



PROJECT STATEMENT

Pune City

Supporting Transformation
of Energy and Recovery
Materials Initiative



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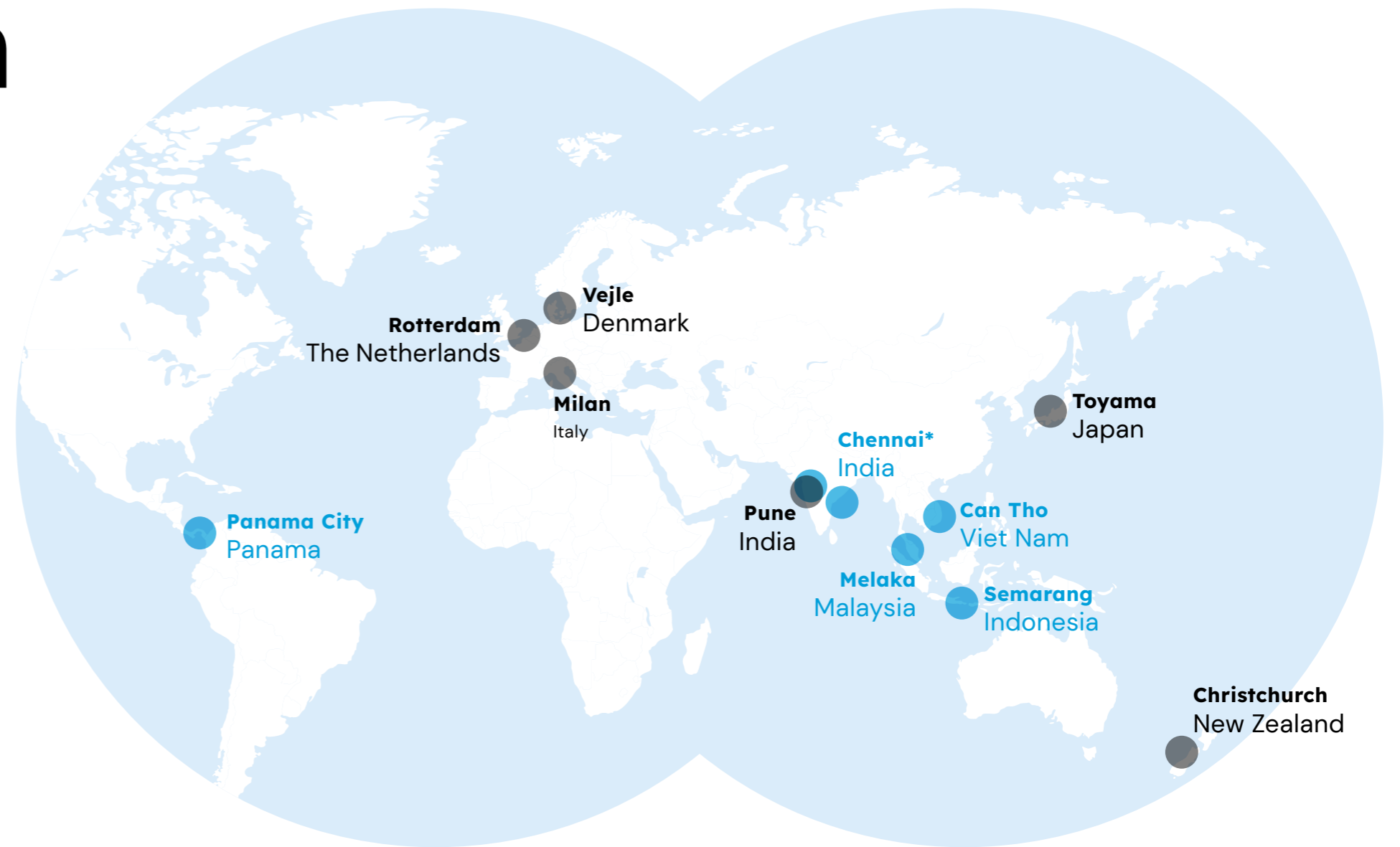
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Introduction

● URBAN OCEAN MENTOR CITIES

● URBAN OCEAN LEARNING CITIES

* Chennai was welcomed as an additional city to the first cohort in August 2021 and it is working through an accelerated program order



Overview of the Urban Ocean Challenge

Cities are home to over half of the global population and account for nearly three-quarters of global greenhouse gas (GHG) emissions¹. The Covid-19 pandemic could push between 71 and 100 million people into extreme poverty, of which 30 percent will reside in urban centers². No climate nor social target will be met without a deep transformation of urban centers towards a more inclusive, sustainable and, ultimately, resilient path. Approaching urban waste management systems through a resilience lens reveals the complex, interrelated ramifications for social, economic, and environmental indicators. It is estimated that the waste management sector alone

has the potential to create 45 million jobs globally and reduce GHG emissions by 15 to 20 percent³. At the same time, the circular economy offers a \$4.5 trillion economic opportunity by reducing waste, stimulating innovation, and creating employment by 2030⁴. Adding a layer of complexity by including the marine plastic debris challenge can push cities towards rethinking their relationship with the ocean. So, a huge opportunity exists for city governments to implement policies and projects that promote a more resilient and circular waste sector in their cities. Now is the time to set out the path towards a more resilient urban-ocean relationship.



Program Objective

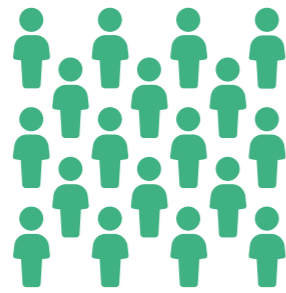
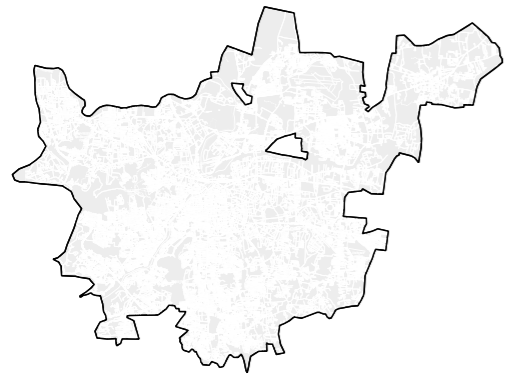
The Urban Ocean program aims to work with city leaders to bring new ideas, partners, and resources together to solve interrelated resilience challenges related to waste management, to reduce plastic leakage and to protect water bodies and the ocean. Urban Ocean provides the platform for ocean advocates and city leaders to join forces with other allies to develop comprehensive solutions that meet the needs and priorities of governments, cities, communities and other actors to create real and lasting impact. The program demonstrates how actions to improve waste management and recycling can provide resilient and sustainable solutions that reduce ocean plastic pollution and address key city priorities, such as improving public health, supporting economic development, and reducing greenhouse gas emissions. Furthermore, Urban Ocean provides cities with the opportunity to showcase leadership and share knowledge and experience across the Resilient Cities Network (R-Cities) community and beyond.

Project Statement

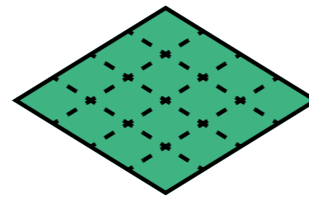
This Project Statement is the result of the dedication of Pune City and trusted partners to develop specific actions to advance solutions to address plastic waste challenges, as mandated by the state to manage municipal waste. It is based on a rigorous gap assessment process and several capacity-building sessions that helped the city pinpoint the best opportunities for impact and formulate data-driven, multipronged approaches to implement locally. It outlines the context and the needs of the city on which the project builds. It provides the vision and an outline of the impact the city is trying to achieve.

