>P C | 6.5. Clean, safe, and accessible toilets | *No. of machines planned to be provided*<br><br>*No. of students benefitting* | P/F stage<br><br>Gender equality & better quality of life |
| **School Infrastructure Cell (SIC)** (part of Education Department) | | | | |
| 1. ★ | Rainwater harvesting (RWH) at municipal schools<br>N C | 6.2. Localized water conservation and efficiency | No. of schools where RWH is planned: **4**<br><br>RWH capacity: **108 cu. M** | M<br><br>Sustainable buildings and cities, resource efficiency |
| 2. | Upgradation of toilets in all Municipal Schools<br>P | 6.5. Clean, safe, and accessible toilets | *No. of toilets planned to be upgraded*<br><br>*No. of schools expected to benefit*<br><br>*No. of students expected to benefit* | P/F stage<br><br>Good health and wellbeing, gender equality |
| 3. | Repairs and upgradation of Municipal School playgrounds<br>P N C | 4.3. Equitable access to green open spaces | *No of students expected to benefit from the project*<br><br>*Area under periphery plantation*<br><br>*Scientific approach adopted for periphery greening* | P/F stage<br><br>Good health and overall well-being |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **City Engineers Department** | | | | |
| 1. ★ | Construction of a new ward office with a net-zero concept at Santacruz East, H/E Ward (C) | 1.3 Low carbon buildings | No. of mitigation measures considered: 3<br><br>No. of heat adaptation measures considered: 6<br><br>No. of environmentally friendly measures considered: 5 | P/F stage<br><br>Sustainable buildings and city |
| 2. ★ | Transportation and commercial hub at Dahisar Check Naka in R/North Ward (P) (C) | 1.2 Transition to clean fuels and resource efficiency<br><br>6.2 Localise water conservation and efficiency.<br><br>4.1. Increase vegetation cover and permeable surfaces | Capacity of planned transportation hub: **456 buses and 1424 motorised vehicle parking** | M<br><br>Sustainable buildings and city |
| 3. ★ | Redevelopment of the Material Testing Laboratory and Asphalt Plant Office (P) (C) | | Capacity of planned STP: **82 KLD**<br><br>Total number of adaption and resilience measures considered: **7** | M<br><br>Sustainable buildings and city |
| 4. ★ | Swimming pool and sports complex near Odeon Mall, Ghatkopar (P) (C) | | Garden Area: **1289.32 sqm**<br><br>No. of trees planted: **524**<br><br>*Scientific approach to greening* | M<br><br>Sustainable buildings and city |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **City Engineers Department** | | | | |
| 5. ★ | Project Affected Persons tenements required for Goregaon Mulund Link Road project, S Ward (P) (C) | 1.2 Transition to clean fuels and resource efficiency<br><br>6.2 Localise water conservation and efficiency.<br><br>4.1. Increase vegetation cover and permeable surfaces | No. of amenity plots planned for RR: **2**<br><br>Capacity of STP: **465 KLD**<br><br>RWH Capacity: **1lakh litres**<br><br>No of trees to be planted: **1364**<br><br>Area of recreational ground: **1293.68 sqm** | M<br><br>Sustainable buildings and city |
| 6 ★ | Municipal chowki, at S Ward (C) | | No. of trees to be planted: **14** | M<br><br>Sustainable buildings and city |
| 7. | Provision for construction of various community infrastructure at various locations in Mumbai (P) | 1.2 Transition to clean fuels and resource efficiency<br><br>6.2 Localise water conservation and efficiency.<br><br>4.1. Increase vegetation cover and permeable surfaces | No. of community infrastructure created: **4**<br><br>No. of trees planted: **20** | L<br><br>Sustainable buildings and city |
| 8. | Construction of public hall (Samajik Sabhgruh) at Murar Road (P) (N) | | No. of units of public infrastructure planned: **1**<br><br>Area of the garden planned: **312.96 sqm**<br><br>No. of trees planted: **334**<br><br>Capacity of RWH Tank: **1.1 KLD** | M<br><br>Sustainable buildings and city |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Mumbai Fire Brigade** (includes budget works reported under City Engineers)- | | | | |
| 1. ★ | Drill tower cum multifacility training simulator<br>P | 6.6. Disaster risk and impact reduction | *No. of people trained in fire safety* | P/F stage<br>Reduction in externalities to livelihoods, employment, homes |
| 2. | Construction, reconstruction of fire brigade stations at various locations in Mumbai<br>P N C | 1.2 Transition to clean fuels and resource efficiency.<br>6.2 Localise water conservation and efficiency<br>4.1. Increase vegetation cover and permeable surfaces<br>6.6. Disaster risk and impact reduction | No. of fire stations under consideration: **4**<br>No. of fire safety related infrastructure: **7**<br>Total capacity of all RWH tank: **3000 lit***<br>No. of trees to be planted: **117****<br>No. of mitigation measures considered: **2**<br>*Data available from Mulund and Kanjurmarg<br>***Data available from Kurla* | M<br>Sustainable buildings and city |
| **Markets Department** (includes budget works reported under City Engineers)- | | | | |
| 1. | Construction and redevelopment of municipal market buildings at various locations in Mumbai<br>P N C | 1.1. Decarbonizing Mumbai's electricity generation mix<br>1.2 Transition to clean fuels | No. of markets considered: **5**<br>Total capacity of all RWH tanks: **28410 lit***<br>Area of garden planned: **857.18 sqm*** | M<br>Sustainable buildings, cities, and communities |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| | | and resource efficiency.<br><br>6.2 Localise water conservation and efficiency<br><br>4.1. Increase vegetation cover and permeable surfaces | Capacity of planned STP: **194 KLD***<br><br>No. of trees planted: **12***<br><br>**Climate relevant actions differ by individual market* | |
| **Improvement schemes** (As reported under City Engineers) | | | | |
| 1. | Planning and redevelopment of residential tenements in M/E ward<br>P N C | 1.1. Decarbonizing Mumbai's electricity generation mix<br><br>1.2 Transition to clean fuels and resource efficiency.<br><br>6.2 Localise water conservation and efficiency<br><br>4.1. Increase vegetation cover and permeable surfaces | Area of garden planned: **8453.66 sqm**<br><br>No. of trees planned: **450**<br><br>Capacity of RWH tank**: ~1.6 crore lit**<br><br>Capacity of STP: **1824 KLD** |  <br><br>Sustainable buildings, cities, and communities |
| 2. | Redevelopment of Municipal Property at Vikhroli Parksite Layout in N ward<br>P N C | | Area of open space: **3564 sqm**<br><br>No. of trees planted: **1553**<br><br>Capacity of STP: **500 cubic meters per day**<br><br>Capacity of RWH tanks: **291 cu (8 recharge pits)** |  <br><br>Sustainable buildings, cities, and communities |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Chief Engineer** (Building Maintenance) Department | | | | |
| 1. ★ | Clean construction practices in building repair and maintenance works (P) | 5.1. Curb the pollution concentration level by 20-30% by 2030 | No. of clean construction practiced followed: **8** | L<br>Better quality of life, improved health, sustainable buildings and city |
| **Sewerage Operations (SO) Department -** | | | | |
| 1. ★ | Efficiency enhancements in sewerage operations, infrastructure upgrades, replacement of screens and flow control systems, and modernization of ventilation systems at key pumping stations (N) (C) | 6.3. Reducing pollution and restoring aquatic ecosystems | Improved efficiency in sewage carrying and processing capacity | L<br>Avoid water-borne diseases, better health, resource efficiency |
| 2. ★ | Procurement of instruments to strengthen wastewater quality monitoring (N) | 6.3. Reducing pollution and restoring aquatic ecosystems | No. of instruments planned to be installed<br>No. of locations where the instruments will be installed | P/F stage<br>Avoid water-borne diseases, better health, resource efficiency |
| 3. ★ | Work of Augmentation of existing Silt Drying Yard at Dadar (C) | 6.3. Reducing pollution and restoring aquatic ecosystems | *Quantity of silt planned to be processed* | L<br>Better ecosystems |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Sewerage Operations (SO) Department -** | | | | |
| 4. ★ | Refurbishment of sewage treatment plant N C | 6.3. Reducing pollution and restoring aquatic ecosystems | Capacity of STP planned to be refurbished: **10.3 MLD** | M<br>Avoid water-borne diseases, better health, resource efficiency |
| 5. | Rehabilitation of lagoons using bioremediation technology N C | 6.3. Reducing pollution and restoring aquatic ecosystems | No. of lagoons planned to be rehabilitated: **2** | L<br>Avoid water-borne diseases, better health, resource efficiency |
| 6. | Rehabilitation of sewer lines N C | | No. of wards with planned rehabilitation projects: **21**<br>Length of sewer lines proposed to be rehabilitated: **97.4km**<br>*Increase in carrying capacity of the sewer network* | L<br>Avoid water-borne diseases, better health, resource efficiency |
| 7. | Systematic cleaning of sewer lines N C | | *Total length of sewer lines planned to be cleaned* | P/F stage<br>Avoid water-borne diseases, better health, resource efficiency |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Mumbai Sewerage Disposal Project (MSDP)-** | | | | |
| 1. | Design, construction, operation, and maintenance of Wastewater Treatment Facility at various locations (N, C) | 6.3. Reducing pollution and restoring aquatic ecosystems | Volume of wastewater treated: **2,464 MLD**<br><br>No. of locations with planned WwTF: **7** | H<br><br>Better health and ecosystem |
| 2. | Design and implementation of Malad and Versova Influent Pumping Stations (N, C) | 6.3. Reducing pollution and restoring aquatic ecosystems | Capacity of the planned pumping stations: **2120 MLD**<br><br>*Quantity of water treated in the treatment facility* | L<br><br>Better health and ecosystem |
| 3. | Diversion of Dry Weather Flow from Bapat Nalla and Safed Pul Nalla to Dharavi Wastewater Treatment Plant (N, C) | 6.3. Reducing pollution and restoring aquatic ecosystems | Amount of wastewater to be treated: **168 MLD** | M<br><br>Better health and ecosystem |
| 4. | Recycling and reuse of wastewater (N, C) | 6.2. Localized water conservation and efficiency and efficiency | Projected volume of water reused for non-potable use: **1233 MLD** | M<br><br>Resource efficiency, better groundwater and aquifers |
| 5. | Operational and Maintenance of the Sewage Treatment Plant at Veermata Jijabai Bhosale Botanical Udyan and Zoo (N, C) | 6.2. Localized water conservation and efficiency | Volume of treated wastewater reused for irrigation within the premises: **500 KLD** | Complete<br><br>Resource efficiency, better groundwater and aquifers |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Environment and Climate Change Department-** | | | | |
| 1. ★ | Development of Urban Greening/ Urban Forest to reduce urban heat island effect (P N C) | 4.1. Increase vegetation cover and permeable surface | Area planned for greening: approx. **6.97 acres**<br><br>Scientific approach to greening: **Yes**<br><br>No. of native trees planted | H<br><br>Better ecosystems, climate resilience, good health and well-being |
| 2. ★ | Nature Based Solutions project/ Climate Resilient Projects (P N C) | 4.1. Increase vegetation cover and permeable surface | *No. of wards expected to benefit*<br><br>*Area developed through blue-green solutions* | P/F stage<br><br>Better ecosystems, climate resilience, good health and well-being |
| 3. ★ | Provision for installation of Renewable Energy Systems at various municipal properties/ locations (C) | 1.1. Decarbonizing Mumbai's electricity generation mix | *No. of systems planned to be installed*<br><br>*Amount of energy generated through renewable energy systems* | P/F stage<br><br>Sustainable communities and cities |
| 4. ★ | Procurement of Stack Monitoring or other exhaust systems (P) | 5.2. Increase information availability through monitoring | *No. of systems and locations planned* | P/F stage<br><br>Sustainable communities and cities |
| 5. ★ | Various measure for road dust suppression (P) | | *Amount of dust particles expected to be reduced* | P/F stage<br><br>Sustainable communities and cities |

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Environment and Climate Change Department-** | | | | |
| 6. ★ | Battery operated Dust Suction Machines P | 5.1. Curb the pollution concentration level by 20-30% by 2030 | *No. of battery-operated dust suction machines planned:* **100**<br><br>*No. of Machines Planned for Installation in Each Ward:* **4** | M<br><br>Sustainable communities and cities |
| 7. ★ | Carbon Cutter for Diesel Generator for municipal properties C | 5.1. Curb the pollution concentration level by 20-30% by 2030 | *No. of carbon cutter planned to be installed*<br><br>*No. of pollutants expected to be reduced* | P/F stage<br><br>Sustainable communities and cities |
| 8. ★ | Pilot project for Retrofitting/ Conversion to clean fuel of BMC vehicle fleet C | 2.3 100% municipal and private zero emission vehicles by 2050 | *No. of vehicles planned to have improved energy efficiency* | P/F stage<br><br>Good health, productivity, overall well-being |
| 9. ★ | Provision for Hyperlocal Sensor based Network Monitoring System P | 5.2. Increase information availability through monitoring | No. of sensors planned to be deployed across the city: **250** | M<br><br>Climate resilience |
| 10. | Installation of Continuous Ambient Air Quality Monitoring Stations (CAAQMS) P | 5.2. Increase information availability through monitoring | No. of stations planned to be installed- 5<br><br>*No. of wards where stations will be set up* | P/F stage<br><br>Good health, productivity, overall, wellbeing |

## 3.2.2 BEST Undertaking Budget

Table 2 | Direct Actions – Not Quantified

| Sr. No. | Activity | Alignment with MCAP | Indicators for A&R | Data Quality / Co-benefits |
|---|---|---|---|---|
| **Transport Section** | | | | |
| 1. ★ | Subsidized public transport services to commuters (P, C) | 2.1. Improve public transport ridership | Projected Ridership for the Financial Year: **3831922 passengers**<br><br>Estimated Increase in Ridership: **896408 passengers** | Complete<br><br>Universal access, Sustainable communities and city |
| 2. ★ | Establishing public electric vehicle charging stations (C) | 2.3 100% municipal and private zero emission vehicles by 2050 | No. of locations enabling access to zero-emission mobility: **4**<br><br>No. of charging stations: **13** | H<br><br>Sustainable communities and city |

**The detailed description of the climate measures and activities in Table 2 | Direct Actions - Not Quantified can be found in Annexure 2.**

## 3.3. Enabling Actions

Enabling actions encompass measures implemented by various departments at an institutional level to develop climate-forward and focused policies. This entails building capacities, and mainstreaming climate into the existing governance system and facilitating progress towards climate resilience. Additionally, it involves encouraging research and external expertise to drive climate innovation and support adoption of nature-based solutions such as green-blue infrastructure, cleaner fuels (e.g. electric vehicles (EVs), solar panels), sustainable sewerage management, and so on.

### 3.3.1 BMC Budget

Table 3 | Enabling Actions

| Sr. No. | Activity | Alignment with MCAP |
|---|---|---|
| **Environment and Climate Department** | | |
| 1. ★ | Provision for development of an Early Warning & Decision Support System for Air Pollution in Mumbai | 5.2 Increase information availability through monitoring |
| 2. ★ | XV FC- Air pollution hotspots identification and hotspot action plan | 2.3 100% municipal and private zero emission vehicles by 2050 |
| 3. ★ | Aquifer Mapping, Geomorphological Studies, and Identification of Groundwater Percolation Hotspots to enhance Rainwater Harvesting and Groundwater Recharge initiatives | 6.2 Localized water conservation and efficiency |
| 4. ★ | Provision of IT Infrastructure for the strengthening of the Environment & Climate Department (GIS Mapping, MIS, Advanced Software, etc.) | 5.2 Increase information availability through monitoring |
| 5. ★ | Setting up of an Environment & Climate Change Information Center | 5.2 Increase information availability through monitoring |
| 6. ★ | Construction and Demolition (C&D) waste manifest system for debris management plans permissions | 3.1 Reducing landfilled waste |
| 7. | Climate Change Cell | All MCAP Action Tracks |
| **Disaster Management Department** | | |
| 1. ★ | District Disaster Management Fund | 6.6. Disaster risk and impact reduction |

| Sr. No. | Activity | Alignment with MCAP |
|---|---|---|
| **Development Planning (DP) Department** | | |
| 1. | Land acquisition for planning of new reserved open spaces (Recreation Grounds/ Playgrounds- R.G./P.G./ Municipal schools with playgrounds) | 4.3. Equitable access to green open spaces |
| **Sewerage Operations (SO) Department** | | |
| 1. ★ | Geospatial mapping and real-time location tracking to monitor sewers | 6.3. Reducing pollution and restoring aquatic ecosystems |
| 2. | Condition assessment of Gravity Sewer Lines | |
| **Mumbai Sewerage Disposal Project (MSDP)** | | |
| 1. ★ | Feasibility Study for the Conversion of Waste Sludge into Bio-Fertiliser | 6.3. Reducing pollution and restoring aquatic ecosystems |
| 2. | Planning and Project Management Consultant for Mithi river Sewage Treatment Plant (Package 1, 2, 3 & 4) | 6.3. Reducing pollution and restoring aquatic ecosystems |
| 3. | Consultancy services for planning and implementation of solutions to efficient sewerage management | |
| **Roads and Traffic** | | |
| 1. ★ | XV FC- Expert services to enhance performance of Fully Adaptive Traffic Control (FATC) Signals in city | 5.1. Curb the pollution concentration level by 20-30% by 2030 |

## 3.3.2 BEST Undertaking Budget

Table 3 | Enabling Actions

| Sr. No. | Activity | Alignment with MCAP |
|---|---|---|
| **Electric Supply Section** | | |
| 1. ★ | Demand Side Management measures | 1.1. Decarbonizing Mumbai's electricity generation mix |

**The detailed description of the climate measures and activities in Table 3 | Enabling Action can be found in Annexure 2.**

# 4. Budgetary Allocations for Climate Measures in FY 2025-26

**Brihanmumbai Municipal Corporation (BMC):** The BMC has allocated ₹ 43,162.23 crore for capital expenditure in FY 2025-26, of which an estimated ₹ 16,321.33 crore has been allocated for climate-aligned activities, accounting 37.81% of the total capital expenditure budget. An additional ₹ 3,074.08 crore has been allocated towards activities that integrate components aligned with the Mumbai Climate Action Plan (MCAP) such as utilizing LED lights, plantations/landscaping, rooftop solar, and decentralised sewage treatment plants in larger construction projects, accounting for 7.12% of the capital expenditure budget.

Also, ₹ 5.62 crore in revenue expenditure will be spent towards the climate budget, which includes allocation towards public transport trip reimbursements and management of bio-medical waste. The increased amount in this year is attributed to the addition of climate-relevant expenditures from seven new departments, an enhanced budget for the Environment and Climate Change Department, and new activities taken up by 20 original BMC departments. For the original 20 departments, the climate budget allocation has increased from ₹10,224.24 crore in FY 2024-25 to ₹16,014.20 crore this year.

Fig 11 | **Percentage Split of Climate Budget, out of BMC's Municipal Capital Budget FY 2025-26**

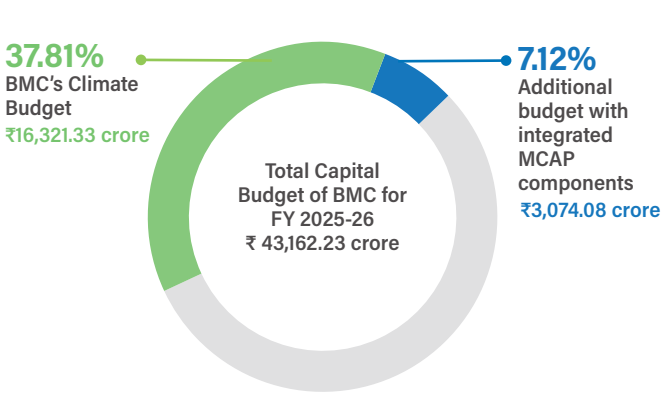



Fig 12 | **BMC Climate Budget Comparison: FY 2024–25 and FY 2025–26**

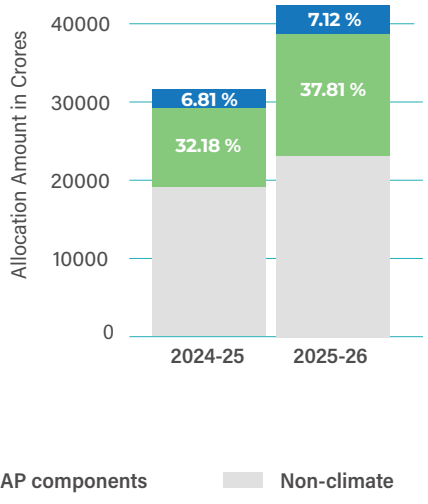
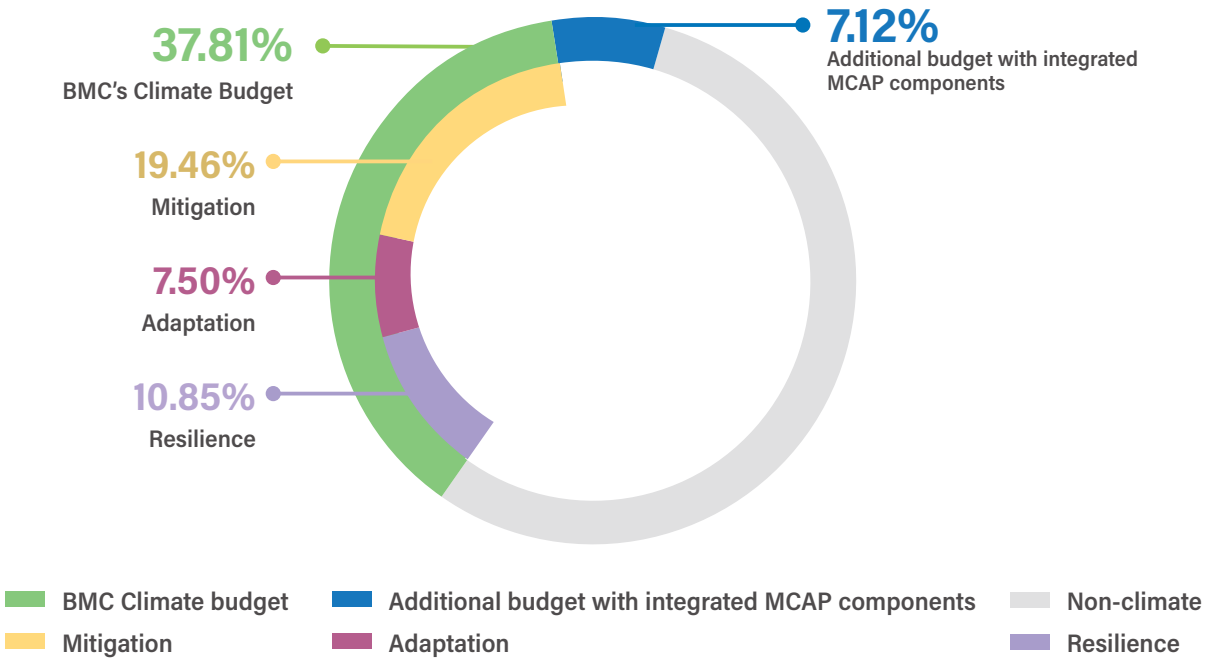


Fig 13 | **Percentage split of BMC's climate budget FY 2025-26 across Mitigation, Adaptation and Resilience**




**BEST Undertaking:** The BEST Undertaking has estimated a total capital works budget of ₹1849.24 crore in its budget, of which 40% i.e. ₹ 744.8 crore is allocated for climate-relevant activities. Additionally, out of the ₹ 7544.39 crore operational expenditure budget, 43.26% i.e. ₹ 3263.35 crores are climate-aligned. Besides this, the Undertaking is providing services worth ₹ 2132.51 crore in a subsidised manner, which is presented in their budget as a deficit.

Fig 14 | **Percentage Split of Climate Budget of BEST Undertaking**

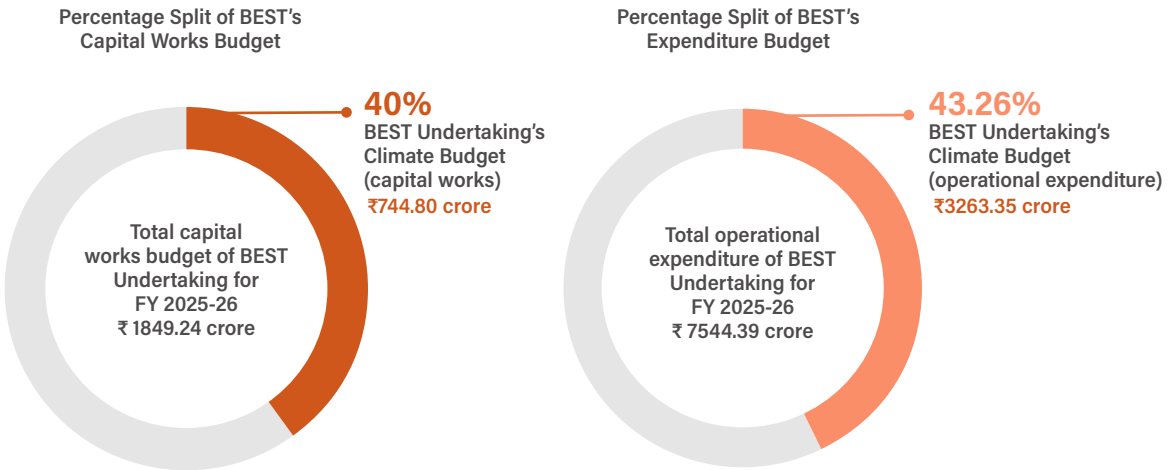


Table | **Mumbai's climate budget figure, including allocations by the BMC and BEST, for the year 2025-26 is ₹ 17067.06 crore in capital expenditures and ₹ 3268.97 crore in revenue expenditures.**

| Sr. No. | MCAP Sector | Sources of fund | CAPEX Budgetary Allocation B.E. (2025-26) (in crores) | % split w.r.t. total climate budget | OPEX Budgetary Allocation | Subsidy |
|---|---|---|---|---|---|---|
| 1. | Energy & Buildings | BMC | 226.94 | 1.33% | - | - |
| | | BEST | - | | 475.46 | - |
| 2. | Integrated Mobility | BMC | 237.48 | 5.76% | 2787.88 | - |
| | | BEST | 744.78 | | - | 2132.51 |
| 3. | Sustainable Waste Management | BMC | 322.49 | 1.89% | | |
| 4. | Urban Greening and Biodiversity | BMC | 383.75 | 2.25% | | |
| 5. | Air Quality Management | BMC | 102.25 | 0.60% | | |
| 6. | Urban Flooding & Water Resource Management | BMC | 15048.43 | 88.18% | | |
| **TOTAL** (BMC & BEST Undertaking) | | | **17066.12** | **100%** | **3268.97** | **2132.51** |

There is significant budgetary allocation across all MCAP sectors this year. While the highest allocation has been towards Urban Flooding and Water Resource Management sector, allocations for the Energy and Buildings, Integrated Mobility, Urban Greening and Biodiversity, and Air Quality Management sectors have also increased notably compared to FY 2024–25. The prominence of the Urban Flooding and Water Resource Management sector reflects its alignment with the BMC's core urban service delivery mandate, which includes water supply, sanitation, sewage and wastewater management and stormwater management. This sector spans six key action tracks: building flood-resilient infrastructure; promoting localised water conservation and efficiency; reducing pollution and restoring aquatic ecosystems; providing safe

and affordable drinking water; ensuring access to clean, safe toilets; and mitigating disaster risks and impacts. In contrast, sectors such as energy transition and grid decarbonisation—while critical to broader climate goals—fall largely outside the jurisdiction of the BMC and therefore have limited actionable scope under the current governance structure. However, the inclusion of the BEST Undertaking has led to a significant increase in allocations to the Energy and Buildings and Integrated Mobility sectors. Similarly, the aspired incremental approach to including other Mumbai agencies would contribute to a more holistic understanding of climate-related allocations across the six sectors.