Context

The City

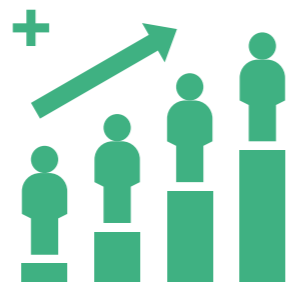


5 million
population in 2021



5,600
people
per square
kilometre

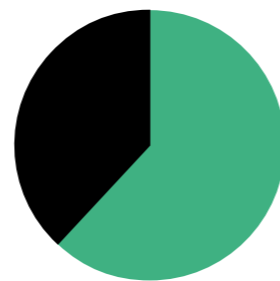
**7th most
populous**
and
**9th largest city
in India**



The population is
projected
to reach
**over 5.6
million**

in 2031 if trends
continue⁵

Source: World
Population Review 2021



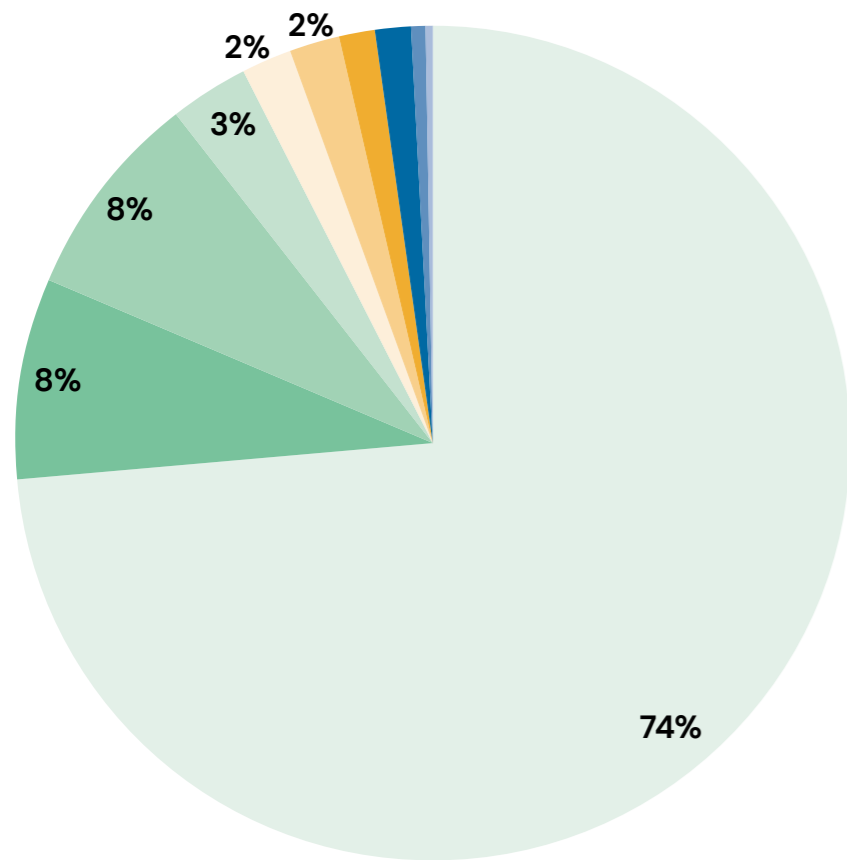
**Young
population:**
62%
of inhabitants are
**under the
age of 30**

Pune is considered the cultural and industrial capital of the Indian state of Maharashtra, with a strong economy, especially in the IT, manufacturing and engineering sectors. The city also has a fairly young population. Pune has been documented as one of the fastest-growing cities in the Asia-Pacific region for the past 40 years.

The growth of Pune has increased municipal waste production. Pune has made strides in recent years toward maximizing its waste collection and management and reducing the amount of waste leakage. However, with a growing population and future projections of waste generation, Pune still faces challenges related to coping with waste and reducing plastic pollution. Municipal waste streams in Pune are highly complex, because of urbanization, an extensive informal-sector workforce and value chain, waste volume, variety of material movement, high-priced urban land and frequent changes in rules, regulations and bylaws.

The Pune Municipal Corporation (PMC), the Solid Waste Collection and Handling (SWaCH) cooperative, informal-sector recyclers, compost service providers, private enterprises in waste management, a range of micro-enterprises and several voluntary civil society efforts are part of the waste management ecosystem in the city. Pune's administration is decentralized around the city: there are 15 ward offices and 211 Kothis, with staff enough to support implementation and enforcement, including two Chief Sanitary Inspectors, 29 Divisional Sanitary Inspectors, 155 Sanitary Inspectors and 211 Mukaddams. Meanwhile, the state government body, Maharashtra Pollution Control Board (MPCB), performs the regulatory role. The city has seen increasing corporate social responsibility and Extended Producer Responsibility (EPR) arrangements, which are expected to grow and support the system transformation necessary for the circular economy.

The City's Waste Management System



SWM Composition in Pune (Sohkhlet and Nagargoje, 2020)

According to the PMC's Environment Status Report, the average amount of solid waste generated in the city is about 2,000 to 2,100 metric tons per day. This is about 455 grams per capita. The municipal waste in Pune consists of a significant component of organic waste (about 55 to 60 percent), while recyclable materials are about 20 percent of the total by mass. Typically for India and like other countries in the region, the majority (74 percent) of the municipal solid waste generated in Pune is organic, followed by plastic and paper which each represent 8 percent of the waste stream⁶.

The city has initiated waste segregation at the neighborhood level. A high percentage of segregation levels are achieved in areas where door-to-door services are operational. The PMC has an agreement with SWaCH for door-to-door waste collection, which currently serves nearly 800,000 households or about two-thirds of the total households in the city. Under this partnership, waste collection services are also extended to lower-income areas and slums at reduced user fees, subsidized by the PMC.

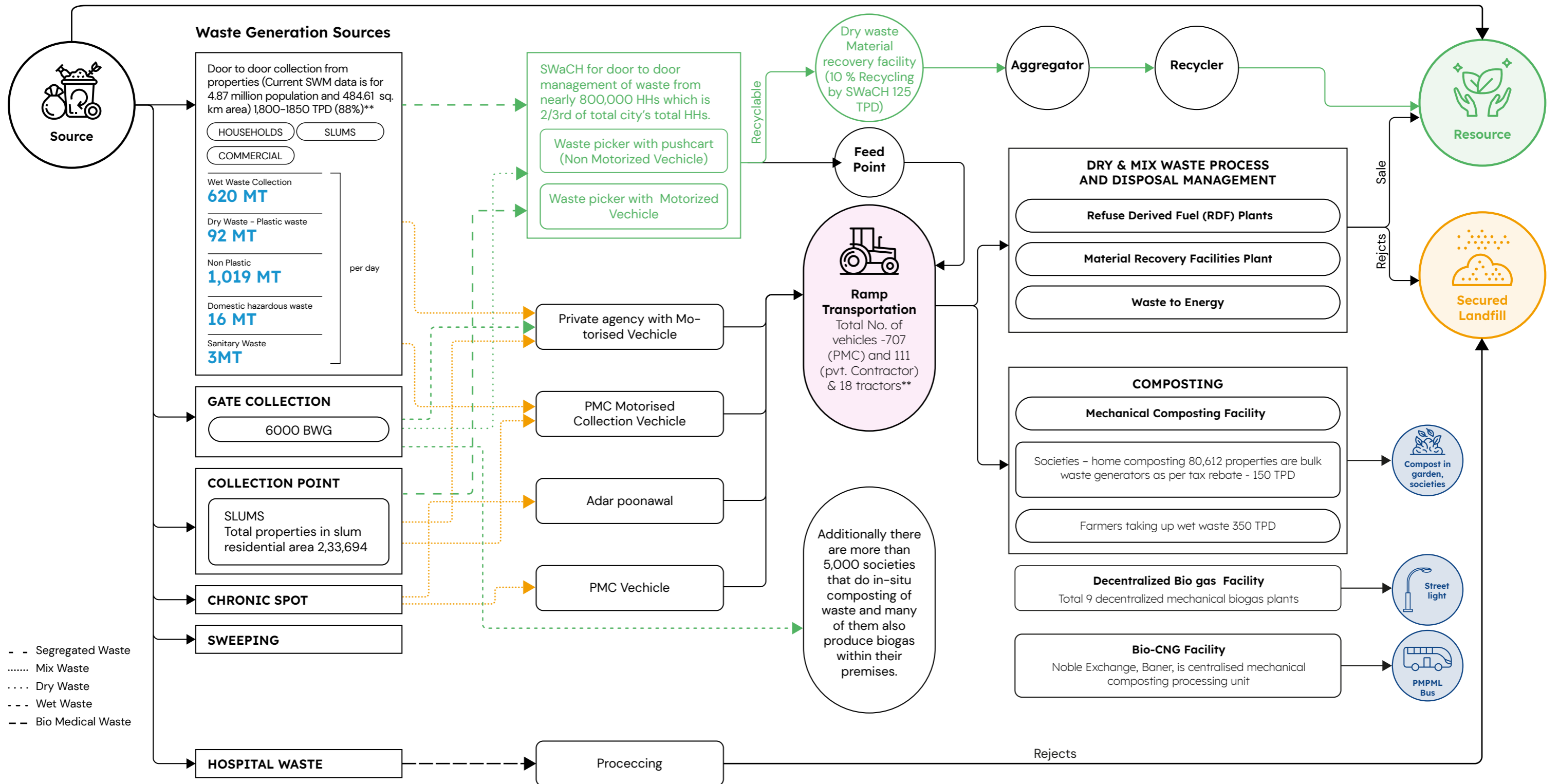
The large amount of organic material and the general diversity of the waste stream in Pune have led to a wide range of processing plants being developed. As of 2021, seven transfer stations and about fifty processing plants process over 90 percent of the municipal solid waste. That includes 19 wet-waste processing plants and 13 dry-waste processing plants – encompassing 10 bio-methanation plants, one bio-CNG plant, and two mechanical composting plants – along with one hazardous-waste processing plant, one plastic-to-fuel processing plant, and several material recovery facilities (MRFs)⁷. Local technology providers have recently been encouraged to develop equipment tailored to meet the needs of waste processing in Pune. This has increased the amount of waste being processed and reduce waste leakage and the amount of waste heading to landfills.

Despite the diverse types of processing plants available to support solid waste management (SWM) in Pune, many are not operating at their full capacity. It was estimated in 2017 that the processing plants in Pune were collectively operating at around half their capacity. Two of the largest plants in particular – Rochem; Noble Exchange Bio-methanation – were only processing at 36 and 16 percent of their installed capacity, respectively, in 2017⁸. In 2021, the Rochem plant was shut down, while the Noble Exchange plant surpassed 50 percent of its capacity⁹.

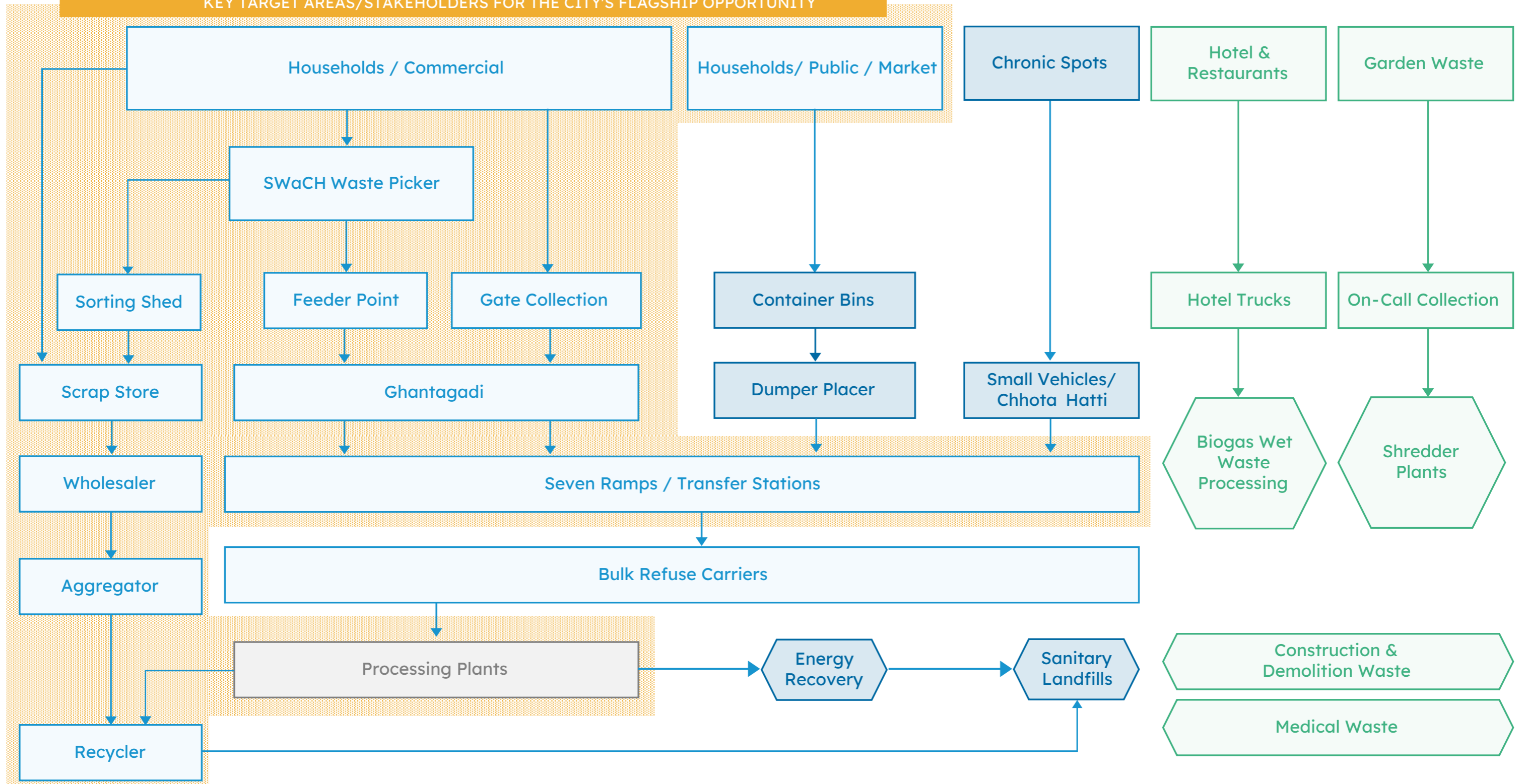
Most waste in Pune still ends up in landfills. The main landfill that services Pune – Urali Devachi – is being filled at a faster rate than planned and is rapidly running out of capacity. As of 2020, around 35 percent of the 43-hectare landfill had reached full capacity and been permanently sealed^{10,11}. The Municipal Solid Waste Strategic Plan states the city has concerns over available land for proper waste management and associated infrastructure to support the city's growing needs, particularly to handle wet waste.

WASTE FLOW CHART

This waste flowchart illustrates the solid waste management system and waste flows in Pune.



KEY TARGET AREAS/STAKEHOLDERS FOR THE CITY'S FLAGSHIP OPPORTUNITY



Project Justification



In 2014, the Indian Government set ambitious targets for improving its municipal solid waste system with the Swachh Bharat Mission, aiming to ensure door-to-door garbage collection and proper disposal of municipal solid waste by 2019. To achieve these targets, the PMC issued the Solid Waste Management Strategic Plan in 2017, which identified several gaps related to waste processing that remained challenging, such as a limited recyclable-waste collection system, limited provision of decentralized recycling and reliable wet-waste treatment facilities, low use levels of treatment infrastructure, over-dependence on landfills leading to environmental and social issues, and limited land available to expand or replace landfills, which are expected to reach capacity in 2022/23¹².

The Pune Resilience Strategy¹³ has a dedicated goal under its Environment pillar to promote the circular economy of Pune through waste management. The goal outlines three key actions to be taken by the city, as follows:

- Goal 2.3 Promote circular economy through waste management.
 - ◊ Strengthen the capacity of PMC and the circular economy ecosystem towards 100 percent in situ processing of organic waste, recovery of recyclables and liquid-waste management.
 - ◊ Support formalization of scrap recycling economy and improve sanitation worker safety and livelihoods.
 - ◊ Promote public behavior change to sustain the circular economy.
- Goal 3.2 Ensure every individual in Pune has the opportunity to work in dignity.
 - ◊ Ensure universal delivery of social protection and improve government regulation and worker entitlements for informal work.
 - ◊ Improve women's participation in paid work across income groups and education levels to increase economic productivity and gender equity.