The BMC is supporting implementation of climate activities across the city through other measures, including: the Standard Operating Procedure (SoP) for energy conservation and reduction in electricity expenses by 10%, 28-points guidelines for air pollution mitigation[6], Universal Footpath Policy[7], Greening Mumbai manual[8], Mumbai Air Pollution Mitigation Plan[9], up to 15% subsidies on general taxes for in-situ waste management and rainwater harvesting[10], rainwater harvesting manual[11], Standard Operating Procedure (SOP) for EV charging stations in multistorey buildings for two/ three/ four wheelers[12] inter alia.

Aarey Forest | Photo by Aaran Patel

# 5. Monitoring, Evaluation and Reporting (MER) for Climate Budget 2024-25

## 5.1 Objectives and integration process

The Environment and Climate Change Department obtained departmental concurrence to pilot the MER system on a quarterly basis this year. An MER template was developed and harmonized with the budget reporting formats already in use by the BMC departments, capturing the contract period, estimated costs, physical progress, financial progress, and key benefits delivered.

The objective of this exercise was to enable departments to assess and report actual expenditures and achievements specific to climate-relevant activities within their budgeted works. Guidance for filling the templates was provided through written communications and quarterly in-person meetings. The templates were refined each quarter based on departmental feedback, including more specific prompts on reporting key benefits.

In this cycle, departments were also asked to provide city-level information to track overall progress on key MCAP indicators. This data will be beneficial for both, the Environment and Climate Change Department and individual departments in prioritizing and planning future climate action projects. It also strengthens the use of the municipal budget as a tool to monitor both, the Climate Budget and the progress on the MCAP implementation.

## 5.2 Summary

### 5.2.1 Progress of Climate Budget FY 2024-25

**Financial Progress**

- Total Climate Budget Estimate for FY 2024–25 (BE): ₹ 10224.24 Crore
- Revised Estimate of Climate Budget FY 2024-25 (RE): ₹ 9132.46 Crore
- Total Expenditure as of March 31, 2025: ₹7877.66 Crore

**Financial Achievement (%):** Revised Estimate of Climate Budget FY 2024-25 (RE)/ Total Expenditure as of March 31, 2025
= **86.26%** of the allocated Climate Budget (RE 2024-25) utilized

### Physical Progress of Climate Budget Fy 2024-25

| Colour | Status | Number of activities | Expenditure details as of 31st March 2025 |
|---|---|---|---|
| | Completed / Nearing Completion / On Track | 318 | ₹ 3899.81 crore |
| | Ongoing with partial completion | 198 | ₹ 3877.57 crore |
| | Tender Invited/ tender Initiated | 93 | ₹ 85.93 crore |
| | Token Provision | 15 | ₹ 14.31 crore |
| | Token cancelled | 4 | ₹ 0.02 crore |

## 5.2.2 Progress of Additional Budget with Integrated MCAP Components

The FY 2024-25 climate budget had also identified an additional 6.81% budget that had been allocated towards allocated to general infrastructure projects—such as new buildings and bridges—that, while not labelled as climate projects, include important climate-friendly features from the Mumbai Climate Action Plan, such as utilizing LED lights, plantations/landscaping, rooftop solar, and sewage treatment plants in new constructions. The progress of those activities are as follows:

**Financial Progress**

- Total 6.81% Additional Capital Budget incorporating the MCAP Components FY 2024–25 (BE): ₹2163.88 Crore
- Revised Estimate of Climate Budget FY 2024-25 (RE): ₹3586.61 Crore
- Total Expenditure as of March 31, 2025: ₹2868.03 Crore

**Financial Achievement (%):** Revised Estimate of Climate Budget FY 2024-25 (RE)/ Total Expenditure as of March 31, 2025
= **79.96%** of the additional budget (RE 2024-25) utilized

### Physical Progress of additional budget with integrated MCAP components

| Colour | Status | Number of activities | Expenditure details as of 31st March 2025 |
|---|---|---|---|
| | Completed / Nearing Completion / On Track | 20 | ₹ 1.89 crore |
| | Ongoing with partial completion | 33 | ₹ 2829.38 crore |
| | Tender Invited/ tender Initiated | 11 | ₹ 32.79 crore |
| | Token Provision | 2 | ₹ 0 crore |
| | Token cancelled | 8 | ₹ 3.95 crore |

## 5.2.3 MCAP Outputs achieved from FY 2024-25 Budget Expenditure [ix]

| Financial Progress | MCAP Action Track | Monitoring Indicators | Key Outputs<br>City wide status |
|---|---|---|---|
| Potential Annual Greenhouse Gas Emissions Saving | | | **FY 2024-25:** 3.426 million $tCO_2e$ |
| **Energy and Buildings** | | | |
| **BE 2024-25-** INR 32.47 crore<br><br>**RE 2024-25-** INR 50.44 crore<br><br>**Expenditure as of March 31, 2025-** INR 47.75 crore | 1.1 Decarbonizing Mumbai's electricity generation mix | Units of renewable energy in electricity mix (BEST Undertaking) | - |
| | | | - Renewable energy- 8.59 lakh MWh<br>- Non- renewable energy- 31.43 lakh MWh |
| | | No. of MW renewable energy capacity installed in municipal buildings | **FY 2022-23 & 2023-24:**<br>- 0.055 MW (4 schools, 1 municipal building)<br><br>**FY 2024-25:**<br>- 0.453 MW (4 municipal buildings, 5 schools, 3 gardens) |
| | | | - |
| | | Buildings with Solar PV installed (BEST Undertaking) | - |
| | | | 592 electricity consumers; (10268.94 MWh) |
| | 1.2 Transition to clean fuels and resource efficiency in buildings | Number of environmentally friendly cooling systems installed in municipal buildings | **FY 2024-25:**<br>- 55 AC units having 134-a refrigerant |
| | | | - |
| | | Annual energy savings from replacing conventional bulbs with LEDs in municipal buildings | **FY 2024-25:**<br>- 450.44 MWh (2 markets) |
| | | | - |

| Financial Progress | MCAP Action Track | Monitoring Indicators | Key Outputs<br>City wide status |
|---|---|---|---|
| **Sustainable Mobility** | | | |
| **BE 2024-25 -** INR 8.4 crore<br><br>**RE 2024-25 -** INR 16.5 crore<br><br>**Expenditure as of March 31, 2025 -** INR 10.04 crore | 2.1 Improve Public Transport Ridership | Average Annual Bus Service Ridership | - |
| | | | 2808570 riders |
| | | Average Monthly Public Transport trips by Persons of Disability | **FY 2024-25:**<br>- 4.87 lakh |
| | | | 4.67 Lakh tickets reimbursed on average per month |
| | 2.2 Access to non-motorized transport (NMT) and infrastructure | Length in Kilometres of Walking and Cycling Infrastructure (km) | **FY 2022-23 & 2023-24:**<br>- 40.67 km Footpaths improved<br>- 18 km along trunk mains newly built<br><br>**FY 2024-25:**<br>- 1.66 km FOB/Skywalks reconstructed/repaired |
| | | | - |
| | 2.3 100% municipal and private zero emission vehicles by 2050 | % of EV Buses of All Buses | - |
| | | | 900 / 2683 fleet (33.54%) |
| | | % of EVs in Municipal Vehicles | **FY 2022-23 & 2023-24:**<br>- 32 EV cars procured<br><br>**FY 2024-25:**<br>- 9 EV cars procured |
| | | | 18% of Municipal Personal Carriers (cars) are EVs |
| | | No. of EV Charging Stations in the City | **FY 2024-25:**<br>- 17 Charging Stations for municipal use |
| | | | - 25 charging stations for municipal use;<br>- BEST Undertaking: 51 charging stations operational for Public Use;<br>- 483 total public charging stations in city |

[ix] *This reflects only the work of BMC and BEST Undertaking, based on available data, and does not represent the full scope of city-wide MCAP implementation. For BEST Undertaking, only citywide status is reported.*

| Financial Progress | MCAP Action Track | Monitoring Indicators | Key Outputs<br>City wide status |
|---|---|---|---|
| **Sustainable Waste Management** | | | |
| BE 2024-25- INR 32.47 crore<br><br>RE 2024-25- INR 50.44 crore<br><br>Expenditure as of March 31, 2025- INR 47.75 crore | 3.1 Reducing landfilled waste | Enhancement in waste processing capacity | **FY 2024-25:**<br>- Construction and Demolition Waste- 1200 TPD (2 plants)<br>- Domestic Hazardous Waste- 24 TPD (8 units)<br>- Decentralised bio-menthanation plant- 2 TPD |
| | | | - Estimated waste generation- 6640 TPD (4820 wet waste, 1820 dry waste)<br>- Waste collected- 6638 TPD<br>- TPD Installed Processing Capacity<br>• Bioreactor landfill- 6000 TPD<br>• Dry waste- 688.2 TPD (1 MRF+ 47 dry waste centres)<br>• Wet waste- 570 TPD (1 composting plant, 1 vermicomposting plant and 3 OWCs)<br>- Refuse Derived Fuel- 1000 TPD<br>- Operational capacity:<br>• Bio-reactor landfill- 5298.71 TPD<br>• Dry waste - 688.2 TPD<br>• Wet waste- 537.5 TPD<br>• RDF- 544.8 TPD<br>• Waste going to landfill- 850 TPD (12.8% of collected waste) |
| | 3.2 Decentralized waste management - Recycle/ Compost at the | Manure generation from composting/ % of organic waste composted | **FY 2023-24:**<br>- 2433.28 MT from organic waste convertor at markets<br>- Rebate of Rs.67500/- per month to BMC |

| Financial Progress | MCAP Action Track | Monitoring Indicators | Key Outputs |
|---|---|---|---|
| | | | City wide status |
| BE 2024-25- INR 32.47 crore<br><br>RE 2024-25- INR 50.44 crore<br><br>Expenditure as of March 31, 2025- INR 47.75 crore<br><br> | | | - 11.15% organic waste composted<br>- Total compost generated from MRF and bio-degradably stabilised MSW from March-2018 till date 31-03-2025 (MT)- 123361.24 |
| | | Informal workers included in SWM process | - |
| | | | Informal waste workers included in dry waste processing centres- 840 |
| | | % of recovery through Decentralized waste management (segregation, recycling and composting) | - |
| | | | - Installed capacity:<br>• Dry waste centres- 47<br>• Daily waste intake capacity- 188.2<br>• TPD Area- 78662 sq.m.<br>• Weighing- 40<br>• Shredding-8<br>• Baling- 11<br>- Wet waste:<br>• Vermicomposting- Cooper Hospital- 1 TPD<br>• Biomethanation- 2 units- 4 TPD |
| | 3.3 Remediation and scientific management of landfills | % of Remediation of all existing dumpsites and scientific disposal of waste | FY 2024-25:<br>- Mulund dumpsite remediation- 43.49 lakh MT |
| | | | - |

| Financial Progress | MCAP Action Track | Monitoring Indicators | Key Outputs<br>City wide status |
|---|---|---|---|
| | | Landfill gas captured at Kanjurmarg Bioreactor Landfill Facility<br><br>(landfill with final cover and active gas collection) | -<br><br>- Daily Average of Landfill Gas Collected: 14981.58 $M^3$<br>- Daily Average of Landfill Gas Flared: 8017.97 $M^3$<br>- Daily Average of Electricity Generated: 13305.87 Units<br>- 95% gas collection efficiency (GHG inventory 2022-23) |
| **Urban Greening and Biodiversity** | | | |
| **BE 2024-25 -** INR 177.8 crore<br><br>**RE 2024-25-** INR 247.18 crore<br><br>**Expenditure as of March 31, 2025 -** INR 120.21 crore | 4.1. Increase vegetation cover and permeable surface<br><br>4.2. Reduce urban heat island effect | Central Medians/ Traffic Islands Vegetated and Beautified | **FY 2024-25:**<br>- Central Median/Traffic Island Beautification in 13 Wards<br><br>- 515 central medians/traffic islands across the city<br>- Area- 252645 sqm (25.2 ha) |
| | | Urban Forest Area Developed | **FY 2024-25:**<br>- 3.2 acres of Urban Forest in Marol – planting 700 indigenous trees and 199 species of flora<br><br>- |
| | 4.3. Equitable access to green open spaces | R.G., P.G, and Garden Plots beautified/ upgraded in Mumbai City and Suburbs | **FY 2024-25:**<br>- 291273.14 sq.m. (32 plots)<br><br>- Total no. of plots: 1790<br>- Area: 6255235 sq.m. (625 ha) |
| | | Area acquired for Public Open Spaces | **FY 2024-25:**<br>- 8604.56 sq.m. |

| Financial Progress | MCAP Action Track | Monitoring Indicators | Key Outputs<br>City wide status |
|---|---|---|---|
| **BE 2024-25 -** INR 177.8 crore<br><br>**RE 2024-25-** INR 247.18 crore<br><br>**Expenditure as of March 31, 2025 -** INR 120.21 crore<br><br>  | | | - Total Open Space: 659262.53 sq.m.<br>- Total of Open Space + other infrastructure: 30030.95 sq.m. |
| | | Per Capita Open Space | - |
| | | | - 6.13 sq.m. Open Space/Per Capita - planned in RDDP 2034<br>- Existing Scenario - 2.37 sq.m. Open Space/Per Capita |
| | | % Residents within a 5-min walk to a park | - |
| | | | - Spatial assessment- RDDP 2034 Map 24- pg. 41810 |
| **Air Quality** | | | |
| **BE 2024-25-** INR 35.3 crore<br><br>**RE 2024-25 -** INR 32.49 crore<br><br>**Expenditure as of March 31, 2025 -** INR 0.84 crore<br><br>  | 5.1 Curb the pollution concentration level by20-30% by 2030 | Number of eco-friendly incinerators | **FY 2023-24 & 2024-25:**<br>- 9 Piped Natural Gas (PNG) incinerators with Air Pollution Control Systems (APCS) (including 1 animal incinerator) |
| | | | - PNG pyres with APCS- 31<br>- Electrical pyres with APCS- 8<br>- Wood pyres- 207<br>- Wood pyres with Air Pollution Control (APC) systems- 204 |
| | | Air Pollution Control Systems at crematoriums | **FY 2024-25:**<br>- 6 installed + 3 retrofitted |
| | | | - |
| | | Number of mechanical power sweeping machines purchased | FY 2022-23:<br>- 7 e-sweepers |
| | | | 9% tools for mechanised sweeping |

| Financial Progress | MCAP Action Track | Monitoring Indicators | Key Outputs<br>City wide status |
|---|---|---|---|
| **BE 2024-25-** INR 35.3 crore<br><br>**RE 2024-25 -** INR 32.49 crore<br><br>**Expenditure as of March 31, 2025 -** INR 0.84 crore | 5.2 Increase information availability through monitoring | No. of monitoring stations installed per year | **FY 2022-23:**<br>- 5 Continuous Ambient Air Quality Monitoring Stations (CAAQMS) |
| | | | - 5 CAAQMS stations (BMC)<br>- 14 CAAQMS stations (MPCB)<br>- 9 CAAQMS stations (IITM)<br>- Total 28 |
| | | Population covered by monitoring and modelling systems | **FY 2022-23:**<br>- 30.2 lakh (ward populations where located) |
| | | | - Current system of 28 CAAQMS meets CPCB minimum criteria for ambient air quality monitoring (16 CAAQMS for population ≥ 50 lakh); [x]<br>- BMC aims to expand to 42 CAAQMS considering city population. |
| | | Annual average for daily PM2.5, PM10, NO2, SO2, O3 (ozone) concentration in µg/$m^3$ | - **FY 2024-25:**<br>- PM10- 83 µg /$m^3$<br>- PM2.5- 39 µg /$m^3$<br>- O3 – 40 µg /$m^3$<br>- CO – 0.7 µg /$m^3$<br>- NO2- 30 µg /$m^3$ |
| | | | - |
| **Urban Flooding & Water Resource Management** | | | |
| **BE 2024-25-** INR 9707.97 crore<br>**RE 2024-25 -** ₹ 8502.9 crore | 6.1 Build flood resilient systems and infrastructure | Flood resilient infrastructural units in the city | - 112 completed budget activities for storm water management:<br>- 23 training and widening projects<br>- 6 retaining walls |

[x] *https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=1810655#:~:text=Mumbai%2C%2028%20March%202022,16*

| Financial Progress | MCAP Action Track | Monitoring Indicators | Key Outputs |
|---|---|---|---|
| | | | City wide status |
| Expenditure as of March 31, 2025 - ₹ 7438.85  | | | - 34 reconstruction projects<br>- 17 new construction projects<br>- 12 box drains<br>- 12 augmentation projects<br>- 3 balance stretches, 1 storage tank, 1 diversion and loop<br>(Distinction between works completed by FYs not done at this time) |
| | | | - Storm water drainage network:<br>- Major nallahs (> 1.5 m dia.): 281.01 km<br>- Minor nallahs (< 1.5 m dia.): 1039.06 km<br>- Mithi River nallahs: 19.1 km<br>- Drains (arch/box; roadside open; closed pipes or dhapa): 3290.56 km<br>- 6 major pumping stations; 10 mini pumping stations<br>- Current planned works:<br>- Projects under BRIMSTOWAD-II undertaken to support the management of rainfall, of 50 mm/ hour intensity and a run-off coefficient of 1. (26/38 planned works completed) |
| | | Flooding spots tackled | **FY 2024-25:**<br>- 25 |
| | | | - Total flooding spots – 498<br>- Flooding spots tackled till date- 393 |
| | 6.2 Localized water conservation and efficiency | Volume of rainwater harvesting structures created at municipal properties (water retention capacity created) | **FY 2024-25:**<br>- 8595 cu.m. |
| | | | - |

| Financial Progress | MCAP Action Track | Monitoring Indicators | Key Outputs |
|---|---|---|---|
| | | | City wide status |
| **BE 2024-25-** INR 9707.97 crore<br><br>**RE 2024-25** - ₹ 8502.9 crore<br><br>Expenditure as of March 31, 2025 - ₹ 7438.85 | | Volume of water reused/ recycled through decentralised treatment | **FY 2023-24:**<br>- 40 MLD (reused at Panjrapur Water Treatment Plant) |
| | | | 55.3 MLD |
| | 6.3 Reducing pollution and restoring aquatic ecosystems | Pollution control and revitalisation of Powai Lake | **FY 2023-24:**<br>- Sewage ingress prevention:<br>- 16 gates at outfall points replaced<br>- 2 barge-monitored aspirator aerators<br>- Outfalls meeting discharge standard<br><br>**FY 2024-25:**<br>- 7 floating aerator fountains installed<br>- 6 Dissolved Oxygen monitoring stations being operated |
| | | | - |
| | | Installed wastewater treatment capacity | **FY 2022-23 & 2023-24:**<br>- 2 STPs- 9 MLD |
| | | | 9 STPs- 2740.5 MLD |
| | | Enhancement in level of wasterwater treatment | **FY 2022-23 & 2023-24:**<br>37 MLD (Colaba STP)<br><br>**FY 2024-25:**<br>- Rehabilitation with Bioremediation technology of lagoons at Versova, Ghatkopar, Bhandup and Malad, until all planned WWTF enhancements completed.<br>- Outfalls of aerated lagoons meeting discharge standards |

| Financial Progress | MCAP Action Track | Monitoring Indicators | Key Outputs<br>City wide status |
|---|---|---|---|
| **BE 2024-25-** INR 9707.97 crore<br><br>**RE 2024-25** - ₹ 8502.9 crore<br><br>Expenditure as of March 31, 2025 - ₹ 7438.85 | | | Planned enhancements with commissioning dates in WWTFs:<br>Versova- 180 MLD- 04/07/2026<br>Ghatkopar- 337 MLD- 04/07/2026<br>Bhandup- 215 MLD- 22/08/2026<br>Worli- 500 MLD- 04/07/2027<br>Bandra- 360 MLD- 04/07/2027<br>Dharavi- 418 MLD- 04/07/2027<br>Versova- 180 MLD- 04/07/2026<br>Ghatkopar- 337 MLD- 04/07/2026<br>Bhandup- 215 MLD- 04/07/2026<br>Worli- 500 MLD- 04/07/2027<br>Bandra- 360 MLD- 04/07/2027<br>Dharavi- 418 MLD - 04/07/2027<br>Malad- 454 MLD- 04/07/2028 |
| | | Volume of centrally Treated water | **FY 2022-23 & 2023-24:**<br>- 36 MLD |
| | | | - 9 STPs- 1384.61 MLD |
| | | Improvements in sewage network | **FY 2024-25:**<br>- Man entry sewer lines (diameter > 900 mm)- 3.5 km rehabilitated<br>- Non- man entry sewer lines (diameters < 900 m)<br>- 42 budget activities pertaining to laying sewer lines completed (over 70 distinct project works)<br>- 23.8 km sewer lines laid (available for 19 budget activities) |
| | | | **City wide status:**<br>- 96.28 km (man entry- 45.79 km) sewer lines rehabilitated till date<br>- Man entry sewer lines length - 181 km<br>- Non- man entry sewer lines length- 1899 km<br>- Total sewer network in Mumbai- 2080 km |

| Financial Progress | MCAP Action Track | Monitoring Indicators | Key Outputs<br>City wide status |
|---|---|---|---|
| **BE 2024-25-** INR 9707.97 crore<br><br>**RE 2024-25** - ₹ 8502.9 crore<br><br>Expenditure as of March 31, 2025 - ₹ 7438.85 | | Number of suction machines purchased for sewer cleaning | **FY 2024-25:** 5<br><br>84 |
| | 6.4 Safe and affordable drinking water | Primary network improvements | **FY 2022-23 & 2023-24:**<br>- 2 projects completed<br>- Length constructed- 3150 m<br>- Carrying capacity- 9.89 ML (available for 1 project)<br><br>**FY 2024-25:**<br>- 1 project completed<br><br>- Primary network (water source to treatment plant)- 500 km<br>- Secondary network (treatment plant to service reservoir)- 1000 km<br>- Tertiary network (from service reservoir to service connections)- 6000 km |
| | | Water Treatment | **FY 2024-25:**<br>- Works completed to strengthen primary network, upgrade chlorine motive water lines, and water reclamation—enhancing treatment efficiency at:<br>• Bhandup WTP: Rated Capacity 2,810 MLD (1,910 MLD + 900 MLD)<br>• Panjarapur WTP: Rated Capacity 1,365 MLD<br><br>4 Water Treatment Plants- 4283 MLD |

| Financial Progress | MCAP Action Track | Monitoring Indicators | Key Outputs<br>City wide status |
|---|---|---|---|
| **BE 2024-25-** INR 9707.97 crore<br><br>**RE 2024-25** - ₹ 8502.9 crore<br><br>Expenditure as of March 31, 2025 - ₹ 7438.85 | 6.4 Safe and affordable drinking water | Water storage and distribution (tertiary network) | **FY 2024-25**:<br>- 36 unique project works related to distribution completed<br>- 3 Kg/Hr Electro Chlorination Plant at Pali Hill Reservoir<br>- Supply improvement in wards- A, B, C, D, E, H/E, H/W, K/E, R/S, R/C, RN, K/W, P/S, P/N, L, M/E & M/W wards |
| | | | - Water demand- 4664 MLD<br>- Water supply- 4000 MLD<br>- Connection Holders- 4,08,492 66.6% slum connections |
| | 6.5 Clean, safe and accessible toilets | Number of new toilets developed | **FY 2024-25:**<br>- 50 community toilet blocks (~1000 seats) |
| | | | - 830 toilets (19000 toilet seats) serving 5.7 lakh population completed) (Slum Sanitation Programme- Lot 10 and 11)<br>- Total Community toilets in Mumbai- 8173 |
| | | Number of sanitary pad vending and incineration machines installed in community toilets and schools | **FY 2024-25:**<br>- 558 |
| | | | - 10% planned coverage in community toilets<br>- 80% coverage in schools |
| | 6.6 Disaster risk and impact reductions | Coverage of viewing centres | **FY 2022-23 & 2023-24:**<br>- All 24 wards |
| | | | - |
| | City Resilience | Dispensary Cooling Rooms for heat relief | - |
| | | | 90 |

## 5.3 Analysis of 2024–25 Climate Budget against Mumbai's CRVA

Mumbai's Climate & Air Pollution Risks and Vulnerability Assessment, March 2022 assessed differential vulnerabilities across wards to various climate risks. As a first step to raise institutional awareness on these ward-level differences, this section maps completed budgetary interventions—aligned with relevant MCAP action tracks—to wards identified as vulnerable to specific risks.