- Goal 3.3 Promote Pune as a centre for innovation by focusing on creativity, research, and development
 - ◊ Create pathways for the transfer of knowledge and technology between industries, research institutions and universities.
 - ◊ Promote collection, storage and dissemination of quality, open data in a privacy-emboldening way.

The City of Pune hopes to create bottom-up and top-down change by setting up local systems, stakeholder and public engagement and information systems to achieve the goals stated above, and strengthen Pune's role and leadership in the circular economy transformation in India. Pune will focus on worker welfare, environmental quality and eliminating plastic and other material leakage.

Through the Urban Ocean gap assessment process, the city has been able to identify its main challenges and prioritize them to come up with opportunities that yield multiple benefits to the city. These opportunities have been structured as initiatives with different areas of intervention. The next sections document this process by highlighting the challenges and opportunities identified, as well as how they have been translated into a project with agreed-upon goals.

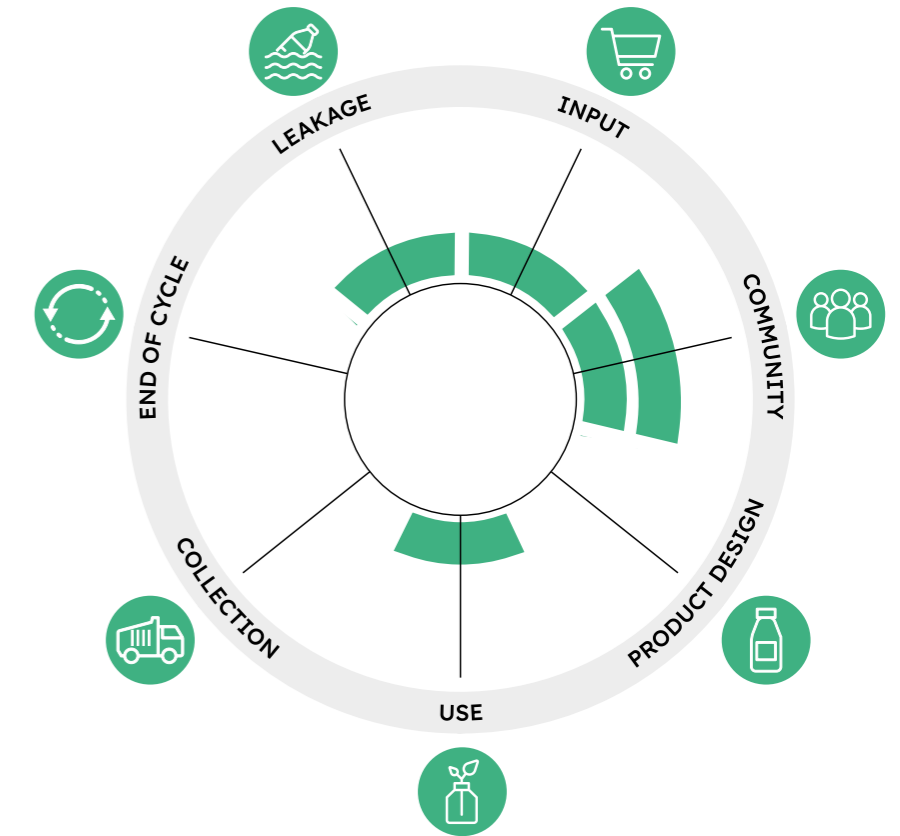
Challenges



- The city's rapid population growth is contributing to the increase in waste production, especially plastic.
- The waste-end cycle is not able to cope with the waste management challenges.
 - ◊ Most waste is being sent to landfills. However, the main landfill in Pune, at Urali Devachi, has almost reached its capacity.
 - ◊ Diverse processing plants have been set up, yet several are not operated at their full capacity.
- It was recognized that there is a general lack of awareness regarding the waste challenge in the city. This includes limited waste segregation at the neighborhood level. Segregation is only achieved in areas where door-to-door collection by SWaCH exists.

- Waste leakage increases risks to the city.
 - ◊ Non-recyclable and lightweight materials tend to leak out from the waste collection system, which results in plastic waste dumps and burning. This not only impacts Pune's resilience, but also the wider environment.
 - ◊ Pune lies in the path of monsoon winds. Solid waste clogging up streams has increased the resultant risk of flooding.
- The PMC has organized a waste collection service in the peri-urban areas, but it is not a regular service. So, the community tends to burn the waste, exacerbating air pollution.

Opportunities



During the Urban Ocean gap assessment phase, the city led participatory workshops to identify the main opportunities for improving the waste management sector in the city, while building more resilient societies and economies. The four opportunity areas that were prioritized and explored were:

- Supporting information, education and communication (IEC)
- Strengthening organic waste management
- Facilitating low-value plastic management
- Formalizing informal recyclers



Translating the Opportunities into a Project

The project below has been designed not only to address the challenges identified but also to use the friendly regulatory environment for circularity and for strengthening the role of diverse waste management stakeholders in improving environmental concerns within the waste management system. It considers the existing partnerships with multiple stakeholders, including NGOs, national authorities and the private sector, with whom the city has been testing different business models and technologies for collecting recyclable waste from households and other sources and transforming them into something beneficial for communities. These experiences have demonstrated a gap between the collection and treatment of materials, highlighting the need for the city to promote and enforce actions that enable the treatment, recycling, and recovery of recyclable materials.

The Supporting Transformations Recovery of Energy and Materials (STREAMS) proposal aims to:

- Enhance at-source segregation and doorstep collection.
- Streamline and expand physical facilities to recover materials.
- Establish and strengthen institutional support for the scrap-value chain.
- Formalize scrap aggregation and recycling enterprises.

This will be achieved using specially designed IEC mechanisms to help make the necessary transition.

Goal

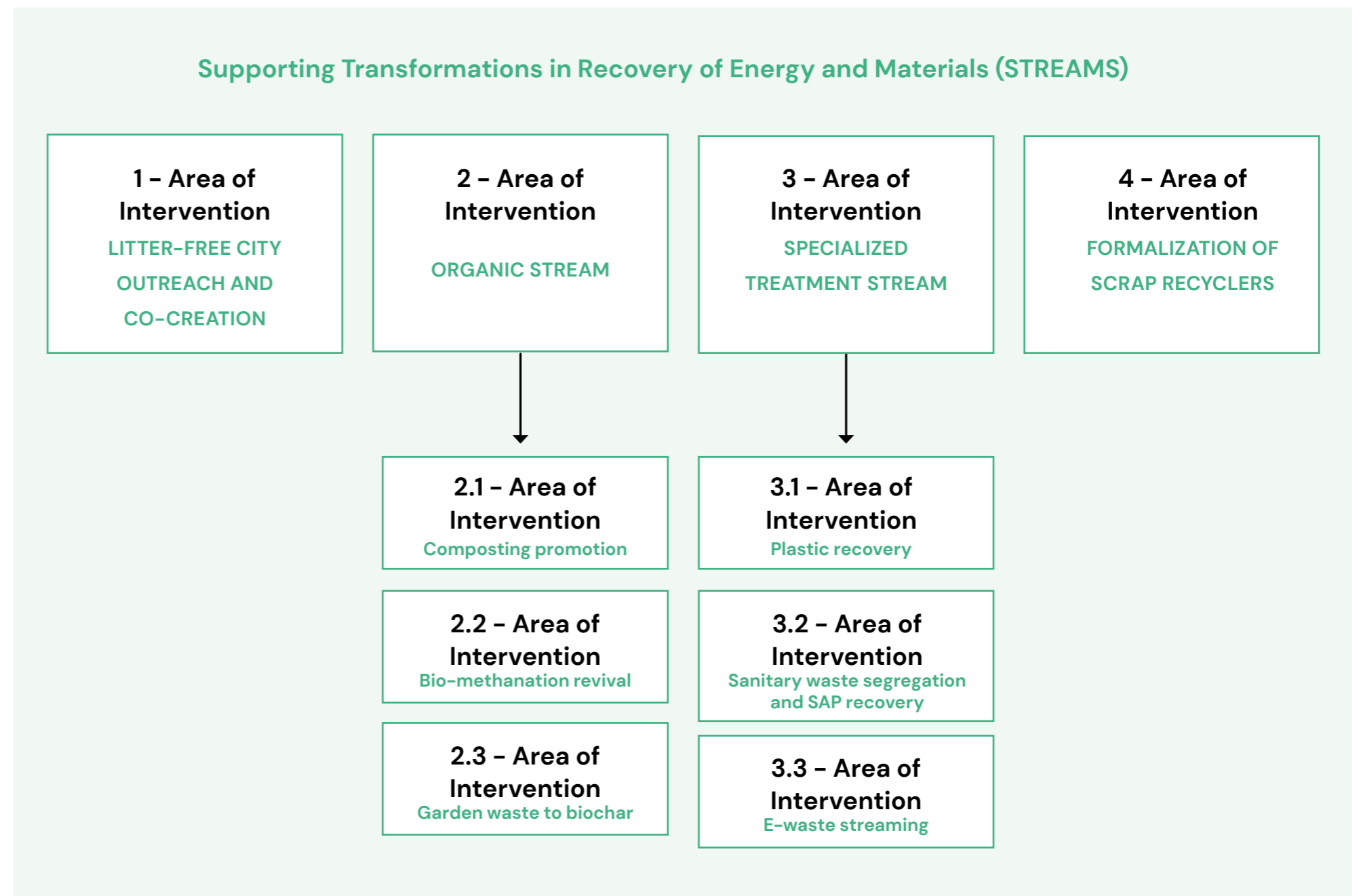
This project's goal is to lead the circular economy transformation in India and specifically in Pune, by supporting the formalization of recycling jobs and enterprises, with a greater role of women, innovation in materials recovery, partnerships along the materials and value chains and mitigating GHG emissions from waste management, to benefit people and improve the local and global environment.