Focusing on wards most vulnerable to heat risk, flood risk, limited green cover, and poor Water, Sanitation, and Hygiene (WASH) access, the tables below pair spatial exposure data (e.g., affected population, green cover percentage) with corresponding completed interventions. For the M/E Ward—deemed most vulnerable as all these risks are present—completed budgetary actions addressing each of the risks are presented.

### Heat Risk

| Exposure indicator in CRVA | Applicable Action Tracks |
|---|---|
| Population affected by heat* | 1.4. Passive design strategies to improve resilience in buildings |
| Percentage ward population affected by heat | 4.1. Increase vegetation cover and permeable surface |
| | 4.2. Reduce urban heat island effect |
| | 4.3. Equitable access to green open spaces |
| | 4.4. Restore and enhance biodiversity in the city |
| | 5.3. Community health resilience through decentralized planning and awareness |

### Access to Green Cover

| Exposure indicator in CRVA | Applicable Action Tracks |
|---|---|
| Percentage Area - Green Cover | 4.1. Increase Vegetation Cover and Permeable Surfaces |
| Access to Public Open Space: Serviced Population on Regular Days | 4.2. Reduce Urban Heat Island Effect |
| Access to Public Open Space- Serviced Population during a Flood Event | 4.3. Equitable Access to Green Open Spaces |
| | 4.4. Restore and Enhance Biodiversity in the City |
| | 4.4. Restore and enhance biodiversity in the city |

| Ward | Key Budget Activities Completed |
|---|---|
| **G/N (Zone II, City)**<br><br>Population affected by heat- 2,23,563<br>Percentage ward population affected by heat- 37.45% | • 4 gardens of 14381 sq.m. area upgraded (Dhote Udyan, V.B. Udyan, SN Maidan Dharavi, R.N.S. Udyan)<br>• Playground upgradation, vegetation of traffic islands, medians<br>• 11 dispensary cooling rooms (Kasarwadi, Anna Nagar, Dhobi Ghat, Soneri Maidan, Kallakilla, etc.) |
| **K/E (Zone III, Western suburbs)**<br><br>Mean surface temperature (degrees Celsius)- 32.64<br><br>Percentage area - green cover- 1.25% | • Urban Forest in Marol (3.2 acres, 700 indigenous trees)<br>• 4 plots acquired for Public Open Spaces of area 1830 sq.m.<br>• Playground upgradation, vegetation of traffic islands and medians<br>• 10 dispensary cooling rooms (Great Indira Nagar, Gundavali, Kajuwadi, Kokan Nagar, Malpa Dongri, etc.) |
| **S (Zone VI, Eastern suburbs)**<br><br>Ward population affected by heat – 1,37,116 | • 4 gardens of 17790 sq.m. area upgraded (Lt. Gen. JSA Kridagan, Chh. Shahu Maharaj Udyan, HRM Maidan, Bal Gandharv Udyan)<br>• 3 plots acquired for public open spaces<br>• 3 dispensary cooling rooms (Paspoli, Ram Nagar, Surya Nagar)<br>• Playground upgradation, vegetation of traffic islands and medians |
| **H/E (Zone III, Western Suburbs)**<br><br>Percentage Area – Green Cover: 0.2%<br><br>Population serviced by open spaces on Regular Days: 55.5%<br><br>Population serviced by open spaces in a Flood Event: 16.9% | • Development of a Garden of area 2975 sq.m. at Kolekalyan Village, Santacruz (E)<br>• Upgradation and Development of RG/PG plots<br>• Vegetation of Traffic Islands and Medians |

## Flood Risk

| Vulnerable Ward | Applicable Action Tracks |
|---|---|
| Population living within 250m radius of a Flooding Hotspot | 6.1. Build Flood Resilient Systems and Infrastructure |
| Percentage of Population living within 250m radius of a Flooding Hotspot | |
| No. of Flooding Hotspot | |
| No. of locations prone to Landslide Risk | 6.6. Disaster Risk and Impact Reduction |
| No. of Landslide locations overlapping with Informal Settlements | |

| Ward | Key Budget Activities Implemented |
|---|---|
| **L (Zone V, Eastern Suburbs)**<br><br>Population within 250m radius of a Flooding Hotspot: 312960 | • Reconstruction of 5 nallas: Duncan Causeway Nalla (length: 700 m; width: 2.5 m), Vinoba Bhave Nagar Nalla (length: 540 m; width: 7.5 m), Premier Main Nalla-II (length: 450 m; width: 4.5 m), Lal Matti Nalla (length: 185 m; width: 4.5 m), Oasis Nalla (length: 245 m; width: 7 m)<br>• Realignment of Nehru Nagar Nalla from Agri Samaj to B. Bhavan Ry.<br>• Upgradation of Storm Water Drains and Culverts at various locations<br>• Rainwater Harvesting Pit of capacity 27 cu.m. constructed in Asalpha Municipal School. |
| **H/E (Zone III, Western Suburbs)**<br><br>Population within 250m radius of a Flooding Hotspot: 329774 | • Augmentation of I. N. Nalla (length: 270 m; width: 1.5 m), at N. D. Marg, Bandra (E)<br>• Augmentation of Roadside Drains and Culverts at 12 locations: Aram Society Rd., G. N. Rd., Santacruz Bus Depot, Nehru Rd. And WEH Jct., Kalina-Kurla Rd., WEH near Airport Cargo Gate, N. D. Marg, Chetna Clg. Rd., S. M. H. Marg, V. N. Marg, H. G. Marg, J. L. S. Marg<br>• Training and Construction of Vakola River on the upstream side from Agripada Slum to Airport Outfall |
| **F/N (Zone II, City)**<br><br>Population within 250m radius of a Flooding Hotspot: 355776<br><br>No. of locations prone to Landslide Risk: 4 | • Construction of 3 Nallas: Wadala Truck Terminal Nalla, Shastri Nagar Nalla, Nalla passing through transit camp near GTB Monorail Stn.<br>• Remedial Measures to abate/minimize waterlogging at Wadala Fire Station |

## Access to Water, Sanitation and Hygiene (WASH)

| Exposure Indicators in CRVA | Applicable Action Tracks |
|---|---|
| Percentage of Households having Treated Tap Water as source of Drinking Water | 6.4. Safe and Affordable Drinking Water |
| Percentage of Households having a Latrine within their premises | 6.5. Clean, Safe and Accessible Toilets |

| Ward | Key Budget Activities Implemented |
|---|---|
| **H/W (Zone III, Western Suburbs)**<br><br>Percentage of Households having Treated Tap Water as source of Drinking Water: 94.2%<br><br>Percentage of Households having a Latrine within their premises: 48.2% | • 4 budget works pertaining to Water Distribution:<br><br>• Providing and laying of 80mm, 100mm, 150mm, 250mm and 300mm dia. Water Mains and Cross Connections of various sizes and Micro-Planning Works<br><br>• SITC of 3 kg/hr Electro Chlorination Plant at Pali Hill Reservoir<br><br>• Sanitary Pad Vending Machines installed in 6 Community Toilets<br><br>• Total No. of Community Toilets in the ward: 235 – consisting of 1936 seats and benefitting 1,88,732 slum dwellers |
| **M/W (Zone V, Eastern Suburbs)**<br><br>Percentage of Households having Treated Tap Water as source of Drinking Water: 93.2%<br><br>Percentage of Households having a Latrine within their premises: 44.3% | • Providing, Laying and Replacing of various dia of water mains and other allied works for improvement of water supply at various location in Eastern Suburbs (6 completed budget works)<br><br>• Total No. of Community Toilets in the ward: 265 – consisting of 4412 seats and benefitting 12,900 slum dwellers (slum population data available for 11 toilets) |
| **P/N (Zone IV, Western Suburbs)**<br><br>Percentage of Households having Treated Tap Water as source of Drinking Water: 91.3%<br><br>Percentage of Households having a Latrine within their premises: 49.5% | • Providing, Laying and Replacing of various dia of water mains and other allied works for improvement of water supply at various places in K/W, P/S & P/N wards in Zone-IV and in western suburbs (6 completed budget works)<br><br>• Total No. of Community Toilets in the ward: 930 – consisting of 10,704 seats and benefitting 4,92,740 slum dwellers |

## Actions undertaken in the most vulnerable ward: M/E Ward (Zone V, Eastern Suburbs)

**Risks Identified:** Heat Risk, Access to Green Cover, Flood Risk, Access to WASH

| Exposure Indicators | Key Budget Activities Implemented |
|---|---|
| Population affected by Heat: 328295<br><br>Percentage ward population affected by heat: 40.08%<br><br>Population within 250m radius of a Flooding Hotspot: 275491<br><br>No. of locations prone to Landslide Risk: 10<br><br>No. of Landslide locations overlapping with Informal Settlements: 6 | • 9 dispensary cooling rooms at Anik Nagar, Baiganwadi, Bhimwadi, K. R. Nagar, Vishnu Nagar, Bharat Nagar, Rafi Nagar, N. P. Marg, Cheetah Camp<br><br>• Upgradation and Development of RG/PG plots<br><br>• Vegetation of Traffic Islands and Medians<br><br>• Reconstruction and Augmentation of 5 Nallas: Ram Nagar Nalla, Gyan Sadhna School nalla upto Deonar Dumping Ground, A. H. Marg culvert to Subhashnagar Nalla, Deonar Main Nalla, Prayag Nagar Nalla<br><br>• Reconstruction and Upgradation of SWD Networks at 2 key locations: Deonar Abattoir Periphery Rd., M. T. Kadam Marg, and various other places within the catchment area<br><br>• Lumpsum Provision for building a Rainwater Harvesting Pit of capacity 27 cu.m. at Shivaji Nagar Municipal School |
| Percentage of Households having Treated Tap Water as source of Drinking Water: 82.8% | • Providing, Laying and Replacing of various dia of water mains & other allied works for improvement of water supply at various places (5 completed budget works)<br><br>• Various measures to tend to leakages and contamination in the Water Supply Network |
| Percentage of Households having a Latrine within their premises: 35.8% | • Total 499 community toilets, 10,586 toilet seats serving 2,18,320 slum dwellers (available for 89 toilets) |

## 5.4 Completed Works through Other Sources of Funds

**XV Finance Commission Grants (2020–2026)**
Recognizing the importance of climate change and air quality, the X Finance Commission has instituted the Air Fund and Water Fund to support city-level action. Mumbai is utilizing these funds—channelled via BMC's Environment and Climate Change Department—for partial and full implementation of key measures.

**XV FC Air Fund**
Total Allocation (2020–26): **₹1240.25 Cr**
Funds Received (till FY22–23): **₹620.11 Cr**

**Key completed initiatives, among others:**

- Procurement of 466 electric buses (of 2,100) and 50 electric double-decker buses (of 200) through BEST Undertaking
- Installation of PNG-based crematoriums at 8 locations including Shivaji Park, Jogeshwari, Sion, and others, with 2 additional sites ongoing
- Deployment of Outdoor Dust Mitigation Units (ODMUs) and Dust Monitoring Systems at 5 locations by the SWM department
- Solar power installations of 80 kW capacity at ward-level offices and for street lighting
- Installation of 5 Continuous Ambient Air Quality Monitoring Stations (CAAQMS) across the city

**XV FC Water Fund**
Total Allocation: **₹2141.58 Cr**
Funds Received (till date): **₹980.44 Cr**
**Key initiatives:**

- Rainwater harvesting systems installed at various MCGM facilities – gardens, hospitals, schools, and ward offices
- Rejuvenation of urban water bodies, including Sion Lake, Sheetal Lake, and Dingeshwar Lake
- Construction of 25 Suvidha Kendras – Smart Sanitation Facilitation Centres across the city
- 180 MLD Versova Wastewater Treatment Facility with 50 % Recycling & Reuse Facility
- Improvements to the sewerage system in key areas

Several ongoing projects under both funds are detailed in Chapter 3. Future disbursements for FYs 2023–24, 2024–25, and 2025–26 are performance-based.

**Corporate Social Responsibility (CSR) Funding (Annual):**

A sizeable amount of CSR funding has also been channelled to support several climate-aligned activities in Mumbai. The CSR cell anchored at the Planning Department, the BMC facilitated projects worth approximately INR 15.4 crore in FY 2024-25.

Some major activities completed are as follows:

- Installation of 72 kW solar panels (3 solar trees + 6 solar gazebos) in 3 municipal gardens: Shilpagram (Jogeshwari), Dr. APJ Abdul Kalam Garden (Malad), and CD Deshmukh Garden (Mulund)
- 90-kW solar tree installation at Nair Hospital
- Distribution of 4.7 lakh compostable sanitary napkins to BMC schoolgirls (Classes 7–10)

**District Planning Development Committees (DPDC) Grants (2024-25):**

The DPDCs in Mumbai, as part of Maharashtra's decentralized planning framework, allocate funds for various developmental activities across the domains of infrastructure, education, healthcare, and environment. A flagship initiative includes the development of a 3.2-acre urban forest in Marol, implemented by the Planning Department, the BMC and facilitated by WRI India:

- 700 indigenous trees across 199 native species planted
- Rainwater harvesting and nature-based wastewater treatment system installed
- Estimated investment: ₹8 Cr

These actions contribute to Mumbai's broader Climate Action Plan goals, and the output from completed works reflect in the city's MER assessment.

Butterfly garden at Marol Urban Forest | Photo by Sayali Lokare, WRI India

# 6. Way Forward

Mumbai has ambitious climate targets and goals, and climate budgeting is a critical tool to help the city achieve the goals outlined in the Mumbai Climate Action Plan (MCAP) in a structured and systematic manner. Now in its second year, BMC's climate budgeting process has evolved, incorporating lessons from the FY 2024-25 cycle. This year, the process involved more in-depth engagements with participating BMC departments. These discussions offered opportunities to align departmental work with climate priorities, explore integration within ongoing projects, and enable cross-departmental collaboration—enhancing, mainstreaming and increasing opportunities to advance climate action. Adaptation, resilience, and equity considerations have been integrated this year through multiple dimensions—processes (inclusion of departments addressing these priorities), reporting (with a focus on population and area-level impacts), and assessments (including adaptation, resilience and equity indicators, co-benefits, and Climate Risk and Vulnerability Assessment findings). The Climate Budgeting process for FY 2025–26 was primarily conducted for measures under the capital budget, with a few climate activities from the revenue budget. BMC will explore expanding the scope of the Climate Budget to integrate the revenue budget in the upcoming years.

Although providing technical support to each department, coordinating data collection, and building capacity across the BMC departments remain extensive tasks, this year's budgeting process has shown greater commitment from BMC's 27 departments. Measures to improve comprehensive management of budget-related data will be explored.

The introduction of the MER process and integration of adaptation and resilience (A&R) priorities, along with efforts to report impacts initiated for the Climate Budget FY 2025-26, have deepened organizational awareness and discussions on climate change and budgeting. It has also initiated the creation of an organized data repository for climate-relevant projects and their outcomes. Moving forward, climate budgeting and its MER process aim to establish a more robust and systematic approach for recording on-ground data on climate project impacts.

The MER process has expanded engagement beyond leadership and nodal officers to include accounts teams, implementation divisions, and ward-level officers, who now actively report progress on budget activities. The current MER system primarily monitors output indicators, with limited evaluation-based outcome indicators. Based on this pilot and learnings from it, the BMC plans to strengthen the MER framework in future cycles. Additionally, there is an opportunity to strengthen the current monitoring process by introducing a short-term target-setting approach, which can be explored during departmental discussions going forward.

Similarly, in conducting impact assessments of A&R actions in the climate budget report, gaps exist due to challenges in collating extensive datasets, limited understanding on collecting climate-relevant data by departments, or projects being in early planning stages—making it difficult

Aerial shot of Parel | By Hardik Joshi

to quantify and assess climate impacts. The BMC aims to establish an organized, robust system to collect, report, and manage climate-relevant outputs and outcomes across three impact areas: people, nature, and climate, enhancing the monitoring and quantification of adaptation and resilience impacts of climate measures.

Climate action tracks with comparatively low allocation—such as integrating passive thermal comfort strategies in buildings, increasing green cover to reduce the heat island effect, and enhancing community health resilience through decentralized planning—are aimed to be strengthened in the coming years. Additionally, mitigation, adaptation, and resilience actions will be explored for integrated implementation through the adoption of climate-friendly approaches, materials, technologies, design, and planning. Municipal building construction sections could explore strengthening adaptation and resilience measures and maintaining records on climate-relevant aspects.

Municipal building construction sections could explore strengthening adaptation and resilience measures and maintaining records on climate-relevant aspects. The BMC will also aim to define budgets for Information, Education, and Communication (IEC) and staff training focused on climate sensitization and preparedness, particularly in areas like public health and disaster management. a system for comprehensive reporting of climate-related actions, such as bulk or consolidated energy-efficient systems and solar panel procurements, can be explored.

Climate budgeting is an iterative process, and BMC aims to enhance its climate governance by developing a “climate lens” within municipal functions. This will be achieved by advancing the mainstreaming of climate considerations within the system, improving coordination among departments and other parastatal and government agencies with jurisdiction over Mumbai, and fostering ongoing cross-departmental engagement as well as technical and knowledge exchange.

# Annexure 1:

## MCAP Goals and Targets

| MCAP Sector/ Action Track | Target | 2030 | 2040 | 2050 |
|---|---|---|---|---|
| **Energy & Buildings** | | | | |
| 1.1 Decarbonising Mumbai's electricity generation mix to renewable sources | % share of total grid electricity from renewables | 50% | 70% | 90% |
| 1.2 Transition to clean fuels and resource efficiency in buildings | % of total buildings with solar PV installed | 10% | 20% | 40% |
| | Residential water flow technology in buildings (% low flow fixtures) | 20% | 40% | 60% |
| | LED lighting in commercial and residential buildings (%) | 100% | 100% | 100% |
| | Commercial cooling system technology (% of high efficiency chillers) | 38% | 59% | 80% |
| 1.3 Low carbon buildings | 4.3. Equitable access to green open spaces | 50% | 50% | 50% |
| 1.4 Passive design strategies to improve resilience in buildings | 4.3. Equitable access to green open spaces | 50% | 50% | 50% |
| **Integrated Mobility** | | | | |
| 2.1 Improve public transport ridership | | | | |
| 2.2 Access to non-motorized transport (NMT) and pedestrian infrastructure | % Mode share for public transport and NMT w | 73% | 78% | 85% |
| 2.3 100% municipal and private zero emission vehicles by 2050 | % Electrification of passenger automobiles | 35% | 70% | 96% |

| MCAP Sector/ Action Track | Target | 2030 | 2040 | 2050 |
|---|---|---|---|---|
| **Integrated Mobility** | | | | |
| | % of electrification of all buses | 100% | 70% | 90% |
| | (2026-27) | 100% | 100% | 50% |
| | % of electrification of all two-wheelers, taxis and autorickshaws | 40% | 70% | 100% |
| | % of electrification of all private four-wheelers by 2050 | 35% | 60% | 96% |
| 2.4 Zero emission freight | (2026-27) | 100% | 100% | 50% |
| | % of electrification of light duty trucks and 2W freight | 40% | 70% | 100% |
| | % of electrification of medium and heavy-duty trucks | 15% | 30% | 46% |
| **Sustainable Waste Management** | | | | |
| 3.1 Reducing landfilled waste | % of Reduced waste disposed to landfill sites | 30% | 40% | 50% |
| 3.2 Decentralized waste management - Recycle/Compost at the local level | % of paper recycled | 20% | 40% | 80% |
| | % of plastic recycled | 20% | 40% | 80% |
| | % of organic waste composted | 20% | 40% | 60% |
| | % Wastewater treated by tertiary treatment | 10% | 15% | 17% |
| | % of recovery through Decentralized waste management (segregation, recycling and composting) | 40% | 60% | 80% |

| MCAP Sector/ Action Track | Target | 2030 | 2040 | 2050 |
|---|---|---|---|---|
| **Sustainable Waste Management** | | | | |
| 3.3 Remediation and scientific management of landfills | % of Remediation of all existing dumpsites and scientific disposal of waste | 100% | 100% | 100% |
| | % landfill gas captured | 20% | 30% | 50% |
| **Urban Greening and Biodiversity** | | | | |
| 4.1 Increase vegetation cover and permeable surface | % of Increase in vegetation cover and permeable surface of the city surface area to tackle flood- and heat-related disaster risk | 30-40% | 45% | 47% |
| 4.2 Reduce urban heat island effect | Reduce heating effect and increase permeable surface to 100% by 2050 along the city streetscape | 40% | 60% | 100% |
| 4.3 Equitable access to green open spaces | Equitable distribution of open spaces and increase per capita open space | 4 sqm per capita | 6 sqm per capita | 6 SQM PER |
| 4.4. Restore and enhance biodiversity in the city | | | | |
| **Air Quality** | | | | |
| 5.1 Curb the pollution concentration level by 20-30% by 2030 | % of curbing the pollution concentration to improve air quality, keeping 2019 as the base year | 20%-30% | 70% | 96% |
| 5.2 Increase information availability through monitoring | | | | |
| 5.3 Community health resilience through decentralized planning and awareness | | | | |

| MCAP Sector/ Action Track | Target | 2030 |
|---|---|---|
| **Urban Flooding & Water Resource Management** | | |
| 6.1 Build flood resilient systems and infrastructure | | |
| 6.2 Localized water conservation and efficiency | % of city's water demand met through localized water conservation and efficient use initiatives | 50% |
| 6.3 Reducing pollution and restoring aquatic ecosystems | | |
| 6.4 Safe and affordable drinking water | Access to safe and affordable drinking water for all | 100% |
| 6.5 Clean, safe and accessible toilets | Provide clean, safe and accessible toilets to all | 100% |
| 6.6 Disaster risk and impact reduction | | |

# Annexure 2:

## Detailed description of climate measures for FY 2025-26

### Solid Waste Management (SWM) Department

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| Direct Actions – Quantified | The Solid Waste Management (SWM) department is undertaking the work of installation of bio methanation plant at 5 BMC hospitals, using the XV Finance Commission's Water Funds. Each plant has a capacity of 2 MTD capacity, and at full capacity produce 80 kgs of cooking gas replacement equivalent to 250 units of electricity. With the potential to reduce 2,693.7 $tCO_2e$ annually, the biogas will be used to fuel kitchens or power common lights and other areas within hospital premises. The first facility has been commissioned at Sewri TB Hospital in February 2025.<br><br>The department is planning technological upgradation of Mahalaxmi Refuse Transfer Station (MRTS). This station will help mechanically segregate recyclables from 700 tons of municipal solid waste received at the facility, resulting in further potential reduction of upto 30,660 $tCO_2e$ annually.<br><br>The department also undertakes projects for setting up dry waste collection sheds in wards, managed by local waste workers or ward associations. Some centres are also used for wet waste, depending on local needs. These centres help reduce landfill waste and lower greenhouse gas emissions. SWM department has set up sheds in 47 locations across the city with weighing, shredding and baling facilities. This year, a 3500 sq. ft. shed will be set up in E ward, with capacity to manage 4 metric tons waste per day and support upto 5 informal waste workers, potentially reducing 438 $tCO_2e$ annually. Additionally, there are 7 wards where dry waste centre projects are currently ongoing.<br><br>The work of Development of Waste to Energy (WTE) Project at the Deonar Dumping Ground (DDG) undertaken by the SWM department, includes design, construction, operating and maintenance of waste to energy plant being set up at Deonar Dumping Ground across 10.47 Ha of land and a capacity to convert 600 MTPD of municipal solid waste to generate about 4 to 8 MW of electricity daily. This will potentially reduce 1,61,622 $tCO_2e$ emissions annually. Part of the work is being carried out using XV Finance Commissions' Water Fund.<br><br>The Bio-mining Project at Deonar Dumping Ground uses a scientific bio-mining method, certified by the Central Pollution Control Board, of excavation, treatment, segregation, and utilisation of aged municipal solid waste also known as legacy waste. Along with its purpose of reducing the greenhouse gases emissions and being a zero-emission process itself, the method also allows for resource recovery by extracting recyclable components of waste like metal, recyclable plastic, etc. One MT of legacy waste has the potential to prevent 1.106 $tCO_2e$ potential emission reduction.<br><br>An area of 24 ha of landfill land will be reclaimed using bioremediation method under the Dumpsite Reclamation Project at Mulund Dumping Ground (MDG), |