Project Description

Pune's Urban Ocean initiative aims to strengthen the resilience and circularity of the local recycling industry. The proposed activities seek to add value to materials, reduce the amount of waste being produced, decrease health and environmental risks associated with waste management and accrue economic and social benefits by enlarging the recycling industry.

The city will create a Supporting Transformations in Recovery of Energy and Materials (STREAMS) initiative. STREAMS will enhance at-source segregation, support doorstep collection, streamline and expand physical facilities to recover a range of materials, establish institutional support and formalize scrap aggregation and recycling enterprises, by engaging institutional figures, the public, service providers, enterprises, and the supporting ecosystem to co-evolve and facilitate the desired changes. The city will (i) create litter-free city outreach and ; (ii) develop and implement activities related to the organic waste stream; (iii) specialized treatment stream; and (iv) formalize scrap recyclers.



The four components of intervention of the project

1 - Litter-free City Outreach and Co-Creation



OVERVIEW

The city intends to develop an IEC strategy that includes opportunity-specific and cross-cutting mechanisms. With multiple stakeholders and complexities in the collection system in Pune, awareness among residents is crucial for the system to function. Limited outreach programs and understanding among the public in Pune around waste collection were mentioned in interviews as a barrier to effective waste management.

ENABLING ENVIRONMENT & LOCAL RESOURCES

Existing infrastructure

- The PMC has appointed an agency to prepare digital media posts with promotional messaging on waste management.
- SWaCH has regular outreach and media for doorstep collection, composting, and V-Collect (see below). Similarly, other collection agencies and composting service providers have their own outreach programs.
- Comprehensive public engagement and outreach on all aspects of solid waste management and specific outreach for specialized streams are not in place.
- The municipality has experience with V-Collect, a joint initiative by the PMC and SWaCH Plus to promote reuse, recycling and recovery and to improve behavior and culture in the community by providing a collection service at the doorstep for bulk generators/societies of items such as clothes, toys, utensils, tools, furniture, etc. that can be reused by others who need them, at minimal prices (details in Appendix 2).

EXPECTED IMPACT



Enhance public outreach training and influence the understanding, attitudes, and behavior of citizens, service providers and municipal staff on different dimensions of SWM.

SDG



Responsible Consumption and Production

Target 12.8
Ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

RESILIENCE VALUE

The communication and awareness-raising activities must be designed to promote social cohesion, participation and inclusion. The campaign in the Red Dot Aundh pilot project demonstrated that interpersonal communication can bring about behavior change, which was key to the project's success. In addition, concern for the environment and public good, benefits of the circular economy, innovations and agency among individuals and groups of civil society, and the range of stakeholders in waste management, may be positively engaged in a litter-free city outreach program. Innovations such as agent modelling and behavioral nudges may be integrated into the outreach program. The campaign is expected to increase consumer awareness and support the city in achieving its environmental goals.

- Leakage of plastics, chemical pollutants and toxins from improper waste management into the environment impact biodiversity and ecosystems, in addition to degrading the water quality in water sources used by people.
- Burning for retrieval of recyclables or waste disposal impacts air quality; Pune is among the 132 cities identified by the Central Pollution Control Board for not meeting air quality standards.
- Transport emissions from unnecessary or avoidable transport of waste contribute to the GHG emissions from the city and impair local air quality

IMPLEMENTATION ACTIVITIES



Set up an IEC cell within the PMC Solid Waste Management (SWM) department that will curate 'Litter-Free' campaigns



Develop audience-specific campaigns to stop street littering, particularly targeting tobacco users



Develop campaigns to support and facilitate source segregation



Develop need-based campaigns and outreach to facilitate specialized waste stream innovations and help address citizens' "Not in my backyard" attitude" to enhance the uptake of innovations

2 - Organic Stream

2.1 - Promoting Composting



OVERVIEW

This initiative will help the city promote composting and other wet-waste management extensively at the source, link it to home gardening, and set up entrepreneurial support services for both, as wet waste is the largest fraction of waste reaching landfill in Pune. Promotion will encourage community networking and knowledge sharing, social enterprises to support composting and biogas management, updating information on the extent of composting and biogas, etc.

ENABLING ENVIRONMENT & LOCAL RESOURCES

- The city’s SWM rules support in situ management by bulk waste generators. Pune has about 20,000 bulk waste generators of organic waste. Bulk waste generators include residential apartment complexes and government, educational, commercial and private facilities. These generate more than 100 kg of waste (all streams combined) on average per day.

Existing Infrastructure

- Three large-scale mechanical composting units.
- National legislation and local bylaws require bulk waste generators to have in situ composting facilities.

EXPECTED IMPACT



Encourage at-source segregation and enhance the proportion of recyclables that are “clean,” potentially increasing retrieval and recycling.

SDG



Responsible Consumption and Production

Target 12.5

By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

RESILIENCE VALUE

- This project aims to decrease pollution and improve environmental quality. For instance, a lot of organic waste is transported to landfills as mixed waste, leading to higher emissions and transport costs, which might be avoided with better management. In addition, monitoring of privately set up small biogas plants needs to be improved to avoid the release of methane into the atmosphere and to support flaring or proper use of the gas.
- These pilot activities will raise community awareness of waste management.
- Carbon is present in garden waste and other biomass waste; making biochar will provide an opportunity to fix this carbon which is otherwise lost in composting.

IMPLEMENTATION ACTIVITIES



Strengthen existing primary waste collection systems



Strengthen secondary waste transfer systems



Address other streams of waste



Strengthen data systems - Update GIS of Aundh SWM



Continue data collection and integrate with PMC SWM ERP



IEC team recruitment, orientation



Promote area wise citizens’ committees for composting



Institute a higher collection charge for wet-waste



In-situ compost systems - finalize the zero-waste model



Introduce maximum in-situ composting



Discontinue wet waste collection



Waste-picker livelihoods strengthening - update SWaCH waste collectors data in the PMC Extended Producer Responsibilities / Monitoring Information System (MIS) for solid waste management, and Social Development Department

2 - Organic Stream

2.2 - Bio-methanation to Bio-briquetting



OVERVIEW

Several large bio-methanation plants were set up by the PMC. Most of these are not functional due to the aging infrastructure and disuse during the Covid-19 pandemic with the shutting down of restaurants and hotels.

A pilot plant to prepare bio-briquettes has been set up in one ward. Based on the experience and learning from the pilot plant, the PMC proposes to scale-up processing of organic waste into bio-briquettes.

ENABLING ENVIRONMENT & LOCAL RESOURCES

- The PMC has already floated an expression of interest for alternative technology; a bio-briquettes technology has been shortlisted and accepted by the PMC considering space requirements, sustainability and economics.
- The PMC has identified 12 sites that currently have non-functional biogas plants to be used for bio-briquette plants and to develop other methods of managing the city's organic waste.

Existing Infrastructure

- Twenty-five biogas plants in different wards; however, most are not functional. The PMC has audited the decentralized biogas plants, resulting in 13 biogas plants needing retrofitting and re-development or a change in technology.
- Noble Exchange¹⁴ collects, segregates and converts food waste into biogas and organic fertilizer.

EXPECTED IMPACT



Expand treatment opportunities for the organic waste.



Explore bio-briquette as an alternative fuel for industries.

SDG



Responsible Consumption and Production

Target 12.5

By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

RESILIENCE VALUE

- This project aims to decrease pollution and improve environmental quality. For instance, a lot of organic waste is transported to landfills as mixed waste, leading to higher emissions and transport costs, which might be avoided with better management. In addition, monitoring of privately set up small biogas plants needs to be improved to avoid the release of methane into the atmosphere and to support flaring or proper use of the gas.
- These pilot activities will raise community awareness of waste management.
- Carbon is present in garden waste and other biomass waste; making biochar will provide an opportunity to fix this carbon which is otherwise lost in composting.

IMPLEMENTATION ACTIVITIES



Creating a Design Finance Operate Transfer mechanism for four plants of about 50 tons each.



Scaling up bio-briquettes technology



Reduce transport costs and the carbon footprint of waste management through
 i) Understand the opportunity to scale up the bio-briquettes technology; ii) Design the scaling-up strategy; iii) Help service providers to maintain sustainability and economic viability; and iv) Document and report

2 - Organic Stream

2.3 - Biochar Garden Waste

OVERVIEW

The city will concentrate efforts on exploring alternative waste treatment process to reduce emission from biomass. There are 47,13,791 trees across the municipal area¹⁵. Pune generates around 50 tons per day of garden waste, which is sent to seven sites for further processing. The PMC has set up a Garden Waste Collection on Call service. Charges for garden waste collection have been fixed. Garden waste (wooden waste) is processed into briquettes and compost. Biochar can be produced from garden waste as fuel, soil enrichment, deodorizers and other products.

Although the business opportunity for biochar is not currently clear, the potential benefits for soil health, climate action and livelihoods appear attractive. They may warrant a systematic attempt to set up one or more biochar production units and simultaneously explore the possibility of a social enterprise.

ENABLING ENVIRONMENT & LOCAL RESOURCES

- There are only a few initiatives to produce and use biochar in cities.^{16 17} Samuchit EnviroTech Pvt Ltd has demonstrated the technology in Pune using garden waste, coconut shells and agricultural residues. If such a project is implemented, technical support for entrepreneurs, micro- or small enterprises and municipal staff is available from Samuchit EnviroTech Pvt Ltd.

Existing Infrastructure

- The PMC has recently invited bids for a Garden Waste Collection on Call service and processing arrangements for wood and leaf biomass.

EXPECTED IMPACT



According to the International Biochar Initiative¹⁸, the primary application of biochar is to improve soil functions and reduce emissions from biomass that would otherwise naturally degrade to GHGs

SDG



Responsible Consumption and Production

Target 12.5

By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

RESILIENCE VALUE

- This project aims to decrease pollution and improve environmental quality. For instance, a lot of organic waste is transported to landfills as mixed waste, leading to higher emissions and transport costs, which might be avoided with better management. In addition, monitoring of privately set up small biogas plants needs to be improved to avoid the release of methane into the atmosphere and to support flaring or proper use of the gas.
- These pilot activities will raise community awareness of waste management.
- Carbon is present in garden waste and other biomass waste; making biochar will provide an opportunity to fix this carbon which is otherwise lost in composting.

IMPLEMENTATION ACTIVITIES



Explore the conversion of woody waste to biochar to fix carbon and enrich soils.

3 - Specialized Treatment Stream

3.1 - Plastic Management and Recycling



OVERVIEW

Streamlining the management of flexible and hard plastics is an urgent need in Pune. A large proportion of recyclable material, including plastics, is already collected through doorstep waste collection services. However, low-value flexible plastic waste may not enter recycling streams due to the low returns and considerable effort involved in sorting, storing and transporting it. Low-value plastics end up in landfill or remain strewn in the city environment and enter water bodies. The Resilient Cities Network Circularity Assessment Protocol conducted in Pune in 2020-21 showed that the leakage of materials from the municipal waste systems largely consisted of low-value plastics, including small sachets and tobacco packaging products. In addition, the Brand Audit 2021 by SWaCH also shows the presence of flexible plastics and multilayered plastic as a large proportion of dry waste in

the form of packaging from multinational and Indian brands.

Through this initiative, the city would like to (i) strengthen the current value chain of different plastic types by providing the minimum support price, (ii) strengthen the current SWaCH - ITC initiative, (iii) improve the segregation at the RDF facility, and (iv) reinforce the existing scrap value chains rather than creating specialized systems of recovery, storage and transport. The scope of the project also includes a strategy for the reduction of single-use plastic and overall plastic use.

ENABLING ENVIRONMENT & LOCAL RESOURCES

- Multilayered plastic is a joint initiative of the PMC, SWaCH Plus, with support from ITC India Limited¹⁹ based on the principles of EPR, has an arrangement to collect multi-layered plastic in Pune. The experience shows that multi-material management and strengthening the existing scrap-value chains and movements systems are a more robust strategy than creating specialized systems of recovery, storage and transport (details in Appendix 2).
- A joint initiative of the PMC, SWaCH, and KK Nag Private Limited, namely RecyCole Thermocol, to recycle thermocol (details in Appendix 2).

Existing Infrastructure

- ITC pays the viability gap fund for collecting, transporting, aggregating, sorting and baling the plastics.
- The existing model of door-to-door collection of source-segregated municipal waste, set up by the PMC and by SWaCH has integrated 1,000 out of 3,500 informal sector waste collectors (waste pickers), providing a strong base on which plastics management can be streamlined.

EXPECTED IMPACT



Strengthened value chain of different plastic types



Improved segregation process at the RDF facility



Strengthened scrap value chains

RESILIENCE VALUE

- Reduced volume of waste leakage into Pune's water bodies.
- Improved waste segregation at source through the waste classification update.
- New generation of businesses enabled through waste classification update.
- Dismantling of e-waste and recovery of recyclables may take place at scrap aggregators and processors without adequate controls, resulting in the release of toxins and pollutants, with severe impacts on the health of workers and environmental quality.
- Improved capacity to collect and use data to inform public policy and to monitor the implementation of programs related to waste management.

SDG



Life Below Water

Target 14.1

By 2025, prevent and significantly reduce marine pollution of all kinds, from land-based activities, including marine debris and nutrient pollution.

IMPLEMENTATION ACTIVITIES



Formal arrangement to be made between PMC, EPR actors and waste collectors/scrap dealers



Register scrap shops and ascertain interest in flexible plastic (and Multi-Layered Packaging/MLP) handling



Provide space for scrap shops, sorting, and storage



Minimum support price to procure MLP to be decided



Recovery and management of flexible plastics and any other plastics or materials



Develop and maintain appropriate documentation systems

3 - Specialized Treatment Stream

3.2 - Sanitary Waste Segregation and SAP Recovery



OVERVIEW

A collaborative project is expected to be initiated between the PMC and a private entity to set up a unit to recover super-absorbent polymer (SAP) from sanitary waste. Once the project is finalized, Pune will be the first location in India to host such technology. The process includes separate collection, secondary transportation, storage at feeder/ aggregation points, further storage at transfer stations and, finally, an independent transportation system to the recycling facility.

ENABLING ENVIRONMENT & LOCAL RESOURCES

The PMC, SWaCH, and the Centre for Environment Education (CEE) have jointly implemented a Red Dot Aundh Pilot Project for outreach on sanitary waste wrapping, marking and segregation (details in Appendix 2).

Existing Infrastructure

- The PMC has identified a space for an SAP recovery plant.