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| | clearing 70 lakh MT of waste resulting in potential emission reduction of 51,63,480 $tCO_2e$, of which 43.49 lakh MT has been cleared. |
| Direct Actions – Not Quantified | Funded under XV Finance Commissions' Air Fund, Outdoor Dust Mitigation Unit (ODMU) and Dust Monitoring Systems (DMS) have been installed at 5 locations with operation and maintenance(O&M) ongoing. The locations are (i) Lal Bahadur Shastri Check Naka, (ii) Eastern Express Highway, Mulund, (iii) Cheddha Nagar, (iv) Bandra-Kurla Complex & (v) Dahisar Check Naka. ODMU and DMS will help reduce and monitor dust respectively.<br><br>Using XV Finance Commissions' Water Funds, the department has undertaken the ask of procurement, operation and maintenance of E Sweepers. A total of 9 units have been procured with O&M ongoing. These sweepers will help in effective cleaning of roads, eliminating dust resuspension that usually happens during manual sweeping thus mitigating dust pollution.<br><br>The department is also planning the construction of prefabricated toilets in all wards. These projects are currently at a planning stage.<br><br>The department is planning to procure new vehicles for segregated waste collection, with separate storage facilities for dry and wet waste. This will help improve the waste collection and segregation process of the department.<br><br>The SWM department has taken the initiative to install sanitary napkin vending machines in public toilets with incinerators in women's public and community toilets across Mumbai, through a pay-and-use model. These machines are IoT-enabled and monitored through a central control room. About 1800 more vending and incineration machines are planned to be installed over the current and next financial year.<br><br>Using capital receipts under the Swachh Maharashtra Mission (SBM), the department is undertaking construction of new toilets, both individual household latrines (IHHLs) and community toilets. 1500 IHHLs and 3,000 community toilets will be built in 2025-26.<br><br>The department is undertaking the work of construction of community toilets in all wards. In total, 559 toilets with 14166 toilet seats are planned. So far, 50 toilet blocks with 1000 seats have been completed. Additionally, under the ongoing activity from FY 2024-25, with funds allocated in FY 2025-26, provision of community toilets in all wards, wherein 9 wards- A, F/N, F/S, G/N, L, M/E, M/W, S, and T will be prioritized.<br><br>Based on site context, bio-toilets with biodigester tanks will be used. These systems break down waste into reusable water and gas, offering a sludge-free, low-maintenance alternative to septic tanks with better waste treatment and no risk of clogging.<br><br>At Deonar Dumping Ground, the department have planned the piling of synthetic vinyl sheets to control land sliding (garbage mound sliding) and prevent leachate seepage into the adjacent Thane creek, thereby preventing creek water pollution. |

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| | In efforts to increase green cover the work of plantation in landfill site at Kanjurmarg Dumping Ground is planned. Additionally, to enable unobstructed flow of water for survival of Mangroves within the Kanjurmarg Dumping Ground, two culverts will be constructed by the SWM department, resulting in efforts towards conservation of mangroves within the dumping ground. |
| **Mechanical & Engineering (M&E) Department** | |
| Direct Actions – Quantified | Using the XV Finance Commission's Air Fund, M&E department is installing 10 PNG crematoriums across the city. Installation at Shivaji Park, Charai, Bhoiwada, Jogeshwari, Sion, Mulund, Gavanpada, and Chunabhatti cemeteries is complete, while work is ongoing at Reay Road, and Tagore Nagar cemeteries. This project has the potential to reduce 4,910 $tCO_2e$ emissions annually.<br><br>Carbon cutting system, referred to as a Retrofit Emission Control Device (RECD), being installed at Shivaji Park cemetery, is a machine that works on the principle of electrostatic precipitation. It captures particulate matter of 2.5 microns and 10 microns and has an efficiency of 80–90% CCM (cubic centimetres per minute) as per Automotive Research Association of India (ARAI) certification. This net zero machine reduces the gases emitted at source like Carbon Monoxide by 90 %, Carbon Dioxide by 70 %, Hydrocarbons by 46 %, Sulphur Oxide by 67 %, and Nitrogen Oxide by 65%. It also captures carbon dioxide and converts it into calcium, thereby potentially reducing carbon emissions by 903.18 $tCO_2e$ annually.<br><br>The department is planning the replacement of coal, wood, cotton stock, and kerosene fuel sources, to provide 40 PNG Gas connections at Mahalakshmi Dhobighat. The gas lines will mainly be used to boil water for laundry work. These efforts will potentially reduce emissions by 150 $tCO_2e$ annually.<br><br>Under the upgradation of the High Mast System, the M&E Department will replace approximately 2,400 units of 400-Watt metal halide/ High Pressure Sodium Vapour (HPSV) streetlights with 150-Watt Smart LED Flood Light High Mast streetlights, saving up to 70% energy.[14] This will potentially reduce 1273.7$tCO_2e$ emissions annually.<br><br>The department has also undertaken the work of installation of solar panel systems at various peripheral hospitals. A total of 385kW of solar panel systems will be installed across a rooftop area of approximately 38,500 sq.m generating 140.5 MWh of energy yearly, reducing 817.29 $tCO_2e$ of potential emissions annually.<br><br>A total of 60 existing AC units using R-22 refrigerant (ODP 0.06, GWP 1810) will be replaced with more energy-efficient units using R-134a (ODP 0, GWP 1430) in municipal offices and hospitals under the activity replacing existing AC units with comparatively more energy efficient AC units in various municipal office and hospital buildings. R-134a is a more environmentally friendly and energy-efficient alternative, offering better heat exchange and lower climate impact.[15] |

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| Direct Actions- Not Quantified | The department plans to retrofit emission control devices for diesel generator sets to meet Maharashtra Pollution Control Board (MPCB) norms.<br><br>The department is undertaking the Installation of Sewage Treatment Plants (STPs) at peripheral hospitals, as well as major and speciality hospitals. At present, construction and installation of 25 KLD ETP/STP plants are in progress at Babasaheb Ambedkar Municipal General Hospital (BDBA) and Mata Balak Hospital. The treated water from these STPs will be used for gardening purposes. |
| **Water Supply Project (WSP) Department** | |
| Direct Actions – Quantified | The development of the Hydro Electric Power Plant & Floating Solar PV Power Project at Hinduhridaysamrat Shivsenapramukh Balasaheb Thackeray Middle Vaitarna Damis ongoing. Out of the 26.5 MW capacity of the Hybrid Power plant, the capacity of the Hydro Electric Power Plant is 20 MW and that of the Floating Solar PV Power Plant is 6.5 MW. This project will result in a potential emission reduction of 53,707.85 $tCO_2e$. Floating solar PV systems will generate clean energy, boost the dam's power capacity, and help reduce water evaporation. As they are installed over existing reservoirs, no additional land is needed for power generation. |
| Direct Actions- Not Quantified | The department has been undertaking extensive work to improve the overall water supply and treatment in the city. This largely involves constructing/reconstructing essential water supply infrastructure.<br><br>Among the newly proposed works, the department is constructing tertiary treated water conveyance tunnels from the Ghatkopar Wastewater Treatment Facility(WwTF) to the Bhandup WwTF, and further up to the Bhandup Complex WTP, as well as from the Dharavi WwTF to the Ghatkopar WwTF. These projects are part of a broader strategy to augment Mumbai's water supply by converting treated wastewater into potable water. Additionally, work on recycling and reuse of wastewater to potable water at Colaba Wastewater Treatment Plant is ongoing. Under this, 12 MLD Advanced Tertiary Treatment Plant (ATTP) at Colaba is being developed on a pilot basis.<br><br>As part of efforts to construct water supply tunnels and replace old mains for a more efficient water system, following works are underway:<br>1. Tunnels from the Yewai Master Balancing Reservoir to Kasheli in Tal. Bhiwandi, and from Kasheli to Mulund Octroi Naka.<br>2. Amar Mahal to Trombay Reservoir (5.5 km) tunnel will serve M/East and M/West wards.<br>3. Chembur to Parel (9.7 km total proposed length; 2.5 m dia.) will serve F/North, F/South & parts of E and L Wards, and cater to future development at Mumbai Port Trust land and Wadala Truck Terminus areas.<br>4. Powai to Veravali and Ghatkopar (2.79 km total proposed length; 2.2 m dia.), from Balkum to Mulund, and from Ghatkopar to Bhandup<br><br>Key pipeline replacements include:<br>1. 2750 mm dia. Tansa Enlarged Main in the Gundavali–Kasheli–Balkum |

section, and 2400 mm dia. Vaitarna Main in the Gundavali–Kapurbawadi–MCP–Saddle Tunnel section, which will be upgraded to a 3000 mm dia. mild steel (MS) pipeline.

2. Replace old twin Tansa Mains (2 x1450 mm dia.) with a single 2000 mm dia. MS pipeline from Maroshi to Sahar Village.

Following works are being carried to develop Water Treatment Plants (WTPs): 1) 2000 MLD WTP at Bhandup Complex, to replace the existing 1910 MLD plant nearing the end of its life; 2) A 910 MLD WTP at Panjrapur to treat raw water. 3) re-engineering and reconstruction of the 18 MLD Tulsi Water Treatment Plant.

Infrastructure improvements also include the demolition and reconstruction of culverts along the Municipal Service Road at the Pise-Panjrapur Complex—comprising 38 box culverts, 4 slab culverts, and 6 minor bridges. Additionally, a 455 MLD pumping station is being developed at Pise to strengthen water supply operations.

The department has completed consultancy services for the proposed 200 MLD Desalination Plant, (expandable to 400 MLD,) to augment the city's supply. The tendering process for its construction is yet to commence.

To address potential flooding caused by the overflow of Vihar Lake into the Mithi River during heavy rains and high tides, a 200 MLD pumping station is under construction to divert approximately 7200 ML of overflow to the inlet bay of the Bhandup Complex Water Treatment Plant.

The department is also undertaking structural repairs for reservoirs (Powai high level, Powai low level, Ghatkopar,), and improvements to upgrading water supply main lines to improve supply in H/West, R/South and R/North wards through the XV Finance Commission funds. On completing these structural repair works, the life of the reservoir will be enhanced by approximately 15 to 20 years.

Consultancy services have been completed for the construction of a new Chlorine Contact Tank (CCT) at Panjrapur treatment plant, which would play a critical role in disinfection; however, the construction of this facility is not currently feasible. In addition, the 5 MLD Advanced Tertiary Treatment Plant at the Powai Wastewater Treatment Facility, and the development of public facilities in the newly established villages for Gargai project-affected persons (PAPs) will be taken up in the future.

## Transport Department

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| Direct Actions – Quantified | The Transport Department is responsible for the procurement and maintenance of municipal vehicles. This year, this activity includes the procurement of 3 Mahindra electric vehicles. This will help reduce GHG emissions by 3.03 $tCO_2e$ annually. These additions aim to expand the decarbonized fleet while diversifying fuel types based on operational need. |

| Hydraulic Engineering Department | |
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| Direct Actions – Quantified | The Hydraulic Engineers Department is planning to install solar power generation systems in various Chowkies, including at Mohili, Jambhivali and the Aghai Chowky. This will contribute to Mumbai's energy grid transition to renewable sources and reduce carbon emissions by 286.58 $tCO_2e$ annually.<br><br>Additionally, the department is also setting up a 2.5 MWp Solar Power Generation Plant on the Rooftop of the New Master Balancing Reservoir (MBR) at Bhandup Complex, which will generate energy for use within the treatment plant, potentially reducing 1,061.42 $tCO_2e$ in emissions. |
| Direct Actions – Not Quantified | The Hydraulic Engineers Department has undertaken the work of laying and replacement of water mains at multiple locations throughout Mumbai and has taken the responsibility of constructing water storage tanks. The following wards have ongoing work: A, B, C, D, E, G/N, G/S, F/N, F/S, K/E, K/W, P/N, P/S, H/E, H/W, R/C, R/N, and R/S.<br><br>Using XV Finance Commission's Air Funds, the department is improving water supply infrastructure in the H/W, R/S & R/N Wards wards by replacing old pipelines in Bandra West, Dahisar East, and Kandivali East. Key works include new mains from S.V. Road to Ambedkar Road in Bandra, 770m of 450 mm pipe replacement in Dahisar, and laying a 900 mm pipe over 1,540m in Kandivali.<br><br>The department is carrying out the replacement of defective sluice valves to prevent the loss of valuable potable water. Efforts are underway to protect BMC's water mains from damage due to illegal sand removal near Anjur-Kasheli.<br><br>To ensure responsible transfer/ carrying of water and minimise wastage, the department has also undertaken efforts the to address leakages and contamination within the water distribution system.<br><br>The Hydraulic Engineers Department has undertaken hill slope stabilisation and allied works in various areas. The benefitted locations include Borivali Hill Reservoir, Malad Hill Reservoir, Pali Hill Reservoir in the Western Suburbs, and Ghatkopar High- and Low-Level and Powai High- and Low-Level Reservoirs in Eastern Suburbs. These slope stabilization works aim to safeguard key BMC water reservoirs and their surrounding premises, collectively serving over 26.5 lakh residents across areas like Borivali, Malad, Jogeshwari, Kurar, Goregaon, Vile Parle, Ghatkopar, Powai, and adjoining slum settlements. Over 290,000 square meters of BMC land is being protected through the construction of RCC retaining walls and new stormwater drain networks to mitigate landslides and potential flash floods in vulnerable foothill communities.<br><br>Stabilisation works are also being carried out at the following reservoir stretches: 11,151 sqm at Bhandarwada Hills; 3,566 sqm and 12,600 Raoli Hills; 21,000 sqm and 124,752.09 sqm at Malabar Hills; and 31,700 sqm and 97,731 sqm at Bhandup Hill. These efforts benefit approximately 5 lakh people in the Raoli High Hill area, 1.94 lakh in Malabar Hills, and 2.5 lakh in Bhandup Hills. |

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| | Furthermore, the department will conduct improvement and plantation activities in various plots of total area 87,266 sqm. at the Bhandup Complex and along Trunk Mains to enhance green cover.<br><br>Additionally, LED streetlights will be installed in pumping station premises at Panjrapur. This project is currently in the planning stage. |
| **Markets Department** | |
| Direct Actions - Quantified | The department is replacing existing conventional incandescent and CFL lights with energy-efficient LED lights in various municipal markets, reducing potential emission by 0.13 $tCO_2e$ per LED replaced.<br><br>The department has installed 100 kW capacity solar panels as part of the redevelopment of Topiwala Market. The installation of 25 kWp at Mahatma Phule Market and 75 kWp across three units at Babugenu Market, initiated last year, is ongoing. These installations will help offset energy demand from grid sources. These panels will reduce potential emissions by 212.28 $tCO_2e$ annually.The 25 kWp solar panel installation at Shirodkar Market will not continue at this time, and a fresh tender is under preparation. |
| Direct Actions – Not Quantified | The Department is working on the redevelopment/reconstruction of municipal markets and transit camp markets.[@] This includes Babu Genu Market, Mahatma Jyotiba Phule Market (Phase-II), Laxman Babu More Municipal Market in Govandi, and B.H. Chemburkar Market. Construction of new municipal market buildings is taking place in Bhandup, Mahul Village, and Tungwe in Kurla, incorporating climate- friendly initiatives. The Topiwala Market building construction has completed Phase-I, and Phase-II shall commence this year.<br><br>A combined Sewage Treatment Plant (STP) of 134 KLD (CMD) and Effluent Treatment Plant (ETP) of 60 KLD (CMD), with a forced ventilation and odour control system is proposed at Mahatma Jyotiba Phule Market market, covering design, supply, installation, testing, commissioning, and 24/7 operations for one year. The system includes advanced components like RMBR, anaerobic reactors, dewatering units, and chemical dosing to ensure efficient wastewater and effluent management. The department also makes provisions for the repairs and reconstruction of toilets at municipal markets. |
| **Mumbai Fire Brigade Department** | |
| Direct Actions – Not Quantified | The department is working to develop a drill tower cum multifacility training simulator for fire safety training at Thakur Village fire station in Kandivali. It will train firefighters to deal with situations of extreme heat and smoke. Firefighters will be trained in the use of modern equipment, safety protocols in confined |

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| | spaces, and adaptable emergency response techniques. The simulator's capacity to replicate varying fire scenarios will significantly strengthen the city's resilience to fire-related disasters.<br><br>The department is also constructing and redeveloping fire brigade stations at Mulund, Chembur, Kurla, Kanjurmarg, Marol and other locations.[@] Additionally, in FY 2023-24, the Mumbai Fire Brigade department has added six EV sedan cars in its fleet. |
| **City Engineers Department** | |
| Direct Actions – Not Quantified | The City Engineers Department undertakes the work of carrying development of numerous municipal buildings across the city.<br><br>One of its notable new initiatives is the construction of a new ward office with a net-zero concept at Santacruz East, H/E Ward, aiming to achieve net-zero energy, water, and waste standards. The building will include a sewage treatment plant, solar panels to meet partial lighting and energy requirements, rainwater harvesting systems, HVAC with radiant cooling, and ground source heat pumps. Additional features include passive design strategies such as shadow analysis, building orientation planning, roof and slab insulation. The project will also include a water treatment plant, smart water management, and garbage management systems which will further enhance its environmental performance.[@]<br><br>The transportation and commercial hub at Dahisar Check Naka in R/North Ward is being planned to accommodate 456 passenger buses and 1,424 motorized vehicles, along with rest and lodging amenities for passengers arriving from other states and cities.[@] Given its direct connectivity to the Western Express Highway and metro stations, the hub is expected to significantly ease Mumbai's traffic congestion and facilitate seamless onward travel for frequent commuters. Importantly, this project aims to create revenue streams so that its capital and maintenance costs can be recovered from the project itself, ensuring no additional financial burden on BMC.<br><br>The department is also redeveloping the Material Testing Laboratory and Asphalt Plant Office in Worli, G/S Ward.[@] This facility plays a critical role in ensuring quality control in civic construction, currently testing 54 types of materials including cement, sand, concrete, and asphalt. The redevelopment will include enhanced testing infrastructure, expanded parking facilities, and additional municipal office spaces. The project will include a Building Management System and incorporation of low flow water saving fixtures.<br><br>Other new works include the reconstruction of a swimming pool and sports complex in Ghatkopar East (N Ward), the construction of a municipal chowki |

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| | in Kanjurmarg West (S Ward), and the development of Project Affected Persons (PAP) tenements at LBS Marg, Kanjurmarg West (S Ward) to resettle families displaced by the Goregaon–Mulund Link Road project.[@]<br><br>Ongoing works include the construction of a community hall in Barve Nagar, Ghatkopar West, and the development of the Samajik Sabhagruh at Murar Road, Mulund.@ Meanwhile, several planned projects are not scheduled for implementation in the current financial year. These include the Saint Rohidas Bhavan in Dharavi, the Dabbewala Bhavan, the Urdu Bhavan, and measures aimed at pollution control and water body rejuvenation. |
| **Improvement Schemes (As reported under City Engineers)** | |
| Direct Actions- Not Quantified | The redevelopment of municipal property at Vikhroli Parksite Layout in N ward has commenced, while the 600 tenaments projects at Deonar in M/E ward awaits MOEFCC NOC.[@] |
| **Slum Improvements- Maintenance (as reported under City Engineers)** | |
| Direct Actions- Not Quantified | The department makes annual budget provisions for the construction of retaining walls to protect against landslides sliding where necessary, particularly in key vulnerable wards F/N, F/S, L, N and S, where projects are implemented as required. |
| **Chief Engineer- Building Maintenance Department** | |
| Direct Actions- Not Quantified | The Building Maintenance Department undertakes structural repairs, renovations, and upkeep of municipal buildings, markets, fire stations, cemeteries, housing colonies, and public amenities, ensuring safety, functionality, and heritage preservation across the city. The department follows clean construction practices in accordance with BMC's 28-point Air Pollution Mitigation Guidelines.<br><br>1. The entire building under construction is enclosed with green cloth/jute sheet/tarpaulin to prevent dust spread.<br>2. Sprinkler systems installed and used throughout construction activity.<br>3. Anti-smog machines installed at all sites.<br>4. Independent air quality measuring devices installed and monitored scrupulously.<br>5. Water sprinklers used to settle dust during demolition.<br>6. Marble cutting, grinding, and other such works done only in enclosed premises.<br>7. Construction debris transported in vehicles covered with tarpaulin; no overloading permitted.<br>8. Vehicle tires cleaned and sprinkled with water before leaving site; vehicles are washed after daily work. |

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| **Disaster Management Department** | |
| Direct Actions- Not Quantified | Already present in 24 wards, the department proposes supplying, installing, training and construction and operation of Viewing Centres in 2 newly created ward offices viz. K/North & P/East in FY 2025-26 under the Mumbai City Surveillance (MCS) Project. Operational 24/7, these viewing centres at the ward offices will enable close surveillance to ensure that quick action can be taken in case of any disaster. |
| Enabling Actions | Using the District Disaster Management fund, the department has hired a consultant to prepare a detailed project report for buying advanced disaster management equipment. The work involves reviewing technologies listed in the Government of Maharashtra–Mazagaon Dock Shipbuilders Limited MoU—such as geo-location systems, air boats, life-saving robots, AI tools, satellite communication, and landslide detection systems—assessing their relevance to Mumbai's conditions, evaluating emergency use cases, market availability, and existing BMC resources, and recommending required quantities, responsible departments, and estimated costs. This will aid the department in effective monitoring and disaster management in the city. |
| **Education Department** | |
| Direct Actions- Not Quantified | In FY 2024–25, 358 sanitary napkin vending machines with incinerator machines were deployed across 439 school buildings by the Education Department to strengthen menstrual hygiene infrastructure. These were accompanied by toilet block repairs and upgrades in both existing and newly constructed schools. Further provisioning is planned for FY 2025–26. These efforts directly contribute to waste diversion from landfills and support gender-responsive sanitation services. |
| **School Infrastructure Cell (SIC) (part of Education Department)** | |
| Direct Actions - Quantified | The School Infrastructure Cell expects energy efficiency improvements through the installation of approximately 33,919 LED lights in municipal schools, with a lump sum provision of ₹4 crore. In FY 2024-25, LED lighting works were underway in 59 school projects. |
| Direct Actions- Not Quantified | In FY 2024–25, rainwater harvesting pits with a combined capacity of 81 cubic meters were completed at three municipal schools: DD Upadhyay Municipal School (T Ward), Asalpha Village U.P. Hindi Municipal School (L Ward) and Dalvi Plot Municipal School (R/S Ward). Ongoing projects include Cama Road Municipal School (K/W Ward), Malvani Hindi and Marathi Municipal Schools |

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| | No. 1 & 2 (P/N Ward), Shivaji Nagar Municipal School No. 1 (M/E Ward), and Tilak Marg School (N Ward).<br><br>As part of its broader mandate in municipal school construction and reconstruction, the section is also responsible for upgrading toilet blocks and repairing/ upgrading playgrounds. Playground works include creating play areas with red soil, installing play equipment, and designating green zones along the periphery. These efforts aim to enhance access to sanitation, open spaces, and contribute to the overall well-being of students. |
| **Environment and Climate Change Department** | |
| Direct Actions - Not Quantified | With strengthened human resources and an enhanced budget, the Environment and Climate Change Department is laying critical groundwork by scaling up air pollution mitigation strategies and initiating pilot projects in key focus areas, with the aim of refining its priorities and implementation strategies over time.<br><br>As part of its efforts, the Air Quality Monitoring and Research Laboratory has procured five Automatic Air Quality Monitoring Vans, with operations and maintenance(O&M) ongoing, which will provide real-time data on local air quality through the BMC server. These vans will monitor pollutants such as $SO_2$, $NO_2$, $PM_{10}$, $PM_{2.5}$, $O_3$, CO, $NH_3$, VOCs, and $CH_4$, and will operate across landfill sites (to be monitored weekly), traffic signals (monitored daily), and locations of citizen complaints. The Mumbai Air mobile app has been created by BMC to enable citizens of Mumbai to log complaints related to air pollution in the city and check their status. Mumbai already has a network of 28 Continuous Ambient Air Quality Monitoring Stations (CAAQMS), and has allocated budget for five additional stations.<br><br>The department is collaborating with IIT Kanpur on the Mumbai Air Network for Advanced Sciences (MANAS) project, which will deploy 250 hyperlocal sensors (phased deployment, with 75 in Phase 1) as part of a citywide Hyperlocal Sensor-based Ambient Air Quality Monitoring (SAAQM) network. Data from this network will feed into an advanced real-time analytics dashboard at Mumbai's Integrated Command and Control Center (ICCC), aiding decision-making and timely interventions. Future applications of this system include creating micro-airsheds with high-resolution spatial maps of PM 2.5 at sub-kilometre scales (200m–700m), using satellite imagery for smoke plume detection, tracking garbage burning, and generating spatial data on exposure levels and health risk estimates.<br><br>The department is also planning to relocate its laboratory and upgrade its monitoring capacity by procuring five 5 High Volume Samplers (HVS), a UV spectrophotometer, and handheld air quality monitors for field inspections. Through all these measures, the department aims to establish a robust air quality monitoring network to support evidence-based decisions and targeted interventions aimed at improving air quality and safeguarding public health. |

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| | The department has made budget provisions for more concrete measures for prevention of air pollution in Mumbai across various sources. Budget allocations are made to support the installation of stack monitoring systems for bakeries and hotels, the development of eco-friendly pyre systems at crematoriums, and the deployment of air pollution control (APC) systems on diesel generators used in hospitals and other municipal premises. Other budget considerations include developing a system for construction and demolition (C&D) debris management, and a pilot project to retrofit or convert BMC's vehicle fleet to clean fuel, reducing emissions and promoting sustainable transportation in the city.<br><br>Urban greening/urban forests are also key components of the department's climate strategy. Following the successful development of a 3.2-acre urban forest at Marol, a second phase of approx. 6.5 acres is being planned under XV Finance Commission funding, in collaboration with the Planning Department, and support from WRI India. Budgets are earmarked for similar urban greening/ urban forest projects aimed at mitigating the urban heat island effect.<br><br>The department is piloting a few Nature-Based Solutions and Climate Resilient Projects aimed at utilizing natural ecosystems to address urban challenges such as flooding, heat stress, and biodiversity loss, enhancing the city's climate resilience and sustainability. Pilot projects for climate-resilient infrastructure include Climate-Resilient Streets Project and Lal Maidan Project. The Climate-Resilient Steets Project will be implemented in collaboration with the Joint Commissioner of Police (Traffic), BMC's Roads and Traffic department, and WRI India as technical partners. The project aims to transform selected traffic intersections in city using the principles of Percolation, Shade, Access, Pollution reduction, and Inclusivity. The Lal Maidan project aims to develop 1886 sqm area to provide low-cost, low-maintenance nature-based solutions, integrating waste and water management with ecologically sustainable greening strategies, developed through collective action. This project is being carried out at the department in collaboration with WRI India and Youth for Unity and Voluntary Action (YUVA). The department has also allocated funds for the installation of renewable energy systems—including solar, wind, and hybrid options—across various municipal properties such as markets, schools, and hospitals. |
| Enabling Actions | Indian Institute of Tropical Meteorology (IITM), Pune is supporting BMC in developing an Air Quality Early Warning Decision Support system for Mumbai, called AIRWISE. The system aims to provide accurate air quality predictions up to 72 hours in advance, identify the contribution of various emission sources—local, regional, and distant—to $PM_{2.5}$ pollution, and suggest targeted strategies to reduce emissions and prevent air pollution events.<br><br>The department is also making use of funds from the XV Finance Commission's Air Fund to identify air pollution hotspots in the city with the help of the National Environmental Engineering Research Institute (NEERI). This data will be used to prepare a hotspot action plan targeted towards air pollution. |

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| | Under the Ministry of Jal Shakti's National Aquifer Mapping and Management (NAQUIM) Programme, the department is undertaking aquifer mapping, geomorphological studies, and identifying groundwater percolation hotspots. These efforts are aimed at strengthening rainwater harvesting and groundwater recharge initiatives. The BMC area has been segmented into grids to allow for stratified sampling, and a random selection of existing wells has been conducted for groundwater monitoring. Initial geophysical data collection has been completed, and the next steps involve using GIS and remote sensing to map groundwater potential zones and generate thematic maps. Additionally, aquifer mapping study is being carried out by the department, with support from WRI India, Advanced Center for Water Resources Development and Management (ACWADAM) and Pani Haq Samiti, with an aim of developing a holistic groundwater recharge strategy for Mumbai.<br><br>To enhance institutional capabilities, budget provisions have been made for advanced IT infrastructure to support the Environment and Climate Department. This includes GIS mapping tools, specialized software, and a Management Information System (MIS) to serve as a centralized database. These upgrades are intended to improve the department's ability to carry out advanced modelling, simulations, and data analysis for environmental monitoring and climate-resilient planning.<br><br>Furthermore, the BMC plans to establish an Environment and Climate Change Information Center, which will serve as a central hub for disseminating research, data, and resources related to environmental and climate initiatives in the city. Continued provisions for the Climate Action Cell will enable the department to undertake pilot projects, take up information, education or communication activities, and strengthen its functioning. |
| **Storm Water Drains (SWD) Department** | |
| Direct Actions- Not Quantified | The Storm Water Drains Department has used the XV Finance Commissions Funds to execute construction of a Sewage Treatment Plant near the Dahisar river. The project involves the design, construction, and commissioning of two modernized and fully automated package/modular Sewage Treatment Plants (STPs) with capacities of 1.5 MLD and 5 MLD, along the Dahisar River under a Design-Build-Operate (DBO) model. It includes 15 years of operation and maintenance. The scope also includes laying 4.42 km of sewer network, installing 10 interceptors for diversion of dry weather flow (DWF), and constructing 1.16 km of service roads and 1.22 km of roadside drains along both banks of the river.<br><br>The design and construction of modernized and fully automated package/ Modular Sewerage Treatment plants on MBR technology along the Dahisar, Poisar, and Oshiwara-Walbhat rivers will involve the construction of sewer networks, access roads, roadside drains, and interceptors. These plants will follow guidelines mandated by the Central Pollution Control Board, monitored by the National Green Tribunal (NGT). The department aims to improve stormwater drainage in the city by widening and training the Mithi River and other nalla systems. |

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| | To address flooding at various identified locations across the city, the department is undertaking the work of widening and training of the stormwater drains wherein the existing drains are widened to increase their carrying capacity. Similarly, the department will augment the size of box drains to tackle flooding at hotspots. Augmenting drains will also help in reduction of risk due to dilapidated condition of existing drains, culverts and nallas, and avert flood-like situations during heavy rainfall.<br><br>The department has also identified several locations with slums along the banks of nallahs, where balance stretches and retaining walls will be constructed to safeguard lives and property during heavy monsoon and flooding, reducing disaster risk and impact. Kannamwar Nalla, Oshiwara Lake, Mithi River, and Ganesh Patel Nalla are among other water bodies that are being worked on.<br><br>Furthermore, holding tanks are planned for construction at strategic locations: one at Milan Subway, Andheri (30,000 cubic meters capacity), St. Xavier playground, Dadar (28,000 cubic meters capacity) and Pramod Mahajan Garden, Dadar (36,000 cubic meters capacity), whose RCC columns beams and slab for covering are complete.<br><br>Additionally, diversions and loops will be constructed at 4 flooding hotspots. Along with making improvements and upgradation work in existing stormwater drainage network, the department will also construct box drains at various locations, expanding the drainage network. Mogra Nalla, and Chincholi Nalla are among the canals being worked on.<br><br>The integration of IIT-B's N-Treat technology within the stormwater drainage system will involve a seven-stage process to treat sewage in nullahs, utilizing screens, gates, silt traps, coconut fibre curtains for filtration, and disinfection using sodium hypochlorite. This technology will be instrumental in improving water quality without requiring additional space. The department is also undertaking construction of nalla retaining walls. |
| **Gardens Department** | |
| Direct Actions- Not Quantified | The Garden Department within BMC is responsible for the development and maintenance of gardens, recreational grounds, playgrounds, and the conservation of trees as per 'The Maharashtra (Urban Areas) Protection & Preservation of Trees Act, 1975'.<br><br>Using the XV Finance Commission's Air Fund, the department has undertaken the project of greening of public and residential areas in Mumbai. These areas include open areas, gardens, community places, and housing societies. Furthermore, as part of beautification of spaces below flyovers, 26 plots have been identified with a total are of 51,954 square metres to be beautified. This will allow increased access to public spaces for people.<br><br>As part of the development of new gardens, the Garden Department will develop |

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| | a green open spaces and enhancing vegetation cover. Green open spaces play a vital role in carbon sequestration, mitigating heat risks through local cooling effects, and promoting local and soil biodiversity. Similarly, the department is undertaking beautification of central medians and traffic islands across 20 wards to increase vegetation cover on streets.<br><br>The activities under the upgradation of existing gardens and horticulture will include repair and maintenance work, adequate illumination, and upgradation of facilities provided within the gardens such as benches, dustbins, drinking water facilities, etc. ensuring safe and equitable access to open spaces within the city. The department plans to undertake particularly, garden upgradations in P/North Ward, R/North Ward, and N Wards.<br><br>The Garden Department will adopt and implement the Open Space Management Scheme, aiming to allow equitable access to well-equipped sports facilities within municipal playgrounds across 22 wards. |
| **Garden Infrastructure Cell (GIC)** | |
| Direct Actions- Not Quantified | The GIC department is undertaking development and upgradation of various Recreational Grounds, Playgrounds, and Garden plots. Currently, works on 47 plots is planned and ongoing. |
| **Roads and Traffic Department** | |
| Direct Actions- Not Quantified | The department has made a new provision for walkable footpaths, taking into consideration parameters such as footpath widths, safety concerns, accessibility, routine maintenance, etc., while ensuring accessibility for persons with disabilities. The broader aim in doing so is to improve public health, reduce dependency on vehicles and decongest traffic, implementing BMC's 'Universal Footpath Policy.'<br><br>The department will continue upgrading footpaths to enhance road safety and inclusive pedestrian access, including better lighting, improved drainage, and retrofitting with tactile markings, ramps, and safe traffic medians with refuge zones. |
| Enabling Actions | Using the XV Finance Commission's Air Fund, the department will assess the performance of existing Fully Adaptive Traffic Control (FATC) systems and convert 70 conventional signals into FATCs. As the current ATC systems have exceeded their useful life, it is necessary to upgrade and install new systems. A consultant will be appointed through a tender to recommend suitable adaptive traffic control technologies, with expert vetting by IIT Bombay. Based on these recommendations, tenders will be invited for the phased installation of new adaptive traffic control systems across Greater Mumbai. |

## Bridges Department

Direct Actions- Not Quantified

The department is engaging in a range of projects pertaining to the construction / demolition and reconstruction / repair / maintenance of foot over bridges (FOBs), FOBs on railways, skywalks and pedestrian subways. The projects are at different stages of conceptualization, approval and implementation. The aim is to ensure structurally-sound, safe, non-motorized transport and enhance the life of the infrastructure with periodical monitoring, structural audit, repairs, and maintenance.

The department will be moving closer to the completion of constructing new / reconstructing pedestrian infrastructure (FOBs, subways and skywalks) of proposed 6.75 km in total lying within the scope of ongoing works. Of this proposed 6.75 km, 1.66 km (available for 12 projects) has already been built.

Key projects include the construction / rehabilitation of skywalks in Bandra East (Bandra station to MHADA office), Borivali East (Borivali Station East to Omkareshwar Mandir, Shrikrishna Nagar Bridge), Kurla West (Taximens colony), Dahisar West (L.T. Road) and Mulund West (Maharana Pratap Chowk); reconstruction and repairs of bridges/FOBs in Zones III, IV and VII; construction of an arm from Cotton Green skywalk to the Cotton Green station; and the improvement of service roads adjacent to the Eastern freeway in M/W ward.

## Sewerage Operations Department

Direct Actions- Not Quantified

The department is taking up works for efficiency enhancements in sewerage operations and sustaining performance, leveraging technologies and best practices to improve service delivery of existing sewage pumping stations. This includes the replacement of old High Tension (HT), Low Tension (LT) and Motor Center Control (MCC) panels, providing a Ring Main Unit for uninterrupted electrical supply, and providing Variable Frequency Drives for HT motors for energy efficiency.

Comprehensive infrastructure upgrades at key pumping stations include dry pit submersible pumps which remain functional during flooding, high-capacity centrifugal and vertical pump sets of varying capacities, and ones equipped with back pull-out assemblies.

Screens and flow control systems works include replacement of screens and allied works at Chheda Nagar Drop Shaft to prevent floating debris from entering the pumps, and hence waterbodies. Penstock gates and sluice valves are also being replaced at the Dadar pumping station to enable sewage isolation during maintenance.

Modernization of ventilation systems at key sewage pumping stations includes replacement of blowers (6 Nos.) connecting ducting with dampers and flexible joints at the Influent Pumping Stations in Bandra, polypropylene centrifugal supply-fans in the dry well area at Matunga pumping station and replacing the ventilation

system at Cleaveland Bunder Pumping Station. The XV Finance Commission funds are also being used to replace vent shafts with odour control systems.

The department has undertaken the procurement of instruments to strengthen wastewater quality monitoring.

Refurbishment of a 10.3 MLD capacity STP using Submerged Aerated Fixed Film (SAFF) technology is planned at Mahul Village, Chembur, in M/West Ward. An arrangement has been made between BMC and M/s. HPCL Refinery, Mahul for the sale of treated water. The discharge of treated water, meeting prescribed Maharashtra Pollution Control Board (MPCB) norms, will benefit local ecosystem. Through similar arrangements, the department is supplying 14.8 MLD of treated water for non-potable purposes to entities such as the Hindustan Petroleum Corporation Ltd., Bharat Petroleum Corporation Ltd., municipal gardens, Raj Bhavan and the Navy.

Augmentation/Refurbishment of the existing Silt Drying System at Dadar Silt Yard is planned. The Silt Drying system is a drying plant designed to treat silt/ sludge removed from sewer lines & manholes. It comprises various equipment like Decanter, Drier/Heater, etc. designed & arranged in a system to treat wet sludge/ silt scientifically & convert it into dry, inert material for safe transportation & disposal at a suitable dumping site.

The work of rehabilitation of lagoons using bioremediation technology has been completed at Versova, Ghatkopar, Bhandup and Malad wastewater treatment facilities, with work ongoing at Lovegrove and Bandra. Bioremediation uses specially selected microbes to naturally break down pollutants and clean contaminated lagoon sites. This project has used a tested microbial consortium from IIT-Roorkee, resulting in reduced sewage pollutant parameters up to the discharge standards prescribed by MPCB. The eco-friendly, non-toxic, non-pathogenic, non-corrosive, and non-contagious microbial solution poses no health risk to humans, animals, or the ecosystem, and can be implemented without major civil infrastructure, at less capital cost.

The rehabilitation of rising mains at Churchgate and Banganga pumping stations, and rehabilitation of man entry sewer lines using trenchless technology is also complete. Trenchless technologies that enable fast curing times, avoid chemical or heating processes, and are relatively cost-effective include GRP lining, Fold and Form PVC lining, Cured-in-Place Pipe (CIPP) with UV curing, Mild Steel Welded Lining (MWSL), and Geopolymer Spray Lining. Other works pertaining to the rehabilitation and systematic cleaning of sewer lines are ongoing.

As part of its efforts towards systematic cleaning of sewers, the department will procure 4 pairs of Modified Power Bucket Machines, Robo Vehicles, and vehicle

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| | mounted hydraulically operated modern grab type manhole desilting machines and has already procured portable manhole cover lifters. The department is also making use of the PPP model to procure, operate and maintain sewer cleaning machines and Quick Response Vehicles. Under this model, contractors are responsible for meeting defined cleaning targets, including resolving complaints and conducting CCTV surveys of sewer lines based on pipe diameters. The targets range from attending a minimum of 5 complaints per shift to performing CCTV inspections of up to 150 meters. |
| Enabling Actions | The department aims to utilise geospatial mapping and real-time location tracking to monitor sewers by commissioning 2 Differential Global Positioning System (DGPS) base stations & 8 Nos. DGPS handheld rovers. DGPS is an enhanced version of the standard GPS that improves accuracy by using correction signals from ground-based reference stations. DGPS reduces positioning errors to 0.5–2 meters, or even centimetre-level, as against 5–10 meters for standard GPS, making it more suitable for precise applications. |
| **Sewerage Projects Department** | |
| Direct Actions- Not Quantified | The sewerage system of Greater Mumbai is organized into seven zones: Colaba, Worli, Bandra, Versova, Malad, Bhandup, and Ghatkopar.<br><br>Using the XV Finance Commission's Water Fund, the department has undertaken the task of rejuvenation of 3 water bodies on pilot basis. These include Sion Lake, Sheetal Lake, and Dingeshwar Lake. The work includes desilting, sewer works, setting up of pretreatment units, and mobile treatment units. These efforts will help protect Mumbai's natural resources and safeguard the aquatic ecosystem.<br><br>A consultant has been appointed to prepare a DPR on diversion of dry weather flow coming into major nallas within the BMC jurisdiction, thus causing pollution of seas/ creeks. An action plan for the said work and checking site feasibility is in progress.<br><br>The Sewerage Project department is also undertaking the work of providing and laying new sewer lines and diversion of sewer lines within the B.M.C. limit. The department is additionally upsizing existing sewer lines in MHADA layouts in Western Suburbs, Eastern Suburbs, and the City area. The work of providing and laying new sewer lines will be carried out using trenchless technologies such as micro-tunnelling, H.D.D., pipe pushing technique, etc. These methods drastically reduce environmental damage, including disturbance to existing soil ecosystems and ground cover, when compared to traditional open-cut construction techniques. The department is planning the sewer line network at various locations and additional locations have been added to the list this year.<br><br>The rejuvenation of the Poisar, Dahisar, Walbhat and Oshiwara rivers is being carried out to improve the water quality, river health, and riverine and riparian ecosystems. The said work is being executed by the Storm Water Drains (SWD) department. |

## Mumbai Sewerage Disposal Project (MSDP)

Direct Actions- Not Quantified

The Mumbai Sewerage Disposal department, responsible for creating facilities for disposal of municipal sewage, has undertaken upgradation of various Wastewater Treatment Facilities (WwTF) in Mumbai, with upto secondary level treatment. The capacities and locations of the WwTF are as follows: 500 MLD in Worli, 360 MLD in Bandra, 418 MLD in Dharavi, 180 MLD in Versova, 454 MLD in Malad, 337 MLD in Ghatkopar, and 215 MLD in Bhandup. These WwTF will treat municipal wastewater as per the latest effluent discharge standards of Hon. National Green Tribunal (NGT).

As per these norms, 50% of treated water will be disposed into the sea and the rest will be treated further upto tertiary level for recycle and reuse for non-potable purposes. These 7 WwTFs will be commissioned by June 2026 to June 2028. Versova's WwTF is expected to be done by the next year and utilises XV Finance Commission's Water Fund. These new WwTFs are in addition to the construction of Colaba WwTF, which was completed and commissioned in April 2020 and is meeting the latest effluent discharge standards of NGT.

Furthermore, the department is constructing new Malad and Versova Influent Pumping Stations and upgrading existing Influent Pumping Stations at Bhandup and Ghatkopar. These pumping stations will receive raw wastewater from the collection system, remove large trash and debris, and lift the wastewater for treatment in the Wastewater Treatment Facilities.

Under the Mithi River Rejuvenation Project, MSDP department is also constructing 2.6 m internal diameter Sewer Tunnel by segmental lining method for intercepting and conveying about 168 MLD Dry Weather Flow of sewage entering into Mithi River from Bapat Nalla and Safed Pul Nalla to the Dharavi Wastewater Treatment Plant for treatment. At Dharavi WwtF, the sewage will undergo treatment before being released into the creek at Mahim.

A Sewage Treatment Plant of 0.5 MLD capacity is also set up at Veermata Jijabai Bhosale Botanical Udyan and Zoo. The treated wastewater is used within the Zoo premises for cleaning and irrigation purposes.

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| Enabling Actions | The department is also undertaking consultancy services for the conversion of waste sludge into bio-fertiliser. A tender will be invited to appoint a consultant to study how Class-A sludge (which will be generated from the STPs) can be converted into useful products, followed by support in implementation and project management. Once the study is completed; the department will create a separate project for the execution of the work.<br><br>The Mumbai Sewerage Disposal Project has also undertaken the following works as part of consultancy services for planning and implementing solutions for efficient sewerage management.<br><br>a. In-situ treatment of 25 nalla stretches in western suburbs of Mumbai, using 'N-Treat' technology using screening, sedimentation, bio-curtains, floating rafter, plants, bio-culture, growth hormones and disinfection, etc.<br>b. Feasibility Study and preparation of Detailed Project Report (DPR) for treatment of 34 nalla stretches in Eastern Suburbs using Bioremediation/ Phytoremediation and other suitable treatment methods. |
| **Planning Department** | |
| Direct Actions- Not Quantified | The Planning department has been providing 100% concession on BEST ticket fares for persons with disabilities. Approximately 4.67 lakh tickets on average per month have been reimbursed to persons with disabilities between financial years 2022-23 and 2024-25. |
| **Development Planning Department** | |
| Enabling Actions | The Development Planning Department undertakes land acquisition of plots reserved for open spaces as part of implementing Mumbai's Revised Development Plan 2034 (RDDP 2034). Open spaces include gardens, recreational grounds, playgrounds, municipal schools with playgrounds, and access streets. The RDDP 2034 made provisions for 7,834.41 ha (6.13 sq.m. per capita). Of this, 1,892.22 ha is reserved public open space targeted for acquisition.<br><br>In FY 2024-25, the department took possession of 13 land parcels in D, F/N, K/E, K/W, L, P/N and S wards, with seven of these plots having an area of 8,604.56 sq.m. For FY 2025-26, it has allocated budget for acquisition of 92 plots across 21 wards, with an estimated available area of 26 ha (available for 66 plots). |

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| | Land is acquired through multiple legal mechanisms: possession or transfer of government and Vacant Land Tenancy land; purchase notices with compensations, Land Acquisition and Rehabilitation (LAR) proceedings, and suo moto acquisitions. These processes involve notifying the land under the Land Acquisition Act, obtaining Joint Measurements (JM) to define the land boundaries, issuing awards, and making compensation payments through the Special Land Acquisition Officer (SLAO). Procedural steps, include obtaining legal clearances, resolving ownership disputes, issuing compensation awards, and securing approvals across administrative levels. Even after possession is taken, formalities such as mutation of land records (Property Card corrections) and final award declarations may continue. |
| **Public Health Department** | |
| Direct Actions- Not Quantified | The city has also allocated funds for the procurement of biomedical waste bags and bins. The department will be procuring colour-coded bags and bins (black, red, blue and yellow) for the segregation of biomedical waste (BMW), ensuring at least three-way separation for composting, recycling, and safe disposal. Biomedical waste is treated and disposed of using methods such as autoclaving, microwaving, chemical disinfection, dry heat sterilisation, incineration, and deep burial. Proper segregation using colour-coded containers is essential for the effective application of these treatment techniques. This will improve the city's overall waste management and ensure that highly contagious biomedical waste is properly separated from regular waste.<br><br>The Public Health Department also routinely organises 2–3 training sessions in a year for healthcare professionals to help build their capacity to manage health risks related to climate change and pollution. To strengthen heat resilience and ensure access to cooling spaces during extreme heat events or heat-related health concerns, the Aapla Dawakhana dispensaries/ clinics are equipped with air-conditioned rooms, which serve as cooling centers. Aapla Dawakhanas offer a range of healthcare services, including general medicine, specialities, and diagnostic services at a subsidized rate. |
| **Health Infrastructure Cell (part of Public Health Department)** | |
| Direct Actions- Quantified | The Health Infrastructure Cell is undertaking construction of several new healthcare facilities, including a Multispeciality clinic and Arogya Kendra at Aarey Road, Goregaon, Multispeciality Bhandup Hospital, Centenary Hospital in Govandi, expansion of K.M. Jyotiba Phule Hospital in Vikhroli East, a new hospital adjacent to Siddharth Hospital, and a new hospital at Sangharsh Nagar.[@]<br><br>It is also redeveloping multiple existing healthcare facilities, including Murli Deora Eye Hospital in Kamathipura (E Ward), Gaurabai Hospital in Kamathipura |

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| | (E Ward), Sion Hospital, B.Y.L. Nair Hospital in E Ward, Bhagwati Hospital Complex Phase-II in Borivali (West) (R/North Ward), Siddharth Hospital, and the Maulana Abul Kalam Azad Municipal Maternity Home.[@]<br><br>Key sustainability measures include the installation of solar streetlights, solar water heaters, and rooftop solar photovoltaic (PV) systems, enabling these facilities to partially meet their energy demands through clean, renewable sources.<br><br>To improve energy efficiency, most hospital projects will install LED lighting, and some will adopt Integrated Building Management Systems (BMS) to centrally control electrical and mechanical systems based on real-time occupancy and usage patterns. Lighting automation systems and centrally controlled air-conditioning systems in few projects will enhance operational efficiency.<br><br>Some of the Heating, Ventilation and Air Conditioning (HVAC) systems will be based on water-cooled chillers, which are more environmentally friendly than conventional systems that rely on freon gas. These systems will also improve thermal comfort within hospital buildings. |
| Direct Actions- Not Quantified | Many health care facility projects feature sewage treatment plants (STPs) and effluent treatment plants (ETPs) to manage wastewater sustainably and comply with environmental regulations.<br><br>Generator exhaust systems are being upgraded in line with the latest standards, with provisions for exhaust stacks that minimize environmental impact by dispersing emissions above the building height threshold.<br><br>The installation of Pneumatic Tube Systems (PTS) will enable the safe and hygienic transport of infected linen and medical equipment, minimize human handling and reduce the risk of contamination and infection during intra-hospital transfers. Stormwater drainage systems are being upgraded. Safety and resilience are also being prioritized in the health care facilities projects. Fire-Resistant Low Smoke Zero Halogen (FRLSZH) cables are being used, reducing fire risk and toxic emissions in the event of a short circuit or fire. Additionally, fire-fighting systems, plumbing infrastructure, and centralised drinking water and hot water supply systems are being incorporated across facilities. |
| **Deonar Abattoir** | |
| Direct Actions - Quantified | The Deonar Abattoir has introduced dual-chamber Piped Natural Gas-based incinerators at slaughterhouse premises designed for safe and environmentally responsible disposal of carcasses. The system features a primary combustion chamber operating at 800–850°C for burning organic waste, and a secondary chamber at 1050–1100°C to oxidize gases and minimize harmful emissions. It includes a flue gas treatment system to control PM, SOx, and NOx emissions, and a heat exchanger unit to improve energy efficiency.<br><br>PNG-based systems are significantly cleaner than traditional wood-fired |

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| | crematoriums, eliminating wood use and producing minimal smoke, ash, and greenhouse gases, while complying with MPCB air quality standards.<br><br>The 50 kg/hr incinerator has been operational since September 2023, while the 500 kg/hr incinerator has been installed at Deonar Abattoir and is in the process of availing PNG supply. The incinerators will help reduce GHG emissions by 555.18 tons per year.<br><br>The bio-methanation plant at Deonar Abattoir, installed in 2015, processes all slaughterhouse wet waste—including animal stomach contents, remains, tissues, and bones—in accordance with MPCB norms. With an annual disposal of 5,91,710 kg of organic waste, the plant currently generates around 13,315 units of electricity per year. The abattoir is in the process of appointing expert consultants for upgradation of the bio-methanation plant's efficiency and explore the production of nutrient-rich organic manure, which could help enhance the abattoir's environmental performance. The plant will help reduce GHG emissions by 446.36 tons per year.<br><br>The department will also carry out replacement of one existing pump with energy efficient water pump with a 50 HP energy efficient water pump, estimated to save 10,000 kWh annually, thereby reducing operational costs while promoting sustainable energy use. The new pump will help reduce GHG emissions by 7.27 tons per year. |
| Direct Actions- Not Quantified | A feasibility study for modernisation and upgradation of Deonar Abattoir is currently underway. Key climate-positive measures being considered include energy-efficient refrigeration and cold storage systems to lower power use and prevent spoilage, rainwater harvesting and wastewater treatment for better water management, solar PV panels and heaters to reduce fossil fuel use, the option of Green Power Tariff, potentially sourcing electricity from off-site solar or wind energy, and energy-efficient infrastructure like LED lighting and Variable Frequency Drives (VFDs) to optimise energy consumption. For effluent treatment, and rainwater harvesting a Zero Liquid Discharge (ZLD) system is being considered for implementation to reduce water wastage and maximize reuse. The treated water shall be reused for internal processes like cooling, washing, and sanitation.<br><br>The Deonar Abattoir's Effluent Treatment Plant (ETP), operational since 2004 with a capacity of 1.3 million litres per day (MLD), is built to ensure that effluent meets MPCB discharge standards. It follows a multi-stage treatment process—starting with primary screening and grit removal, followed by biological treatment using the activated sludge process, and concluding with tertiary clarification and filtration. Sludge is dewatered and disposed of in accordance with environmental regulations. The treated water, with significantly reduced Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) levels, is reused for non-potable purposes such as floor cleaning, equipment washing, and landscaping irrigation within the abattoir premises, and is also provided to the local ward office for road cleaning. This strengthens the facility's commitment to reducing freshwater consumption, |

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| | lowering operational costs, preventing water pollution, promoting environmental compliance and circular water use. Budget provision is made for the refurbishments to the Effluent Treatment Plant at Deonar Abattoir, to replace the primary clarifier and secondary aerator.<br><br>The abattoir will install a modern slaughter line with an automated Blood Coagulator and Dryer system to safely and efficiently process slaughterhouse blood, with a capacity of 20,000 litres per batch. The advanced plug-and-play system separates blood from wastewater—sending wastewater to the Effluent Treatment Plant—and uses an eco-friendly, high efficiency electric boiler to dry the coagulated blood. The dried coagulated blood is repurposed as a high-protein ingredient for animal feed, used in organic fertilizers due to its nitrogen content, and processed into protein supplements for pet food and aqua feed. The system supports cleaner operations, better waste management, and circular use of byproducts. |
| **Wards** | |
| Direct Actions - Quantified | E and M West wards are utilizing funds from the XV Finance Commission for 25 kW solar panels - at the E ward Municipal Office Building, and at General Arunkumar Vaidya Swimming Pool and BMC Schools in M West ward. |

@ In ensuring adoption of sustainable practices across projects having this symbol, the departments will adhere to a set of core principles:

- Utilizing LED lights to enhance energy efficiency and reduce electricity consumption.
- Designating areas within sites for plantation and landscaping to increase green cover and promote local biodiversity.
- Implementing systems to capture and utilize rainwater effectively and manage stormwater runoff.
- Installing rooftop solar panels on selected buildings to harness solar energy for electricity generation, contributing to renewable energy adoption and lowering carbon emissions.
- Establishing Sewage Treatment Plants (STPs) to conserve and efficiently manage water by treating wastewater onsite and reuse for irrigation or flushing.