EXPECTED IMPACT



In India, 1,230 Cr-soiled pads are generated yearly, of which 28 percent are thrown in routine waste, 26 percent thrown in open spaces, 23 percent buried, 15 percent burned in open areas, 8 percent thrown down toilets²⁰. Of the waste generated in Pune, about 2.5 percent is estimated to be sanitary waste. This initiative is expected to address the gap of hygienic collection and management of sanitary waste and SAP recovery.

RESILIENCE VALUE

- Reduced volume of waste leakage into Pune's water bodies.
- Improved waste segregation at source through the waste classification update.
- New generation of businesses enabled through waste classification update.
- Dismantling of e-waste and recovery of recyclables may take place at scrap aggregators and processors without adequate controls, resulting in the release of toxins and pollutants, with severe impacts on the health of workers and environmental quality.
- Improved capacity to collect and use data to inform public policy and to monitor the implementation of programs related to waste management.

SDG



Responsible Consumption and Production

Target 12.5

By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

IMPLEMENTATION ACTIVITIES



Red Dot IEC program and material development



Recruitment and training of IEC and outreach staff



Map household typologies in each ward to create management pockets



Procurement and Personal Protective Equipment (PPE) Gears and bags for collection



Design and implementation of an IEC campaign and communications



Area-wise orientation for waste collectors, PMC, and contract staff



Fabrication and retrofitting on the secondary collection vehicle



Infrastructure for weighing and manpower arrangement at the ramps



Monitoring of collection, feeder points, and ramps



MOU between PMC, Producers, Importers and Brand (PIBO) the facility operator, and waste collectors, in accordance with

3 - Specialized Treatment Stream

3.3 - E-waste Streamlining

OVERVIEW

The actions envisaged include developing a framework to guide and facilitate private players, including a requirements checklist, types of certifications or authorizations required from MPCB and other essential steps. The framework/guidance materials may include information about authorized recyclers, daily household collection systems, integration with the informal sector, drives for larger items, institutional awareness and links with informal markets.

ENABLING ENVIRONMENT & LOCAL RESOURCES

A few organizations such as SWaCH, Poornam Ecovision (a Partnership with formal recycler), and Authorized in E-Waste Facilities in State facilitate the collection centre, collection drives in Pune.

Existing Infrastructure

- Studies related to e-waste management by the informal sector by SWaCH and GIZ are available.

EXPECTED IMPACT



Improved waste management monitoring and information system.

SDG



Responsible Consumption and Production

Target 12.8

Ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.

RESILIENCE VALUE

- Reduced volume of waste leakage into Pune's water bodies.
- Improved waste segregation at source through the waste classification update.
- New generation of businesses enabled through waste classification update.
- Dismantling of e-waste and recovery of recyclables may take place at scrap aggregators and processors without adequate controls, resulting in the release of toxins and pollutants, with severe impacts on the health of workers and environmental quality.
- Improved capacity to collect and use data to inform public policy and to monitor the implementation of programs related to waste management.

IMPLEMENTATION ACTIVITIES



Map available and potential E-waste collection points and stakeholders, e.g. scrap stores, PMC ward office, gardens



Identify places for satellite centres (scrap stores, ward offices, gardens, malls) for collection as per required criteria across Pune.



Set up and support satellite centers for neighborhood collection of E-waste across Pune. Drop-off facilities for individuals and V-collects for societies and Bulk Generators



IEC campaign design and implementation in the catchment areas of the satellite centers



Operate the mechanism for collecting and handing over e-waste to authorized waste processing centers

4 - Formalizing Scrap Recyclers



OVERVIEW

Several hundred tons of scrap materials are generated and pass through homes, shops, offices, institutions, and businesses in Pune every day. Though many scrap shops and dealers are present in the city, a separate database of scrap dealers is not available. These enterprises provide a valuable service and are an essential link in the reuse and recycling chain. However, they are primarily informal-sector enterprises. This informality often means poor working conditions, hazardous processes of recycling and materials recovery, leading to environmental pollution and health impacts and, possibly, less efficient processing and recovery.

The city would like to support the informal figures in strengthening their environmental, social, and economic aspects around their business. This will be achieved by creating a separate database of scrap

dealers to provide an essential link in the reuse and recycling chain and so providing good working conditions, reducing health impacts, strengthening processes for the efficiency of materials recovery and integrating collection and management of different materials that are currently considered low-value or hazardous waste. The project's scope also includes supporting informal agents in creating their legal identity so they can register with MPCB and other platforms.

ENABLING ENVIRONMENT & LOCAL RESOURCES

Purchase of scrap and free doorstep services of scrap collection and disposal are provided to households, retailers, corporates, manufacturers, etc.

Existing Infrastructure

- Currently, most scrap shops are expected to be registered under the Shop Act (but not specifically identified as scrap shops).

Environment condition

- Site management and labor protection may both be compromised due to the informal nature of the sector.
- Leakage and rejections emanate from scrap shops and aggregator sites and spread into the surrounding environment.
- Recovery of certain recyclables may take place in ways that are unsafe for workers and have an adverse environmental impact, such as burning and chemical leeching.

EXPECTED IMPACT

The action plan could help the informal actors to:



Improve their business environment and obtain support from the local administration.



Create their own space in the low-value plastic chain.



Have legal identity.

SDG



Decent Work and Economic Growth

Target 8.5

By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value

RESILIENCE VALUE

- Improved livelihood and work conditions for informal-sector workers.
- More efficient recovery of materials.

IMPLEMENTATION ACTIVITIES



Streamlining the existing systems of doorstep collection of segregated municipal solid waste, primary sorting by waste collectors, sale of various categories of plastics to the neighbourhood or distributed scrap shops, aggregation, packaging, and transport for further value addition in the recycling chain,



Outreach to scrap shops and traders to identify critical issues faced and to understand how leakages may be minimized,



Development of a city-level policy in collaboration with the PMC to register and onboard scrap shops and traders within the plastic waste management system,



Benchmarking the costs of handling and “minimum support price” needed for different categories of plastics,



Building partnerships with Producers, Importers, and Brand Owners to support the collection and handling of plastic waste through the system,



Outreach among the public required dialogues among the community of waste workers towards registration of scrap dealers and traders and incorporation of all categories of plastics into scrap recovery systems.

Further Understanding the Resilience Value

This project has been designed for resilience. Not only it will make the recycling industry in Pune more robust, innovative and adaptable to the needs of the city, but it will also develop more interconnected systems, so the City of Pune can be better prepared to overcome the shocks and stresses it faces. Conceptually, this means thinking about this project from three perspectives:

- How the project itself demonstrates qualities of resilience, such that it can better handle external shocks and stresses.
- How the project contributes to the resilience of the city, considering its direct and indirect impacts.
- How the operation of the project is (positively or negatively) influenced by the resilience of the city environment overall.

Beyond the immediate objectives to be achieved, the transformation sought will include and maximize all the “co-benefits” generated by the project that contribute to the structural, community and/or individual resilience of the citizens of Pune. For this, the link between recycling industry and the city, the province, the region and even the nation will be considered, including the interdependencies between the existing social, environmental, economic and institutional systems.

The City Resilience Framework identifies seven qualities of resilience that any urban system must incorporate so that it can resist, respond and adapt more quickly to the shocks and stresses it faces. So, this project – understood as a system integrated into the city – is designed considering the following qualities of resilience:

REFLECTIVE	Systems that have mechanisms to continuously evolve and will modify standards or norms based on emerging evidence, learning from past experiences.	The city learns from several pilot activities and other experience, a starting point for the city to develop its plan and improve its programs related to waste management.
ROBUST	Systems that include well-conceived, constructed, and managed physical assets so they can withstand impacts of shocks and stresses.	The design of the sorting and treatment facility will investigate the possibility of designing for building efficiency (including renewable energy, water efficiency, etc.), and including social programs for training the workforce, among others.
REDUNDANT	Systems that create spare capacity purposely to accommodate disruption, extreme pressure, and surges in demand.	The project is designed to strengthen the recycling sector in the city; therefore, more recycling businesses will be created. The idea is that alternative materials can be used in product design.
FLEXIBLE	Systems that can change, evolve, and adapt in response to changing circumstances.	The project will include assessment of the waste management-value chain and allow for improvement of the activity during the project lifetime.
RESOURCEFUL	Systems that can rapidly find different ways to achieve their goals or meet their needs during a shock or under stress.	The project is anchored on a deep analysis of the context, searching for different solutions to the pressing issue.
INCLUSIVE	Systems that emphasize the need for a broad consultation and engagement of communities.	The project has a multistakeholder approach, working with the private sector, the national government, communities and NGOs.
INTEGRATED	Systems that promote consistency in decision making and ensure that all investments are mutually supportive to a common objective.	<ul style="list-style-type: none"> • The project is completely connected, as all components mutually support each other. • The project has the potential to improve various urban systems, the environment, public health and local economic development.