Budget provisions for these projects are part of the additional budget incorporating MCAP components.

## BEST Undertaking- Electric Supply Division

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| Direct Actions- Quantified | The BEST Undertaking submitted its updated Resource Adequacy Plan (RAP) to the Maharashtra Electricity Regulatory Commission (MERC) on 27th January 2025. Covering FY 2025–26 to FY 2034–35, the plan includes a demand forecast, medium- and short-term resource adequacy plans, and a power procurement strategy, including plans for procurement of renewable energy. The demand forecast was developed using a Multi Linear Regression (MLR) model, which incorporates meteorological and economic variables—such as temperature, precipitation, and State GDP—along with values to account for seasonality and trends. Future values of these inputs were projected using ARIMA time-series methods. BEST also considered the impact of electric vehicle adoption and rooftop solar expansion on future demand.<br><br>To meet its projected demand, BEST has outlined a procurement mix that includes 2620.68 million units thermal (non-renewable), and 1674.59 Mus from renewable sources (691.67 Mus Solar, 242.28 Mus Wind, and 740.64 Mus Hydro) for FY 2025–26, with a 15% planning reserve margin. It plans to procure energy through short-term contracts this year, should there be delays in the commissioning of the solar energy source.<br><br>Looking ahead, BEST plans to contract 201 MW of Firm and Dispatchable Renewable Energy (FDRE) in FY 2027–28 and further expand with 15 MW FDRE and 54 MW wind in FY 2028–29. By FY 2029–30, BEST's portfolio is expected to include a diversified mix aligned with MERC's mandate to ensure reliability while integrating renewable sources effectively.<br><br>BEST Undertaking is actively promoting rooftop solar adoption among its consumers, with or without subsidies, and is currently implementing the PM Surya Ghar Muft Bijli Yojana. This national scheme offers subsidies and concessional loans for residential rooftop solar installations. Residential consumers can avail subsidy of ₹30,000 per kW for the first 2 kW and ₹18,000 per kW for the next 1 kW, with a maximum subsidy of ₹78,000. In the Group Housing Societies/Residential Welfare Association (GHS/RWA), Rs.18,000 per kW for common facilities, including EV charging, up to 500 kW capacity (at 3 kW per house) with the upper limit being inclusive of individual rooftop plants installed by individual residents.<br><br>Consumers can opt for net metering—allowing them to offset electricity bills with self-generation—or gross metering, where they are compensated for the energy supplied to the grid. Non-residential consumers can apply online on BEST Undertaking's website for rooftop solar installations without subsidy.<br><br>In FY 2025–26, residential sector is projected to add 18 new consumers generating 428982 kWh. The commercial sector is expected to add 29 new consumers (28 LT and 1 HT), generating 524,375 kWh. In the government sector, 4 new public service consumers are projected to generate 230,836 kWh, while the industrial sector is expected to contribute 29,862 kWh from 2 new LT consumers. |

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| | In total, in FY 2025-26, 645 consumers are expected to have rooftop systems installed, generating approximately 11.48 million kWh of renewable energy annually. All this will help reduce emissions by 581.31 $tCO_2e$ annually. |
| Enabling Actions | BEST Undertaking is in the process of appointment of consultant to study & implement a range of Demand Side Management (DSM) measures focused on promoting energy efficiency and reducing peak demand through consumer education, load research, energy audits, and technology upgrades. Key initiatives include programmes to replace inefficient lighting and appliances, sustained load surveys, and planned large-scale deployment of energy-efficient equipment over the next five years. This year, budget allocation has been made to onboard the services of a consultant to support the DSM programmes.<br><br>The proposal to sign a E-Retail Partnership agreement with EESL is in under process to make available energy efficient appliances such as LED tube light, LED lights, BLDC Fans and energy efficient appliances to consumers. |
| **BEST Undertaking Transport Section** | |
| Direct Actions-Quantified | In FY 2025–26, BEST Undertaking is expanding its electric bus fleet through a combination of direct purchases and wet lease arrangements under the Gross Cost Contract (GCC) model. This expansion is being supported by BEST's own budget, BMC grants, and the XV Finance Commission's Air Fund. Under the XV FC Air Fund alone, BEST has issued contract work-order for the operation of 2100 single-decker and 200 double-decker electric buses through wet leasing, of which 464 single-decker and 50 double-decker buses are currently in operation. In addition to, Contract work orders for 2400 & 250 single-decker AC Electric buses have been issued on wet lease.<br><br>As of now, BEST operates a fleet of 2683 buses, of which 2,119 are on wet lease, including 900 electric buses and 1225 CNG buses.<br><br>In the coming year, with the support of the BMC grant, BEST plans to purchase 273 single-decker and 237 MIDI electric AC buses for its owned fleet and induct an additional 4,436 electric buses through wet leasing. A per the revised budget expenditure estimate for 2024-25, 2576 electric buses will be procured to maintain BEST's owned fleet of 3337 buses.<br><br>Through these measures, BEST plans to achieve a total fleet size of 10,000+ buses by March 31, 2026—comprising 3,337 owned buses and 6,845 wet-leased buses. With 8422 electric buses planned (510 owned and 1774 leased in FY 2025–26), and 200 CNG buses, the projected fleet mix will be 84.22% electric, 15.4% CNG, and 2.43% diesel—moving BEST significantly closer to its target of a complete zero-emission fleet by 2026-27. This transition is also expected to support an increase in annual ridership, with BE 2025–26 estimating 38.31 lakh passengers, marking a rise of over 8.96 lakh in 2 years. |

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| | For its own motor vehicles fleet, BEST Undertaking plans to scrap 27 diesel cars and wet lease 141 electric cars in FY 2025-26. |
| Direct Actions- Not Quantified | The Undertaking provides subsidized public transport to a wide range of commuters, including freedom fighters, persons with total blindness, students up to Class XII, persons with physical disabilities, mentally challenged students, accredited press reporters, and senior citizens—through both tickets and bus passes. Even for the public, BEST bus fares have been kept low and subsidized to ensure accessible public transport across Mumbai. A fare hike is anticipated this year. For FY 2025–26, the subsidy amount is projected at ₹ 2,132.51 crore. The subsidies for persons with disabilities persons are reimbursed by BMC.<br><br>To expand charging infrastructure for both public and private EVs, BEST has an agreement in place with M/s. Reliance BP Mobility Ltd. since 2022 for the installation, operation, and maintenance of EV charging stations across Mumbai and its suburbs. BEST Undertaking has established public electric vehicle charging stations at 57 key locations (276 chargers) across Mumbai city and the suburban district. This charging infrastructure includes a mix of fast (60 kW) and slow (22–30 kW) chargers to cater to different charging needs of 2-Wheeler, 3-Wheeler, private e-cars and delivery vans. Out of these, 51 charging stations are operational and 6 are under development. Under this public-private partnership, BEST earns ₹11.22 per unit of electricity consumed for EV charging and ₹2,000 per parking slot per month in land rental. In FY 2024-25, revenue of ₹ 5.23 crore is collected and for year 2025-26 revenue collection of ₹ 6.03 crores is estimated.<br><br>To support the transition to electric buses, BEST is developing robust EV charging infrastructure. Four new 33 kV receiving substations are proposed at Dharavi, Anik/ Pratiksha Nagar, and Wadala bus depots for EV charging. At present, 14 charging station for BEST operated buses are in operation.<br><br>Complementing electrification, BEST has commissioned app-based CNG filling stations at Ghatkopar, Goregaon and Gorai depots in association with Mahanagar Gas Ltd, whereas the remaining 12 depots will become operational in phase manner in year 2025-26. |

# Annexure 3:

## Solid Waste Management (SWM) Department

**$CH_4$ emissions from Per MT of Municipal Waste**

The average composition of Brihanmumbai Municipal Waste is as follows-

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|---|---|
| Food Waste (organic- wet) | 72.60 % |
| Wood, clothing (organic- dry) | 3.51 % |
| Sand, stone, and fine earth | 17.37 % |
| Plastic | 3.24 % |
| Paper and recyclables (including metals) | 3.28 % |
| Management of landfill considered | Uncategorized |

(Source- Report of NEERI,2016)

The table below shows the emission reductions for 1 MT of waste.

| **Source** | **Total GHGs (metric tonnes $CO_2e$)** |
|---|---|
| | $CH_4$ |
| Direct release of landfill gas to atmosphere | 0.738 |

Source: CIRIS tool

Methane generated using methane commitment method (GPC Chapter 8.3.2, Page 92)[16]

| Quantity of waste (in MT) | $tCO_2e$ |
|---|---|
| 1 | 0.738 |

**1. XVFC- Installation of Bio-methanation plant at BMC hospitals** (Ongoing FY 2025-26)

***Specifications:***

4 bio-methanation plants of 2MT/day capacity each are being installed and operated across municipal hospitals. These plants process organic waste into clean fuel and electricity. The processing of organic waste avoids methane emissions otherwise generated from anaerobic decomposition in landfills.

Capacity per plant = 2 MT/day
Total capacity = 4 × 2 = 8 MT/day
Operational days/year = 365
Total organic waste processed annually = 8 × 365 = 2,920 MT/year
Each MT of organic waste diverted avoids emissions due to landfill $CH_4$ generation.

***Assumptions & Emission Factor:***

- Emission factor for $CH_4$ avoidance from municipal waste: 0.738 $tCO_2e$/tonne
- Energy recovery is not double counted as avoided landfill emissions are primary GHG benefit.

[xi] Calculations for climate relevant actions reported in FY 2024-25 climate budget have also been updated based on revised emission factors following latest GHG inventory

***Calculations:***

| Parameter | Value |
|---|---|
| Annual Organic Waste Treated | 2,920 MT |
| Emission Factor | 0.738 $tCO_2e$/MT |
| Total Emissions Avoided | 2,154.96 $tCO_2e$ |

1 No. (2MT/day Capacity) Bio-Methanation Plant at Sewri TB Hospital

***Specifications:***

- Daily organic waste processed = 2 MT
- Operational days/year = 365
- Annual organic waste diverted = 2 × 365 = 730 MT

***Projected Emission Avoided:***

| Units | Value |
|---|---|
| Annual Organic Waste Treated (MT) | 730.00 |
| Emission Factor ($tCO_2e$/MT) | 0.738 |
| Total GHG Emission Avoided | 538.74 $tCO_2e$ |

**Total annual GHG emissions saving from this project- 2154.96 + 538.74= 2693.7 $tCO_2e$**

Note:
The pilot project generates approximately 80 kg of clean biogas/day or 250 kWh/day of renewable electricity. For GHG estimation, only $CH_4$ emissions from landfill avoidance have been accounted for, following standard methodology.

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**2. Technological Upgradation of Mahalaxmi Refuse Transfer Station** (Ongoing FY 2025-26)

***Specification:***
**Current MSW received:** 700 TPD
**After modernisation:**

- Municipal solid waste is mechanically segregated
- Recyclables recovered
- Reduced landfill burden

***Assumption:***
Out of 700 TPD, 60% is considered Wet Waste and 40% Dry waste
Considering 40% dry waste diverted from landfill
Annual Dry waste handled: 700 TPD×0.4x365=1,02,200 MT/year

***Calculations:***
$CH_4$ emissions avoided by preventing dry waste from being landfilled.
Emission factor for dry municipal solid waste diverted from landfill (uncategorised):
= **0.3 tCO2e/MT**
*(Source: CIRIS tool, based on methane commitment method as per GPC Chapter 8.3.2, Page 92)*[16]

The table below shows the emission reductions for 1,02,200 MT/year of waste, avoided from landfill.

| **Source** | **Total GHGs (metric tonnes $CO_2e$)** |
|---|---|
| | $CH_4$ |
| Direct release of landfill gas to atmosphere | 30,660 |

Therefore, the estimated annual emission reduction from modernisation of Mahalaxmi Refuse Transfer Station is **30,660 $tCO_2e$.**

| Quantity of waste (in MT) | $tCO_2e$ |
|---|---|
| 1 | 0.3 |
| 1,02,200 | 30,660 |

## 3. Setting up dry waste collection sheds in wards

Specifications of E Ward Dry Waste Collection Shed:
Dry Waste Handling Capacity– 4 MTD

***Calculations:***
Dry waste diverted to Material Recovery Facilities instead of landfill.
Total quantity of dry waste processed per year:
= 4 MTD × 365 days = 1460 MT/year

$CH_4$ emissions avoided by preventing dry waste from being landfilled.
Emission factor for dry municipal solid waste diverted from landfill (uncategorised):
= 0.3 tCO2e/MT
(Source: CIRIS tool, based on methane commitment method as per GPC Chapter 8.3.2, Page 92)

The table below shows the emission reductions for 4 MT of dry waste avoided from landfill:

| **Source** | **Total GHGs (metric tonnes CO2e)** |
|---|---|
| $CH_4$ (diversion of dry waste from landfill) | 438 |

Therefore, potential emission reduction by setting up dry waste centre shed at E-ward is **438 $tCO_2e$/year**.

| **Quantity of waste (in MT)** | **$tCO_2e$ avoided** |
|---|---|
| 1 | 0.3 |
| 1460 | 438 |

**4. Solid Waste Management at Deonar Dumping Ground** (Ongoing FY 2025-26)

- *Development of Waste to Energy Project at Deonar Dumping Ground*

***Specifications:***

Waste to Energy Plant capacity- 600 TPD (Tons Per Day)

Estimated energy generation- 8 MW/ day

***Calculations:*** *Development of Waste to Energy Project at Deonar Dumping Ground*

***Specifications:***

- Waste to Energy Plant capacity- 600 TPD (Tons Per Day)
- Estimated energy generation- 8 MW/ day

***Calculations:***

Potential emissions from 600TPD of landfill waste.

600 TPD x 365 days = **2,19,000 tons** annually

$CH_4$ emissions from per MT of Municipal Waste = 0.738 $tCO_2e$

The table below shows the emission reductions for 2,19,000 T of waste.

| Source | Total GHGs (metric tonnes $CO_2e$)<br>$CH_4$ |
|---|---|
| Direct release of landfill gas to atmosphere | 1,61,622 |

Therefore, potential emission reduction through preventing 600TPD of landfill waste is **1,61,622 $tCO_2e$**.

| Quantity of waste (in MT) | $tCO_2e$ |
|---|---|
| 1 | 0.738 |
| 2,19,000 | 1,61,622 |

B. Potential emission from 8 MW of energy generated

Weighted average emission factor of Indian Grid for FY 2023-24 (including renewable energy sources) = 0.727 $tCO_2/MWh$ [17]

- Total energy generated from 8 MW by the WtE plant per day for a year (assuming that it runs for 12 hours),

8 MW x 12 hours/day x 365 days/year = 35040 MWh

Therefore, projected emission avoided,

= Total energy generated per year x weighted emission factor

= 35040 MWh x 0.727 tCO2/MWh = 25,474.08 $tCO_2$

- Therefore, total carbon emission reduction from development of Waste to Energy Project at Deonar Dumping Ground (A + B) is **1,87,096.08 $tCO_2e$.**

- *Biomining of legacy waste at Deonar Dumping Ground*

***Calculations:***

Assuming 1MT of legacy waste being bio-mined i.e 1 MT of waste being avoided in the landfill.

The table below shows the emission reductions for 1 MT of waste.

| Source | Total GHGs (metric tonnes $CO_2e$) |
|---|---|
| | $CH_4$ |
| Direct release of landfill gas to atmosphere | 0.738 |

Source: CIRIS tool
Methane generated using methane commitment method (GPC Chapter 8.3.2, Page 92) [16]

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**5. Dumpsite Reclamation Project at Mulund Dumping Ground (MDG) (Ongoing FY 2025-26)**

***Specifications:***

Quantity of waste- 70 lakh MT, 70,00,000 MT

***Calculations:***

$CH_4$ emissions from per MT of Municipal Waste = 0.738 $tCO_2e$

The table below shows the emission reductions for 70 lakh MT of waste, avoided from landfill.

| Source | Total GHGs (metric tonnes $CO_2e$) |
|---|---|
| | $CH_4$ |
| Direct release of landfill gas to atmosphere | 51,66,000 |

Therefore, potential emission reduction by removal of 70 lakh MT landfilled waste is **51,66,000 $tCO_2e$**.

| Quantity of waste (in MT) | $tCO_2e$ |
|---|---|
| 1 | 0.738 |
| 70,00,000 | 51,66,000 |

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**Completion Status of Project as of FY 2024-25**

***Specifications:***
Total legacy waste processed and disposed in FY 2024-25: 43.48 lakh MT = 4,348,000 MT

***Calculations:***
Total quantity of legacy waste processed = 4,348,000 MT

Projected GHG emissions avoided = 4,348,000 × 0.738 = **3,208,824 $tCO_2e$**

| **Quantity of waste (in MT)** | **$tCO_2e$ avoided** |
|---|---|
| 1 | 0.738 |
| 4,348,000 | **32,08,824** |

Therefore, the estimated GHG emission reduction achieved through the processing of 43.48 lakh MT of legacy waste in FY 2024-25 is **32,08,824 $tCO_2e$.**

**Completed Projects**

**A. <u>2 600 TPD C&D Waste Processing Plants (Total 1200 TPD)</u>** (Completed FY 2024-25)
- *Collection, Transportation & Disposal of Construction & Demolition (C&D) Waste in Mumbai*

***Specifications:***
Slice A (For City & Eastern Division) and Slice B (For Western Division).
Slice A: Capacity: 70 TPH or 600 TPD; Tipping Fee: INR 1425/Ton
Slice B: Capacity: 70 TPH or 600 TPD; Tipping Fee: INR 1415/Ton

***Calculations:***
Potential emissions from 1200 TPD of C&D waste.
1200 TPD × 365 days = 438,000 tonnes/year of C&D waste processed.

C&D waste does not release methane, but its scientific processing and reuse offsets emissions from the extraction and use of virgin construction materials. Based on conservative estimates, approximately 60% of the processed C&D waste is reused for aggregate applications and 40% for sand replacement. Material reuse estimates are based on CPCB guidelines for C&D waste management.

The table below shows the emission reductions for 4,38,000 MT of C&D waste processed:

| **Material Replaced** | **Share** | **Tonnes Replaced** | **Emission Factor (tCO2e/ton)** | **GHG Avoided (tCO2e)** |
|---|---|---|---|---|
| Aggregate | 60% | 2,62,800 | 0.0058 | 1524.24 |
| Sand | 40% | 1,75,200 | 0.0030 | 525.6 |
| **Total** | | | | **2049.84 tCO2e/year** |

Therefore, the estimated annual emission reduction from operation of the 2 600 TPD C&D Waste Processing Plants (total 1200 TPD) is **2049.84 tCO2e.**

B. **<u>Installation of Plasma Technology-based Domestic Hazardous Waste (DHW) Disposal Units</u>** (Completed in FY 2024-25)

***Specifications:***
Supply, Installation, Testing and Commissioning (SITC) of 08 modular units, each with a capacity of 04 TPD, employing plasma arc technology for scientific disposal of Domestic Hazardous Waste (DHW). The system targets difficult-to-manage waste such as paints, cleaners, solvents, pesticides, e-waste residues, and biomedical household discards.

***Calculations:***

Total disposal capacity:
08 units × 4 TPD = 32 TPD

Annual waste processed:
32 TPD × 365 days = 11,680 MT/year

Avoided GHG emissions from uncontrolled landfilling, burning, or co-disposal (assumed emission factor for hazardous waste disposal = 1.5 $tCO_2e$/MT).

World Bank Urban Solid Waste Management Review (2018) and IPCC 2006 Volume 5[18]: Waste – Incineration and Open Burning - Guidelines estimate GHG emissions avoided by controlled incineration or plasma arc of mixed hazardous waste in the range of: 1.4–2.3 $tCO_2e$/ton, depending on calorific value, segregation, and combustion efficiency.

For controlled plasma arc disposal in India: WRI & GIZ India studies (2020)[19] suggest a safe national average of 1.5 $tCO_2e$/ton of DHW avoided from open burning/landfilling.

| Quantity of Waste (in MT) | $tCO_2e$ Avoided |
|---|---|
| 1 | 1.5 |
| 11,680 | 17,520 |

## Mechnical and Electrical (M&E) Department

**<u>1. XVFC- Installation of PNG-based crematorium</u>** (Ongoing FY 2025-26)
<u>2 Nos. of PNG Pyre Sets to be Installed</u>
***Specifications:***
The pyres will reduce wood consumption by approximately 200 kg per cremation compared to traditional pyres.

***Calculation:***
Average cremations per pyre per year – 1,000
Total cremations annually – 2 × 1,000 = 2,000 cremations/year
Wood saving per cremation – 200 kg
Emission Factor of burning 1 tonne of wood - 2.45 tCO2e [18]
GHG Emissions Avoided per Cremation (adjusted for 200 kg wood use):

| Units | $CO_2$ | $CH_4$ | $N_2O$ | Total |
|---|---|---|---|---|
| $tCO_2e$ | 0.455 | 0.031 | 0.005 | 0.491 |

Total Emissions Avoided Annually (for 2,000 cremations):

| Units | $CO_2$ | $CH_4$ | $N_2O$ | Total |
|---|---|---|---|---|
| $tCO_2e$ | 910.00 | 62.00 | 10.00 | 982.00 |

8 Nos. of PNG Pyre Sets Installed (Completed FY 2024-25)

**Calculation:**

Average cremations per pyre per year – 1,000

Total cremations annually – 8 × 1,000 = 8,000 cremations/year

Wood saving per cremation – 200 kg

GHG Emissions Avoided per Cremation using 200 kg wood:

| Units | $CO_2$ | $CH_4$ | $N_2O$ | Total |
|---|---|---|---|---|
| $tCO_2e$ | 0.455 | 0.031 | 0.005 | 0.491 |

Total Emissions Avoided Annually (for 8,000 cremations):

| Units | $CO_2$ | $CH_4$ | $N_2O$ | Total |
|---|---|---|---|---|
| $tCO_2e$ | 3,640.00 | 248.00 | 40.00 | 3,928.00 |

Total annual estimated GHG emission saving from project = 982+ 3,928= **4,910 $tCO_2e$**

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2. **Providing PNG Gas connections in Mahalakshmi Dhobighat** (Ongoing 2025-26)

***Specifications:***

40 gas connections are proposed to be installed at Mahalakshmi Dhobighat to replace traditional fuels such as coal, wood, cotton stock, and kerosene waste.

***Assumptions:***

- Average baseline fuel per connection/day = 5 kg of mixed biomass/fossil fuel (coal/wood/cotton/kerosene waste)
- Daily use per connection = 5 kg × 40 connections = 200 kg/day
- Annual use = 200 kg/day × 300 days = 60,000 kg/year = 60 tonnes/year
- Composite emission factor for mixed traditional fuels (based on IPCC average for wood/coal/kerosene): 2.5 $tCO_2e$/tonne
- PNG (replacement fuel) has lower emission intensity and cleaner combustion. Only avoided emissions from fuel replacement are considered.

***Calculations:***

| Parameter | Value |
|---|---|
| Traditional Fuel Replaced | 60 tonnes/year |
| Emission Factor | 2.5 $tCO_2e$/tonne |
| Total Emissions Avoided | 150.00 $tCO_2e$/year |

**Remarks:**

- Gas-based heating systems offer improved thermal efficiency and significantly reduced particulate, $NO_x$, and unburnt hydrocarbon emissions.
- The project enables a clean-energy transition for informal workers and aligns with air quality improvement goals in dense urban service zones.

---

**3. Upgradation of High Mast System**

***Specifications:***

Number of lights to be replaced – 2400

Metal Halide/ High Pressure Sodium Vapour (HPSV) bulb streetlights- 400 W

Smart LED flood light high mast- 150 W

***Calculations:***

Weighted average emission factor of Indian Grid for FY 2023-24 (including renewable energy sources) = 0.727 $tCO_2$/MWh

Electricity saved each mast light= 400 W – 150 W = 250 W

Total energy saved for 2400 number of lights,

= 250 W x 2400 = 60,00,00 W = 0.6 MW

Assuming operation of 8 hrs for 365 days,

Total energy saved for a year = 0.6 MW x 8 hrs x 365 days = 1752 MWh

Therefore, potential emission avoided = 1752 MWh x 0.727 $tCO_2$/MWh= 1273.704 **$tCO_2$**

| Number of lights replaced | Potential $tCO_2e$ reduced |
|---|---|
| 1 | 0.53 |
| 2400 | 1273.7 |

---

**4. Installation of solar panel systems at various peripheral hospitals**

***Specifications:***

Capacity of solar panel system to be installed- 385 KW

***Calculations:***

Weighted average emission factor of Indian Grid for FY 2023-24 (including renewable energy sources) = 0.727 $tCO_2$/MWh

For a year,

385 KW x 8 hrs x 365 days = 11,24,200 KW = 1124.2 MWh

Projected emission avoided = 1124.2 MWh x 0.727 $tCO_2$/MWh= **817.29 $tCO_2e$**

| Solar panel system to be installed (KW) | Potential $tCO_2e$ avoided |
|---|---|
| 1 | 2.12 |
| 385 | 817.29 |

---

**5. Carbon Cutter System**

***Specifications:***

Retrofitted to wood pyre cremation system.

Flue gases reduction at source

| | |
|---|---|
| Carbon Monoxide | 90% |
| Carbon Dioxide | 70% |
| Hydrocarbons | 46% |
| Sulphur Oxide | 67% |
| Nitrogen Oxide | 65% |

***Calculations:***

Average wood used per cremation = 300 kg = 0.3 T

GHG Emissions = Wood used per cremation x Emission factor for wood

GHG Emissions per cremation:

| **Units** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **Total** |
|---|---|---|---|---|
| **$tCO_2e$** | 0.683 | 0.046 | 0.007 | 0.736 |

Net zero machines reduce the other flue gases emitted at source, 70% Carbon dioxide and 65% Nitrogen Oxide at source i.e., $tCO_2$ = 0.683 x 0.70 = **0.4781**

Therefore, total potential emission reduction per cremation,

| **Units** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **Total** |
|---|---|---|---|---|
| **$tCO_2e$** | 0.4781 | 0.046 | 0.005 | 0.566 |

Based on 2022-23 data, the number of cremations at cemetery where installation of carbon cutter system is proposed = 1707

Therefore, total potential emission reduction with proposed carbon cutter system would be **903.18 $tCO_2e$.**

| **Units** | **$CO_2$** | **$CH_4$** | **$N_2O$** | **Total** |
|---|---|---|---|---|
| **$tCO_2e$** | 816.12 | 78.52 | 8.54 | **903.18** |

---

**7. Replacing existing AC units with comparatively more energy efficient AC units in various municipal office and hospital buildings** (Ongoing FY 2025-26)

Calculating greenhouse gas (GHG) emission reductions by replacing R22 refrigerant with R134a refrigerant per unit:

The GWP of R22 over a 100-year timeframe is approximately 1,810, while the GWP of R134a is about 1,430. [15]

Let's assume, replacing 1 unit of R22 refrigerant with 1 unit of R134a refrigerant for a specific application.

Emission reduction per unit = Emissions from R22 - Emissions from R134a

Emission reduction per unit = (GWP of R22 - GWP of R134a) * Quantity of refrigerant used

Emission reduction per unit = (1,810 - 1,430) * 1 unit

Emission reduction per unit = 380 * 1 unit

Emission reduction per unit = 380 kg CO2-equivalent units = **0.38 tCO2e**

***60 units are planned for installation in FY 2025-26.***

60 nos. of 2 Tonne of Refrigerant (TR) inverter AC units using R22 refrigerant with R134a refrigerant i.e. total 120 tonnes of refrigerant.

It's important to consider other factors such as leakage rates, energy efficiency, and system performance when evaluating the overall environmental impact of the refrigerant replacement.

| No of units of R22 refrigerant replaced with R134a refrigerant | $tCO_2e$ reduction |
|---|---|
| 1 | 0.38 |
| 120 | 45.6 |

***55 AC Units installation was completed in FY 2024-25.***

40 nos. of 2 Tonne of Refrigerant (TR) inverter AC and 15nos. of 1 TR inverter AC units using R22 refrigerant with R134a refrigerant i.e. total 95 tonnes of refrigerant.

It's important to consider other factors such as leakage rates, energy efficiency, and system performance when evaluating the overall environmental impact of the refrigerant replacement.

| No of units of R22 refrigerant replaced with R134a refrigerant | $tCO_2e$ reduction |
|---|---|
| 1 | 0.38 |
| 95 | 36.1 |

**Annual potential GHG emissions saving from this project-** FY 2025-26: 45.6 $tCO_2e$**,** FY 2024-25: 36.1 $tCO_2e$

## Markets Department

**1. Fitting LED lights in municipal markets** (Ongoing FY 2025-26)

***Calculations:***

Average watt of electricity used,

Incandescent bulb- 60 watt, CFL bulb- 15 watt, LED bulb- 8 watt

Weighted average emission factor, simple operating margin (OM), of Indian Grid for FY 2023-24 (adjusted for cross-border electricity transfer & including RES), in t $CO_2$/MWh = 0.727

Considering CFL bulb, 15W - 8W = 7W

Assuming operation of 8 hrs for 365 days,

i. By replacing **Incandescent bulb with LED bulb**

| | |
|---|---|
| Average electricity saved | = Watt of electricity used by incandescent bulb – Watt of electricity used by LED<br>= 60W - 8W = 52W |
| Total energy saved per year | = 52W x 8h x 365 days = 0.15 MWh |
| Projected emission avoided | = 0.15 MWh x 0.727 $tCO_2$/MWh<br>= **0.109 $tCO_2e$** per bulb per year |

ii. By replacing **CFL bulb with LED bulb**

| | |
|---|---|
| Average electricity saved | = Watt of electricity used by incandescent bulb – Watt of electricity used by LED<br>= 15W - 8W = 7W |
| Total energy saved per year | = 7W x 8h x 365 days = 0.02 MWh |
| Projected emission avoided | = 0.02 MWh x 0.727 $tCO_2$/MWh<br>**= 0.014 $tCO_2e$** per bulb per year |

| | Energy consumption saved | $tCO_2e$ avoided |
|---|---|---|
| **Per unit of energy saved** | 1 MWh | 0.727 |
| **Per Incandescent bulb** | 0.15 MWh | 0.109 |
| **Per CFL bulb** | 0.02 MWh | 0.014 |

**2. Installation of solar panels on rooftop of market buildings** (Ongoing FY 2025-26)

***Specifications:***

Capacity of one solar system= 25 KW, Number of markets= 2

***Calculations:***

Total emission reduction = Energy generated per year (MW) X weighted emission factor for electricity ($tCO_2$ /MWh)

Weighted average emission factor of Indian Grid = 0.727 $tCO_2$/MWh

| Markets | Number of 25 KW solar (n) | Energy generated daily (e) (25 KW x n) *KW* | Annual energy generation (A) (8h x 365 days x e) *MW* | Emissions (A x weighted emission factor) *$tCO_2$* |
|---|---|---|---|---|
| Babu Genu Market | 3 | 75 | 219 | 159.21 |
| Mahatma Jyotiba Phule Market | 1 | 25 | 73 | 53.07 |
| Total | 4 | 100 | 292 | 212.28 |

| Energy generation | $tCO_2e$ avoided |
|---|---|
| 1 MW | 0.727 |
| 292 MW | 212.28 |

Installation of Solar Power System at Topiwala Market (Completed FY 2024-25)

***Specifications:***
Installed capacity – 100 kW

***Calculations:***
Annual energy generation = 100 × 8 × 365 = 292,000 kWh = 292.00 MWh
Weighted average emission factor of Indian Grid for FY 2023-24 = 0.727 $tCO_2$/MWh
Projected emission avoided = 292.00 × 0.727 = 212.284 $tCO_2e$

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 292.00 | 212.284 |

**Annual potential GHG emissions saving from this project-**

FY 2025-26- 147.1 $tCO_2e$**,** FY 2024-25- 212.28 $tCO_2e$

**Completed Projects**

A. **Operational Waste Collection and Manure Generation from Markets in FY 2024-25**
(Projects completed in FY 2022-23 & 2023-24)

***Specifications (actuals):***
Number of OWCs in operation- 3 (Market Department)

Total waste collected at these 3 OWCs – 15,671.921 MT (received at 3 nos. of OWCs)
Wet (organic) waste – 12,681.831 MT
Manure generated – 2,422.28 MT

***Calculations:***
Wet waste collected from municipal markets and processed through Organic Waste Converters (OWC), avoiding landfill.
$CH_4$ emissions avoided by diverting 12,681.831 MT of wet waste from landfill.
Emission factor for organic waste diverted from landfill: = 0.9 tCO2e/MT
(Source: CIRIS tool, based on methane commitment method as per GPC Chapter 8.3.2, Page 92) [16]

The table below shows the emission reductions for 12,681.831 MT of wet waste avoided from landfill:

| Source | Total GHGs (metric tonnes $CO_2e$) |
|---|---|
| $CH_4$ (diversion of organic waste from landfill) | 11,413.648 |

Therefore, the potential emission reduction from actual diversion of wet waste from markets through 3 OWC units in FY 2024–25 is **11,413.648 $tCO_2e$**.

| Quantity of waste (in MT) | $tCO_2e$ avoided |
|---|---|
| 1 | 0.9 |
| 12,681.831 | 11,413.648 |

## Water Supply Project (WSP) Department

1. Development of Renewable Hybrid Energy Project Facilities at HSBT Middle Vaitarna Dam (Ongoing FY 2025-26)

***Specifications:***

Capacity of Hydro Electric Power Plant= 20 MW

Capacity of Floating Solar PV= 6.5 MW

***Calculations:***

Annual Energy generated (MWh) = Capacity (MW) x Hours in a Year x Capacity Factor

For Hydro Electric Power Plant,

Capacity Factor of Hydro Electric Power Plant = 40 %

Therefore, annual energy from 20MW Hydro Electric Power Plant = 20 x 24 x 365 x 0.40 = 70,080 MWh

Projected emission avoided = 70080 MWh x 0.727 $tCO_2$/MWh = **50,948.16 $tCO_2$**

For Floating Solar PV System,

Capacity Factor of Solar PV Power Plant = 17-25 %, assuming 20%[16]

Therefore, annual energy from 6.5 MW Floating Solar PV Power Plant = 6.5 x 8 x 365 x 0.20 = 3,796 MWh

Projected emission avoided= 3,796 MWh x 0.727 $tCO_2$/MWh **= 2,759.69 $tCO_2$**

The total potential emission reduction by developing the hybrid power plant at Middle Vaitarna Dam is **53,707.85 $tCO_2$.**

| | Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|---|
| | 1 | 0.727 |
| Hydro Electric Power Project | 70080 | 50,948.16 |
| Floating Solar PV Project | 3796 | 2759.69 |

## Transport Department

**1. Procurement of EV Sedan cars** (Ongoing FY 2025-26)

A. Mahindra EV Cars (3 Nos.) – Replacing Petrol Cars
**Assumptions (as per MoRTH and ICCT studies)** [20]**:**

- Average annual km per car: 18,000 km/year
- Fuel efficiency of petrol car: 14 km/l
- Petrol emission factor: 2.31 kg $CO_2$/litre
- Electric car energy efficiency: 0.15 kWh/km
- Grid emission factor: 0.727 $tCO_2$/MWh

**Step 1: GHG from petrol use (baseline)**

- Petrol use/year/car = 18,000 / 14 = 1,285.71 litres
- GHG = 1,285.71 × 2.31 / 1000 = **2.97 $tCO_2$/car/year**

**Step 2: GHG from EV electricity**

- Electricity used = 18,000 × 0.15 / 1000 = 2,700 kWh = 2.7 MWh
- GHG = 2.7 × 0.727 = **1.96 $tCO_2$/car/year**

**Net GHG avoided per car = 2.97 – 1.96 = 1.01 $tCO_2$/year**

**Total for 3 cars = 3 × 1.01 = 3.03 $tCO_2$/year**

**Completed works**

**Total 41 cars procured** (9 in FY 2024-25, 32 in FY 2023-24)

**Specifications:**
The deployment contributes to direct GHG emission reductions through avoided petrol combustion.

**Assumptions:**

- Average annual distance driven per car = 18,000 km
- Fuel efficiency of petrol car = 14 km/litre
- Emission factor for petrol = 2.31 kg $CO_2$/litre (IPC default)
- EV electricity efficiency = 0.15 kWh/km
- Grid emission factor (India average) = 0.727 $tCO_2$/MWh

**Net GHG avoided per car = 2.97 – 1.96 = 1.01 $tCO_2$/year**

**Total GHG Emission Avoided for 41 Cars:**
= 1.01 × 41 = **43.17 $tCO_2e$/year**

**Annual potential GHG emissions saving from this project-**

FY 2025-26- 3.16 $tCO_2e$, FY 2024-25- 43.17 $tCO_2e$

## Hydraulic Engineers Department

**1. Install solar panels in various Chowkies** (Ongoing FY 2025-26)

Solar Rooftop Photovoltaic (SRTPV) System at Mohili & Jambhivali Pressure Monitoring Chowky, Aghai Security Chowky and Aghai Police Chowky

**Specifications:**
Number of solar panels – 9
Capacity per panel – 15 kW
Total installed capacity – 9 × 15 = **135 kW**
System designed for 100% utilisation of generated energy

**Calculations:**
Annual energy generation = 135 × 8 hrs/day × 365 days = **394,200 kWh = 394.20 MWh**
Weighted average emission factor of Indian Grid for FY 2023-24 = **0.727 $tCO_2$/MWh**
Projected emission avoided = 394.20 × 0.727 = **286.58 $tCO_2e$**

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 394.20 | 286.58 |

**2. Setting up of Solar Power Generation Plant on the Rooftop of New Master Balancing Reservoir (MBR) at Bhandup Complex** (Ongoing FY 2025-26)

***Specifications:***

Capacity of Solar power generation plant= 2.5 MW

***Calculations:***

Annual Energy generated (MWh) = Capacity (MW) x Hours in a Year x Capacity Factor

Capacity Factor of Solar PV Power Plant = 17-25 %, assuming 20%[17]

Therefore,

Annual Energy from 2.5MW Solar Power Plant = 2.5 x 8 x 365 x 0.20 = 1460 MWh

Projected emission avoided = 1460 MWh x 0.727 $tCO_2$/MWh **= 1,061.42 $tCO_2$**

| Energy generation | $tCO_2e$ avoided |
|---|---|
| 1 MWh | 0.727 |
| 1460 MWh | 1,061.42 |

## City Engineers Department

**1. Solar power generation and appliances at various new municipal building constructions** (Ongoing 2025-26)

**Proposed Redevelopment of Material Testing Laboratory & Asphalt Plant Office, Worli**

**Specifications:**
Installed solar rooftop capacity – 170 kW

**Calculations:**
Annual energy generation = 170 × 8 hrs/day × 365 days = **496,400 kWh = 496.40 MWh**
Weighted average emission factor of Indian Grid for FY 2021–22 = **0.727 $tCO_2$/MWh**
Projected emission avoided = 496.40 × 0.727 = **360.88 $tCO_2e$**

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 496.40 | 360.88 |

**Redevelopment of Open Plot Known as 600 Tenements Deonar, M/E Ward – Installation of Solar Panel**
**Specifications:**
Installed rooftop solar capacity – 235 kW

**Calculations:**
Annual energy generation = 235 × 8 hrs/day × 365 days = **686,600 kWh = 686.60 MWh**
Weighted average emission factor of Indian Grid for FY 2023–24 = **0.727 $tCO_2$/MWh**
Projected emission avoided = 686.60 × 0.727 = **499.15 $tCO_2e$**

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 686.60 | 499.15 |

---

**Proposed Construction of Fire Brigade Station on Land of Amenity Space at Village Kanjurmarg, L.B.S. Road, S Ward – Installation of Solar Water Heater**

**Specifications:**
Solar Water Heater Capacity – **1000 litres per day (LPD)**
**Assumptions:**

- 1,000 LPD system offsets electric geyser/heater load
- Daily heating demand = ~2 kWh per 100 litres , so for 1000 L = **20 kWh/day**
- Annual heating energy saved = 20 × 365 = **7,300 kWh = 7.30 MWh**
- Indian Grid Emission Factor = **0.727 $tCO_2$/MWh**

**Calculations:**
Projected emission avoided = 7.30 × 0.727 = **5.30 $tCO_2e$**

| Energy Saved (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 7.30 | 5.3 |

Therefore, total annual GHG emissions saving from solar power generation and appliances at various new municipal building constructions = 360.88+ 499.15+ 5.3 = **865.33 $tCO_2e$**

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**2. Replacement of conventional lighting with LED lighting in various reconstruction projects** (Ongoing FY 2025-26)

***Assumptions for these calculations:*** Traditional lighting fixtures consume 3 times more electricity than LED

**Reconstruction of Swimming Pool and Sports Complex near Odeon Mall**

***Specifications:***
Number of LED Bulbs – 633 Nos.
Electricity consumption – 35,476 W = 35.476 kW

***Calculations:***
Assumed baseline traditional load = 35.476 × 3 = **106.43 kW**
Electricity saved annually = (106.43 – 35.476) × 8 hrs × 365 days
Electricity saved annually = 70.954 × 8 × 365 = **206.99 MWh**
Projected emission avoided = 206.99 × 0.727 = **150.48 $tCO_2e$**

| **Energy saved (MWh)** | **$tCO_2e$ avoided** |
|---|---|
| 1 | 0.727 |
| 206.99 | 150.48 |

**Redevelopment of Municipal Property at Vikhroli Parkside Layout in N Ward**
**Specifications:**
LED Bulbs – 1661 Nos.
Electricity consumption – 37,590 W = 37.59 kW

**Calculations:**
Assumed traditional lighting load = 37.59 × 3 = **112.77 kW**
Electricity saved annually = (112.77 – 37.59) × 8 hrs × 365 days = **219,336.6 kWh = 219.34 MWh**
Emission factor = 0.727 $tCO_2$/MWh
Projected emission avoided = 219.34 × 0.727 = **159.46 $tCO_2e$**

| Energy saved (MWh) | $tCO_2e$ avoided |
|---|---|
| 1 | 0.727 |
| 219.34 | 159.4 |

---

**Redevelopment of Open Plot Known as 600 Tenements, Deonar, M/E Ward**
**Specifications:**
LED Bulbs – 2,500 Nos.
Electricity consumption – 37.5 kW

**Calculations:**
Assumed traditional lighting load = 37.5 × 3 = **112.5 kW**
Electricity saved annually = (112.5 – 37.5) × 8 hrs × 365 days = **219,000 kWh = 219.00 MWh**
Emission factor = 0.727 $tCO_2$/MWh
Projected emission avoided = 219.00 × 0.727 = **159.21 $tCO_2e$**

| Energy saved (MWh) | $tCO_2e$ avoided |
|---|---|
| 1 | 0.727 |
| 219.00 | 159.21 |

Therefore, total annual GHG emissions saving from replacing conventional lighting with LED lighting in various reconstruction projects = 150.48 +159.4+ 159.21 = **469.09 $tCO_2e$**

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3. **Installation of a Building Management System in proposed redevelopment of Material Testing Laboratory** (On-going FY 2025-26)

***Specifications:***
Building Management System (BMS) with energy optimization features linked to lighting, HVAC, and equipment scheduling.
Estimated load under BMS control – 170 kW

Assumptions:
- BMS systems typically reduce energy consumption by 10–15% through smart controls.
- For conservative baseline estimate, assume 10% savings on controlled load.

- Daily usage assumed = 10 hours/day
- Annual energy saved = 170 × 10% × 10 hrs/day × 365 days = 170 × 0.10 × 10 × 365 = 62,050 kWh = 62.05 MWh

***Calculations:***
Emission factor = 0.727 $tCO_2$/MWh
Projected emission avoided = 62.05 × 0.727 = 45.11 $tCO_2e$

| Energy Saved (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 62.05 | 45.11 |

Therefore, total annual GHG emissions saving from installing the Building Management System (BMS) = **45.11 $tCO_2e$**

## Health Infrastructure Cell (HIC) (Part of Public Health Department)

**1. Various solar installations in hospital construction- solar panels, solar water heaters, solar lighting** (Ongoing FY 2025-26)

**Redevelopment of Siddharth/Murali Deora Eye Hospital, Kamathipura, E Ward**

**Component A: Installation of 9 Solar Street Lights (24W each)**
**Specifications:**
Off-grid solar streetlights (24W) assumed to replace grid-connected lighting

**Calculations:**
Annual energy saved = 24W × 9 × 8 hrs/day × 365 days
= 0.024 × 9 × 8 × 365 = **6307.2 kWh = 6.31 MWh**
Emission factor = 0.727 $tCO_2$/MWh
Projected emission avoided = 6.31 × 0.727 = 4.58 **$tCO_2e$**

**Component B: Solar Water Heating System (6000 LPD)**
**Specifications:**
Solar water heating system capacity – 6000 litres/day
Electricity displaced = ~2 kWh per 100 litres

**Calculations:**
Annual heating energy saved = (6000 ÷ 100) × 2 × 365 = **43,800 kWh = 43.80 MWh**
Projected emission avoided = 43.80 × 0.727 = 31.8 **$tCO_2e$**

**Component C: Solar PV Grid – 24 kW**
**Specifications:**
Installed rooftop solar capacity – 24 kW

**Calculations:**
Annual generation = 24 × 8 × 365 = **70,080 kWh = 70.08 MWh**
Projected emission avoided = 70.08 × 0.727 = 50.94 **$tCO_2e$**

| | Energy/Heat Saved or Generated (MWh) | Projected emission ($tCO_2e$) avoided |
|---|---|---|
| Solar Streetlights (24W × 9) | 6.31 | 4.58 |
| Solar Water Heater (6000 LPD) | 43.80 | 31.8 |
| Solar PV Grid (24 kW) | 70.08 | 50.94 |
| **Total** | **120.19** | **87.32** |

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**2. Redevelopment of Gaurabai Hospital, Kamathipura, E Ward**

**Component A: Solar Water Heating System (500 LPD)**
**Specifications:**
Solar water heating system capacity – 500 litres/day
Electricity displaced = ~2 kWh per 100 litres

**Calculations:**
Annual heating energy saved = (500 ÷ 100) × 2 × 365 = **3650 kWh = 3.65 MWh**
Projected emission avoided = 3.65 × 0.727 = **2.65 $tCO_2e$**

**Component B: Solar PV Grid – 15 kW**
**Specifications:**
Solar PV grid capacity – 15 kW

**Calculations:**
Annual generation = 15 × 8 × 365 = **43,800 kWh = 43.80 MWh**
Projected emission avoided = 43.80 × 0.727 = 31.84 **$tCO_2e$**

| | Energy/Heat Saved or Generated (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|---|
| Solar Water Heater (500 LPD) | 3.65 | 2.65 |
| Solar PV Grid (15 kW) | 43.80 | 31.84 |
| **Total** | **47.45** | **34.49** |

**Proposed Reconstruction of Maulana Abul Kalam Azad Municipal Maternity Home, Malvani – Installation of Solar Water Heater**

**Specifications:**
Solar Water Heater Capacity – 150 litres per day (LPD)

**Assumptions:**
- A 150 LPD solar water heating system is assumed to replace electric geyser/heater usage
- Daily heating energy offset – ~2 kWh per 100 litres
- Therefore, for 150 LPD: (150 ÷ 100) × 2 = **3 kWh/day**
- Annual energy saved = 3 × 365 = **1,095 kWh = 1.10 MWh/year**

**Emission Factor:**
• Indian Grid Emission Factor (CEA, 2023-24): **0.727 $tCO_2$/MWh**

**Projected Emission Avoided:**
= 1.10 MWh × 0.727 $tCO_2$/MWh = **0.799 $tCO_2e$/year**

| Energy Saved (MWh) | Projected Emission Avoided ($tCO_2e$) |
|---|---|
| 1 | 0.727 |
| 1.10 | 0.799 |

Therefore, total annual GHG emissions saving from solar power generation and using solar equipment = 87.36+ 34.49+ 0.799= **122.65 $tCO_2e$**

**2. Water cooled screwed chiller systems in hospital construction projects** (Ongoing FY 2025-26)

**Proposed Construction of Hospital Infrastructure at B.Y.L. Nair Hospital, E Ward – Water-Cooled Screw Chillers**

***HVAC System Proposed:***
- Water-cooled screw chillers
- Combined capacity: 62 TR + 62 TR + 220 TR + 220 TR + 300 TR = 864 TR
- Application: Comfort and medical equipment cooling
- Efficiency: Considered highly efficient compared to air-cooled alternatives

***Assumptions for Emission Estimation:***
- Chiller operating efficiency (Water-cooled screw): 0.65 kW/TR [21]
- Daily operation: 10 hours
- Annual operating days: 300
- Electricity consumption = 864 × 0.65 × 10 × 300 = 1,684,800 kWh = 1,684.80 MWh/year
- Grid Emission Factor (India Average): 0.727 $tCO_2$/MWh

**Projected GHG Emissions (Indicative Load Estimate):**

| Parameter | Value |
|---|---|
| Annual Energy Use | 1,684.80 MWh |
| Emission Factor | 0.727 $tCO_2$/MWh |
| Total Projected Emissions | 1,224.85 $tCO_2e$ |

Therefore, total annual GHG emissions saving from installing the water-cooled screwed chiller system = 1,224.85 $tCO_2e$. Water-cooled screwed chillers are proposed in 2 other projects.

**3. Replacement of conventional lighting to LED lighting in hospital reconstruction projects**
(On-going 2025-26)
Structural repair, renovation, and refurbishment of Topiwala National College Building at BYL Nair Hospital area in E ward

***Specifications:***

- LED Tube Lights – 29 Nos. (18W each)
- LED Tube Lights – 30 Nos. (18W each)
- LED Tube Lights – 2,504 Nos. (40W each)

***Baseline Assumptions:***

- An 18W LED tube light is assumed to replace a traditional 40W fluorescent tube, resulting in a net energy saving of 22W per unit (0.022 kW).
- A 40W LED tube light is assumed to replace a 72W T12 fluorescent fitting, resulting in a saving of 32W per unit (0.032 kW).
- Emission factor: 0.727 $tCO_2$/MWh
  Operational hours: 8 hours/day
  Operational days: 365 days/year

***Calculations:***

- 18W LED Tube Lights:
  59 Nos. × 0.022 kW × 8 hrs/day × 365 days = 3,790.16 kWh = 3.79 MWh
- 40W LED Tube Lights:
  2,504 Nos. × 0.032 kW × 8 hrs/day × 365 days = 233,166.72 kWh = 233.17 MWh

Total Energy Saved = 3.79 + 233.17 = 236.96 MWh
Projected Emission Avoided = 236.96 MWh × 0.727 $tCO_2$/MWh = 172.26 $tCO_2e$

| Energy saved (MWh) | $tCO_2e$ avoided |
|---|---|
| 1 | 0.727 |
| 236.96 | 172.26 |

## Deonar Abattoir Department

**1. Piped Natural Gas-based Incinerators at slaughterhouse premises (Ongoing FY 2025-26)**

***Specifications:***

- Technology: Dual-chamber high-temperature cremation with flue gas treatment
- Installed capacity: 500 kg/hr
- PNG consumption per cremation: ≤ 85 SCM

***Assumptions:***

- PNG Emission Factor (CIRIS, IPCC-based): 2.0 kg $CO_2$/SCM
- Emission factor for firewood (IPCC 2006 Guidelines): 1.747 $tCO_2$/tonne

- Traditional wood-based cremation emission: 0.262 $tCO_2$ per carcass (150 kg firewood × 1.747 $tCO_2$/ton)
- PNG-based cremation emission: 85 SCM × 2.0 kg = 170 kg $CO_2$ = 0.17 $tCO_2$ per carcass
- Net emission avoided per carcass = 0.262 – 0.17 = 0.092 $tCO_2e$

***Projection for Future Capacity Utilisation:***

If operated at moderate scale for 2,000 cremations/year,
Projected emission avoided = 0.092 × 2,000 = 184.00 $tCO_2e$/year

| Cremations (Nos.) | Avoided Emission per Unit ($tCO_2e$) | Total Projected Emission Avoided ($tCO_2e$) |
|---|---|---|
| 2,000 | 0.092 | 184.00 |

Therefore, total annual GHG emissions saving from the PNG-based incinerator = 184.00 $tCO_2e$

**Installation and Operation of PNG-Based Animal Carcass Incinerator at Malad – 50 kg/hr Capacity** (Completed FY 2023-24)

***Specifications:***

- Technology: Dual-chamber high-temperature cremation (primary and secondary chambers with flue gas treatment and heat recovery)
- Fuel consumption per carcass: ≤ 35 SCM (Standard Cremation Method – SCM)
- Annual cremations conducted: 1,928 carcasses

***Assumptions:***

- PNG emission factor (IPCC default for stationary combustion): 2.0 kg $CO_2$/SCM
- Traditional method assumed baseline: wood-based cremation
- Average firewood use per carcass: 150 kg
- Emission factor for firewood (IPCC 2006 Guidelines): 1.747 $tCO_2$/tonne
  Emissions per traditional cremation = 0.150 × 1.747 = 0.262 $tCO_2$
  Emissions per PNG cremation = 35 SCM × 2.0 kg = 70 kg $CO_2$ = 0.07 $tCO_2$

**Net Emission Avoidance per Cremation:**
= 0.262 $tCO_2$ (wood) – 0.07 $tCO_2$ (PNG) = 0.192 $tCO_2$ avoided
Annual Emission Avoided = 0.192 × 1,928 = 370.18 $tCO_2e$

| Source | Total GHGs (metric tonnes $CO_2e$) |
|---|---|
| Transition from wood to PNG fuel | 370.18 |

| Cremations (Nos.) | Avoided Emission per Unit ($tCO_2e$) | Total Avoided Emission ($tCO_2e$) |
|---|---|---|
| 1,928 | 0.192 | 370.18 |

**2. Upgradation of Bio-methanation Plant at Deonar Abattoir (Installed by BARC, 2015)** (Ongoing FY 2025-26)

***Specifications:***

- Annual Organic Waste Treated: 5,91,710 kg = 591.71 MT/year
- Electricity Generated: 13,315 units/year = 13.32 MWh/year

***Assumptions and Emission Factors:***

- Waste diverted from landfill: emission factor for methane avoidance = 0.738 $tCO_2e$/MT (CIRIS/GPC recommended)
- Grid emission factor: 0.727 $tCO_2e$/MWh (India average)

A. GHG Emissions Avoided via Waste Diversion (Landfill Methane Avoidance):
= 591.71 MT × 0.738 $tCO_2e$/MT = 436.68 $tCO_2e$

B. GHG Emissions Avoided via Renewable Electricity Generation (13.32 MWh):
= 13.32 MWh × 0.727 $tCO_2e$/MWh = 9.68 $tCO_2e$

Total GHG Emission Avoided = 436.68 + 9.68 = 446.36 $tCO_2e$/year

| Source | Annual Quantity | Emission Factor | GHG Emission Avoided ($tCO_2e$) |
|---|---|---|---|
| Organic Waste Treated (Landfill diversion) | 591.71 MT | 0.738 $tCO_2e$/MT | 436.68 |
| Renewable Electricity Generated | 13.32 MWh | 0.727 $tCO_2e$/MWh | 9.68 |
| Total | | | 446.36 |

Therefore, total annual GHG emissions saving from the Biomethanation Plant = **446.36 $tCO_2e$**

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**3. Replacement of one existing pump with energy efficient water pump** (Ongoing FY 2025-26)

***Assumptions and Factors:***

• Estimated annual electricity savings = 10,000 kWh = 10.00 MWh (as per make of the pump, as shared by the department)
• Emission factor (Indian Grid, FY 2022-23, CEA v20) = 0.727 $tCO_2e$/MWh

***Calculations:***

**Annual Emission Avoided = 10.00 MWh × 0.727 $tCO_2e$/MWh = 7.27 $tCO_2e$/year**

| Energy Saved (MWh) | Projected Emission ($tCO_2e$) Avoided |
|---|---|
| 1 | 0.727 |
| 10.00 | 7.27 |

Therefore, total annual GHG emissions saving from the new Water Pump = 7.27 $tCO_2e$

## School Infrastructure Cell (SIC) (Part of Education Department)

**1. Replacement of conventional lighting to LED lighting at municipal schools** (On-going FY 2025-26)

***Specifications:***

Number of LED fixtures procured – 33,919 Nos.

***Assumption:*** Each LED replaces a 100W traditional bulb; LED wattage is assumed to be 20W, resulting in an 80W saving = 0.08 kW

**Calculations:**

Energy saved per fixture per year = 0.08 × 8 hrs × 365 = **233.6 kWh**
Total energy saved = 233.6 × 33,919 = **7,929,358.4 kWh = 7,929.36 MWh**
Emission avoided = 7,929.36 × 0.727 = **5,629.85 $tCO_2e$**

| Energy saved (MWh) | $tCO_2e$ avoided |
|---|---|
| 1 | 0.727 |
| 7,929.36 | 5,764.64 |

Therefore, total annual GHG emissions saving from the LED Lighting = **5,764.64 $tCO_2e$**

## Other Completed Projects [22] [23] [24]

1. **LED lighting in public buildings**

Babu Genu Market – LED Lighting Retrofit

***Specifications:***

- LED tube lights = 806 Nos.
- LED bulkhead bulbs = 80 Nos.

***Calculations:***

As per standard assumption:

- Traditional tubelight = 40W, LED tubelight = 18W, resulting in a saving of 22W (0.022 kW)
- Traditional bulb = 60W, LED bulkhead = 8W, resulting in a saving of 52W (0.052 kW)

**Energy saved annually:**

- Tubelights = 0.022 × 806 × 8 × 365 = 52,058.56 kWh = 52.06 MWh
- Bulbs = 0.052 × 80 × 8 × 365 = 12,109.6 kWh = 12.11 MWh
  Total = 64.17 MWh
  Emission avoided = 64.17 × 0.727 = 46.65 $tCO_2e$

| Energy saved (MWh) | $tCO_2e$ avoided |
|---|---|
| 1 | 0.727 |
| 64.17 | 46.65 |

Mahatma Jyotiba Phule Market – LED Lighting Retrofit

***Specifications:***

- LED tube lights = 607 Nos.
- LED bulkhead = 95 Nos.
- LED strips = 99 meters
- LED crisbay = 450 Nos.

***Baseline Comparisons & Energy Savings:***

- Tubelights: Traditional 40W replaced with 18W LED, resulting in 22W savings
- Bulkhead: Traditional 60W replaced with 8W LED, resulting in 52W savings
- LED strips: Traditional 30W/m replaced with 15W/m LED, resulting in 15W/m savings
- Crisbay: Traditional 400W halide replaced with 150W LED, resulting in 250W savings

***Annual Energy Savings:***

- Tubelights = 0.022 × 607 × 8 × 365 = **39,078.32 kWh**
- Bulkhead = 0.052 × 95 × 8 × 365 = **14,435.6 kWh**
- LED strips = 0.015 × 99 × 8 × 365 = **4,329.6 kWh**
- Crisbay = 0.25 × 450 × 8 × 365 = **328,500 kWh**
- Total = **386,343.52 kWh = 386.34 MWh**
- Emission avoided = 386.34 × 0.727 = **280.87 $tCO_2e$**

| Energy saved (MWh) | $tCO_2e$ avoided |
|---|---|
| 1 | 0.727 |
| 386.34 | 280.87 |

Annual energy savings from replacing conventional lighting with LEDs in municipal buildings (FY 2024-25) = 64.1+ 386.34 = **450.44 MWh**

Annual GHG emissions savings from replacing the conventional lighting with LEDs in municipal buildings (FY 2024-25) = 46.65 + 280.87 = **327.52 $tCO_2e$**

## 2. Renewable energy capacity installed within city boundaries (solar power)

Installation of 20 kW Total Solar Rooftop System in G/S Ward at 4 municipal schools- XV Finance Commission (Completed 2023-24)

**Specifications:**
Installed capacity – 20 kW (0.02 MW)

**Calculations:**
Annual energy generation = 20 × 8 × 365 = 58,400 kWh = 58.40 MWh
Projected emission avoided = 58.40 × 0.727 = 42.45 $tCO_2e$

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 58.4 | 42.45 |

2. Supply, Installation, Testing & Commissioning of 35 kW Solar Power Plant on Sewer Office Terrace (XV Finance Commission Project) (Completed FY 2023-24)

***Specifications:***

Installed capacity – 35 kW (0.035 MW)

***Calculations:***

Annual energy generation = 35 × 8 × 365 = **102,200 kWh = 102.20 MWh**

Projected emission avoided = 102.20 × 0.727 = **74.29 $tCO_2e$**

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 102.20 | 74.29 |

No. of MW renewable energy capacity installed in municipal buildings FY 2023-24 = 0.02+ 0.035= 0.055 MW

Estimated annual emissions savings from renewable energy capacity installed in municipal buildings FY 2023-24 = 42.45+ 74.29 = 116.74 tCO2e

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Installation of Solar Power System at Topiwala Market (Completed FY 2024-25)

***Specifications:***

Installed capacity – 100 kW (0.1 MW)

***Calculations:***

Annual energy generation = 100 × 8 × 365 = 292,000 kWh = 292.00 MWh

Weighted average emission factor of Indian Grid for FY 2023–24 = 0.727 $tCO_2$/MWh

Projected emission avoided = 292.00 × 0.727 = 212.28 $tCO_2e$

| **Energy Generation (MWh)** | **Projected emission ($tCO_2$) avoided** |
|---|---|
| 1 | 0.727 |
| 292.00 | 212.284 |

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Installation of 25 kW Solar Panel System- M/West ward (Completed FY 2024-25)

**Specifications:**

Installed capacity – 25 kW (0.025 MW)

**Calculations:**

Annual energy generation = 25 × 8 × 365 = **73,000 kWh = 73.00 MWh**

Projected emission avoided = 73.00 × 0.727 = **53.07 $tCO_2e$**

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 73.00 | 53.07 |

Installation of 20W LED Solar Street Lighting System (Per Unit Basis) (Completed FY 2024-25)

***Specifications:***
Off-grid 20W solar-powered streetlight assumed to replace grid-connected lighting

***Calculations:***
Annual energy saved = 20W × 8 hrs/day × 365 days
= 0.02 kW × 8 × 365 = **58.4 kWh = 0.0584 MWh**
Weighted average emission factor of Indian Grid for FY 2021–22 = **0.727 $tCO_2$/MWh**
Projected emission avoided = 0.0584 × 0.727 = **0.0415 $tCO_2e$**

| **Energy Generation (MWh)** | **Projected emission ($tCO_2$) avoided** |
|---|---|
| 1 | 0.727 |
| 0.0584 | 0.0415 |

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CSR – Installation of 72 kW Solar Panels (Solar Trees & Gazebos in 3 Gardens) (Completed FY 2024-25)

*Locations: Shilpagram (Jogeshwari), Dr. APJ Abdul Kalam Garden, CD Deshmukh Garden (Mulund)*

**Specifications:**
Installed capacity – 72 kW (0.072 MW)

**Calculations:**
Annual energy generation = 72 × 8 × 365 = 210,240 kWh = 210.24 MWh
Projected emission avoided = 210.24 × 0.727 = 152.84 $tCO_2e$

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 210.24 | 152.84 |

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CSR – Installation of 90 kW Solar Tree at Nair Hospital (Completed FY 2024-25)

**Specifications:**
Installed capacity – 90 kW (0.09 MW)
**Calculations:**
Annual energy generation = 90 × 8 × 365 = 262,800 kWh = 262.80 MWh
Projected emission avoided = 262.80 × 0.727 = 191.05 $tCO_2e$.

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 262.80 | 191.05 |

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CSR – Installation of 166.9 kW Rooftop Solar Systems on 5 School Buildings (Completed FY 2024-25)
*Locations: Warli Naka (G-South), Pali Chimbai (H-West), Hasnabad (H-West), Shivaji Nagar (H-East), Bharat Nagar (H-East)*

**Specifications:**
Installed capacity – 166.9 kW (0.166 MW)

**Calculations:**
Annual energy generation = 166.9 × 8 × 365 = 487,348 kWh = 487.35 MWh
Projected emission avoided = 487.35 × 0.727 = 354.30 $tCO_2e$

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 487.35 | 351.30 |

No. of MW renewable energy capacity installed in municipal buildings FY 2024-25 = 0.1 + 0.072 + 0.09 + 0.025 +0.1669 = 0.4539 MW

Estimated annual emissions savings from renewable energy capacity installed in municipal buildings FY 2023-24 = 212.284 + 53.07+ 0.0415+ 152.84 + 191.05 + 351.30 = 950.58 tCO2e

## Total Estimated Annual Greenhouse Gas Emissions Saving from Completed Projects= 3246214.06 i.e. 3.426 million tonnes C02e

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## BEST Undertaking

### Electric Supply Section

1. **Procurement of renewable energy for the electricity supply mix**

***Specifications:***
BEST has proposed procurement of green power from solar, wind, and hydroelectric sources through SECI, IEX, REC, and bilateral procurement mechanisms. The electricity replaces grid supply and avoids emissions based on the Indian grid emission factor.

***Assumptions:***

- Emission factor for grid electricity (India, FY 2021–22): 0.727 $tCO_2e$/MWh
- Only avoided emissions from grid displacement are considered (no double counting of REC)

***Calculations:***

| Source | Energy Procured (MWh) | Emission Factor ($tCO_2e$/MWh) | Emission Avoided ($tCO_2e$) |
|---|---|---|---|
| Walwhan Solar Energy (Maharashtra) | 31.50 | 0.727 | 22.9 |
| RE – Non-Solar (Wind, via SECI+IEX) | 242.28 | 0.727 | 176.13 |
| RE – Solar (SECI + IEX + REC) | 660.17 | 0.727 | 479.94 |
| RE – Hydro (IEX + TPC) | 740.64 | 0.727 | 538.44 |
| Total | 1,674.59 | | 1,217.41 |

***Remarks:***

- This procurement displaces equivalent units of grid electricity and directly contributes to scope 2 emissions reduction in municipal operations.
- Actual emission factor can be updated based on CEA revision or DISCOM-specific data.

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**2. Rooftop Solar Installations by Consumers**

Rooftop Solar Installation by Consumers – Residential Sub-Sector (On-going FY 2025-26)

***Specifications:***
Number of new residential consumers – 18
Additional renewable energy units (RWE) generated – 14,414 kWh = 14.41 MWh

***Calculations:***
Weighted average emission factor of Indian Grid for FY 2023–24 = 0.727 $tCO_2$/MWh
Projected emission avoided = 14.41 × 0.727 = 10.47 $tCO_2e$

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 14.41 | 10.47 |

Rooftop Solar Installation by Consumers – Commercial Sub-Sector (LT Consumers)

***Specifications:***
Number of new commercial LT consumers – 28
Additional renewable energy units (RWE) generated – 460,795 kWh = 460.80 MWh

***Calculations:***
Projected emission avoided = 460.80 × 0.727 = 327.17 $tCO_2e$

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 460.80 | 335.0 |

Rooftop Solar Installation by Consumers – Commercial Sub-Sector (HT Consumers)

***Specifications:***
Number of new commercial HT consumers – 1
Additional renewable energy units (RWE) generated – 63,580 kWh = 63.58 MWh

***Calculations:***
Projected emission avoided = 63.58 × 0.727 = 46.22 $tCO_2e$

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 63.58 | 46.22 |

Rooftop Solar Installation by Consumers – Government Sub-Sector (LT Public Service Consumers)

***Specifications:***
Number of new government LT public service consumers – 3
Additional renewable energy units (RWE) generated – 223,226 kWh = 223.23 MWh

***Calculations:***
Projected emission avoided = 223.23 × 0.727 = 162.28 $tCO_2e$

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 223.23 | 162.29 |

Rooftop Solar Installation by Consumers – Government Sub-Sector (HT Public Service Consumers) (On-going FY 2025-26)

***Specifications****:*
Number of new government HT public service consumers – 1
Additional renewable energy units (RWE) generated – 7,610 kWh = 7.61 MWh

***Calculations:***
Projected emission avoided = 7.61 × 0.727 = 5.53 $tCO_2e$

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 7.61 | 5.53 |

Rooftop Solar Installation by Consumers – Industrial Sub-Sector (LT Consumers) (On-going FY 2025-26)

***Specifications***:
Number of new industrial LT consumers – 2
Additional renewable energy units (RWE) generated – 13,362 kWh = 13.36 MWh

***Calculations:***
Projected emission avoided = 13.36 × 0.727 = 9.9 $tCO_2e$

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 13.36 | 9.9 |

Rooftop Solar Installation by Consumers – Industrial Sub-Sector (HT Consumers) (On-going FY 2025-26)

***Specifications***:
Additional renewable energy units (RWE) generated – 16,500 kWh = 16.50 MWh

***Calculations***:
Projected emission avoided = 16.50 × 0.727 = 11.99 $tCO_2e$

| Energy Generation (MWh) | Projected emission ($tCO_2$) avoided |
|---|---|
| 1 | 0.727 |
| 16.50 | 11.99 |

| **Sector** | **Energy Generated (MWh)** | **Emission Avoided ($tCO_2e$)** |
|---|---|---|
| Residential | 14.41 | 10.47 |
| Commercial (LT) | 460.80 | 335 |
| Commercial (HT) | 63.58 | 46.22 |
| Government (LT) | 223.23 | 162.29 |
| Government (HT) | 7.61 | 5.53 |
| Industrial (LT) | 13.36 | 9.9 |
| Industrial (HT) | 16.50 | 11.99 |
| **Total** | **799.49** | **581.31** |

# Transport Section

## 1. Procurement of Electric Buses

As stated in BEST Undertaking's budget book, the planned procurement of owned buses is proposed as an alternative to CNG buses. For wet leasing as well, it is assumed that CNG buses will be replaced.

***Assumptions & Emission Factors:***
CNG: 2.75 kgCO2/kg
Electricity: 0.727 kgCO2/kWh

***CNG bus efficiency:***
23-seater = 3.0 km/kg;
39-seater = 2.7 km/kg

***EV efficiency:*** 0.85 km/ kWh

***Annual mileage:***
23-seater = 50,000 km;
39-seater = 60,000 km

**A. Scrapping and Replacement of CNG Buses – Owned Fleet**

| | |
|---|---|
| Bus Type | SD Electric AC (23-seat) |
| Quantity of Buses | 273 |
| Annual km per Bus | 60,000 km |
| Fuel Replaced | CNG |
| CNG Use Replaced per Bus | 60,000 ÷ 3.0 = 20,000 kg |
| GHG from CNG | 20,000 × 2.75 = 55,000 kg = 55 $tCO_2e$ |
| Electricity Use per Bus | (60,000 ÷ 0.85) ÷ 1,000 = 70.59 MWh |
| GHG from EV Use | 70.59 × 0.727 = 51.32 $tCO_2e$ |
| Net GHG Avoided per Bus | 55.00 − 51.32 = 3.68 $tCO_2e$ |
| Total GHG Avoided | 273 × 3.68 = 1,004.64 $tCO_2e$ |

| | |
|---|---|
| Bus Type | MIDI Electric AC (39-seat) |
| Quantity of Buses | 237 |
| Annual km per Bus | 50,000 km |
| Fuel Replaced | CNG |
| CNG Use Replaced per Bus | 50,000 ÷ 2.7 ≈ 18,519 kg |
| GHG from CNG | 18,519 × 2.75 = 50,928 kg = 50.93 $tCO_2e$ |
| Electricity Use per Bus | (50,000 ÷ 0.85) ÷ 1,000 = 58.82 MWh |
| GHG from EV Use | 58.82 × 0.727 = 42.76 $tCO_2e$ |
| Net GHG Avoided per Bus | 50.93 − 42.76 = 8.17 $tCO_2e$ |
| Total GHG Avoided | 237 × 8.17 = 1,936.3 $tCO_2e$ |

**B. Wet Lease of Electric Buses - FY 2025-26**

| | |
|---|---|
| Bus Type | SD Electric AC (23-seat) |
| Quantity of Buses | 1200 |
| Annual km per Bus | 60,000 km |
| Fuel Replaced | CNG |
| CNG Use Replaced per Bus | 60,000 ÷ 2.7 = 22,222.22 kg |
| GHG from CNG | 22,222.22 × 2.75 = 61,111.11 kg = 61.11 $tCO_2e$ |
| Electricity Use per Bus | (60,000 ÷ 0.85) ÷ 1,000 = 70.59 MWh |
| GHG from EV Use | 70.59 × 0.727 = 51.32 $tCO_2e$ |
| Net GHG Avoided per Bus | 61.11 − 51.32 = 9.79 $tCO_2e$ |
| Total GHG Avoided | 1200 × 9.79 = 11,748 $tCO_2e$ |

| | |
|---|---|
| Bus Type | DD Electric AC (39-seat) |
| Quantity of Buses | 10 |
| Annual km per Bus | 70,000 km |
| Fuel Replaced | CNG |
| CNG Use Replaced per Bus | 70,000 ÷ 2.7 ≈ 25,925.9 kg |
| GHG from CNG | 25,925.9 × 2.75 / 1000 = 71.29 $tCO_2e$ |
| Electricity Use per Bus | (70,000 ÷ 0.85) ÷ 1,000 = 82.35 MWh |
| GHG from EV Use | 82.35 × 0.727 = 59.87 $tCO_2e$ |
| Net GHG Avoided per Bus | 71.3 − 59.87 = 11.42 $tCO_2e$ |
| Total GHG Avoided | 10 × 11.42 = 114.2 $tCO_2e$ |

**Total GHG Emission Avoided in FY 2025-26:**
Owned SD Electric AC: 1,004.64 $tCO_2e$
Owned MIDI Electric AC: 1,936.3 $tCO_2e$
Leased SD Electric AC: 11,748 $tCO_2e$
Leased DD Electric AC: 114.2 $tCO_2e$
Grand Total = 14,803.14 $tCO_2e$

**2. Wet leasing of Electric Motor Vehicles** (On-going FY 2025-26)

**Specifications:**
141 electric vehicles (EVs) have been taken on wet lease for official municipal use.

**Assumptions:**
- Annual average distance travelled per car: 18,000 km/year
- Baseline fuel type considered: Petrol
- Petrol vehicle fuel efficiency: 14 km/litre
- Emission factor for petrol: 2.31 kg $CO_2$/litre
- EV efficiency: 0.15 kWh/km
- Grid emission factor (India, CEA 2023–24): 0.727 $tCO_2$/MWh

**Stepwise Calculations:**

A. Petrol GHG Emission per Vehicle per Year
= (18,000 / 14) × 2.31 = 2,970 kg $CO_2$ = 2.97 $tCO_2e$

B. EV GHG Emission per Vehicle per Year
= (18,000 × 0.15) kWh = 2,700 kWh = 2.70 MWh
= 2.70 × 0.727 = 1.96 $tCO_2e$

C. Net GHG Avoided per Car per Year
= 2.97 – 1.96 = 1.01 $tCO_2e$/car/year

**Total GHG Avoided for 141 Cars:**
**= 0.8108 × 141 = 114.32 $tCO_2e$/year**

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