Roadmap for Implementation

Institutional Arrangements

Litter-free City Outreach and Co-creation

Pune Municipal Corporation (PMC)

Review and approve the communication

Implementing actors / Agency (s)

Develop and conduct campaigns

Organic Stream: Composting Promotion

Pune Municipal Corporation (PMC)

Support the composting promotion IEC campaigns

Develop and facilitate the incentive scheme

Facilitate troubleshooting related to secondary collection

Enforcement of composting and BWG bylaws

Implementing Actors / Agency (s)

Map neighbourhoods for household and waste generation typologies

Develop the composting promotion campaign

Facilitate support for composting and recycling infrastructure

Solid Waste and Collection Handling (SWaCH)

Ensure daily collection

Promote and advocate for segregation at the source

Ensure the participation of waste collectors, supervisors, and coordinators

Organic Stream: Composting Promotion

Maharashtra Pollution Control Boards (MPCB)

Evaluate the technology for in situ wet-waste management

Organic Stream: Bio-methanation to Bio-briquetting

Pune Municipal Corporation (PMC)

Implementing Actors / Agency (s)

Service Providers

Evaluate the scalability of the accepted technology

Design the scalability strategy

Maharashtra Pollution Control Boards (MPCB)

Evaluate and verify alternative wet-waste processing technologies

Organic Stream: Biochar Garden Waste

Pune Municipal Corporation (PMC)

Ensure the availability of basic infrastructure, e.g., space, shed

Ensure garden waste collection

Implementing Actors / Agency (s)

Demonstration of the biochar technology

Check feasibility and profitability of the biochar solution for the PMC

Maharashtra Pollution Control Boards (MPCB)

Evaluate and verify biochar technologies from garden waste, coconut shells, and other biomass

Specialized Treatment Stream: Plastic Management and Recycling²¹

Pune Municipal Corporation (PMC)

Signatory to an arrangement with EPR actors and waste collectors/scrap dealers

Register scrap shops and ascertain interest in flexible plastic (and MLP) handling

Provide space for scrap shops, sorting and storage

Implementing Actors / Agency (s)

EPR actors:

Signatory to the arrangement

Provision of MSP

Solid Waste and Collection Handling (SWaCH)

Together with other actors in the scrap value chain:

Registration in the arrangement

Recovery and management of plastics

Specialized Treatment Stream: Sanitary Waste Segregation and SAP Recovery

Pune Municipal Corporation (PMC)

Personal protective equipment and bags for collection and handling

Fabrication at secondary collection vehicle

Change in the PMC contract's terms of reference

Implementing Actors / Agency (s)

Outreach materials, teams, campaign

Training for waste collectors and PMC and contractual staff

Personnel for monitoring and coordination

Service Providers

In this case, is generator:

Securely wrap used sanitary waste like diapers, sanitary pads, etc., and place it in bins meant for dry or non-biodegradable waste

Solid Waste and Collection Handling (SWaCH)

Required support in route mapping

Monitoring of waste pickers

Ensure segregated waste

Ensure daily collection

Specialized Treatment Stream: E-waste Streamlining

Implementing Actors / Agency (s)

Mapping for satellite collection points

Identifying the places for satellite collection points

Provide infrastructure to set up satellite collection points as per rules

Maharashtra Pollution Control Boards (MPCB)

Checks and approvals as appropriate to set up the satellite collection centres and transport facilities

Formalization Scrap Recyclers

Pune Municipal Corporation (PMC)

Space for storage and sorting

Place and required infrastructure for the scrap market

Create a platform to manage registration, safety, and security of workers, fire and safety security and assurance

Implementing Actors / Agency (s)

Facilitate minimum support price

Baseline study

Inventory management

Facilitate the registration process

Digital platform

Implementation Timeline

AREAS OF INTERVENTION	SEMESTER 1	SEMESTER 2	SEMESTER 3	SEMESTER 4	SEMESTER 5	SEMESTER 6
Litter-free City Outreach and Co-creation						
Set up an IEC cell within the PMC SWM department that will curate 'Litter-Free' campaigns						
Implementing actor/agency to develop audience-specific campaigns to stop street littering, particularly targeting tobacco users						
Implementing actor/agency to develop campaigns to support and facilitate at-source segregation						
Implementing actor/agency to develop needs-based campaigns and outreach to facilitate specialized waste stream innovations and help address citizens' "Not in my backyard" attitude to enhance the uptake of innovations						
Organic Waste Stream						
Promoting composting						
Strengthen existing primary waste collection systems						
Strengthen secondary waste transfer systems						
Address other waste streams						
Strengthen data systems - update Aundh SWM geographic information system						
Continue data collection and integrate with PMC SWM ERP						
IEC team recruitment, orientation						
Promote area-wide citizens' committees for composting						
Institute a higher collection charge for wet-waste						
In situ compost systems - finalize zero-waste model						
Introduce maximum in situ composting						
Discontinue wet-waste collection						
Strengthen waste picker livelihoods - update SWaCH waste collector data in the PMC ERP / MIS for solid waste management, and Social Development Dept						
Bio-methanation Plants Revival						
Evaluate scalability of the accepted technology						
Design the scalability strategy						
Help service providers maintain sustainability, economic viability						
Scale the initiative as per the design strategy						
Document and report						
Biochar Garden Waste						
Set a demonstration plan as proof of concept						

AREAS OF INTERVENTION	SEMESTER 1	SEMESTER 2	SEMESTER 3	SEMESTER 4	SEMESTER 5	SEMESTER 6
Ensure PMC support						
Identify demonstration site						
Make sure garden waste available at site						
Ensure availability of basic infrastructure ,e.g., space, shed						
Ensure sustainable market, e.g., selling biochar as a soil enhancer						
Check feasibility and profitability of scaling up the biochar solution for the PMC						
Facilitate collaborative efforts for PMC, societies, farmers and entrepreneurs						
Demonstration						
Documentation						
Technical approval						
Advocacy for scale						
Specialized Treatment Stream						
Plastic Management and Recycling						
Policy steering group on plastics management, briefing meetings						
Formation of PMC Circular Economy Cell, policy discussions and facilitation						
Policy draft development						
Agreements between the PMC, SWaCH, PIBO and recyclers						
Baseline documentation, supply chain mapping (location, volumes, types, value, support required, compliance obligations, etc.)						
Align existing and potential EPR-based plastic waste management systems with standard operating procedures, documentation, traceability mechanisms to ensure EPR compliance and certification						
Establish links with one or more recyclers around Pune and elsewhere						
Evaluate, develop case studies, reports for reflection, strengthening						
Explore options to reduce MLP and flexible plastic use in food delivery services						
Sanitary Waste Segregation and Sap Recovery						
Red Dot IEC program and material development						
Recruitment of coordinator and campaigner						
Map household typologies in each ward to create management pockets						
Procurement of personal protective equipment and bags for collection						
Implementation of the awareness campaign and communications						
Phasewise WP, PMC, and contract staff training and role identification						
Phasewise fabrication and retrofitting on the secondary collection vehicle						

AREAS OF INTERVENTION	SEMESTER 1	SEMESTER 2	SEMESTER 3	SEMESTER 4	SEMESTER 5	SEMESTER 6
Infrastructure, weighing and staffing arrangements at the ramps						
Monitoring of collection, feeder points, and ramps						
Memorandum of understanding between the PMC, PIBO, facility, and WP						
Provide a place for facility, support approval and compliance processes						
Explore the scope for EPR in sanitary waste reduction and management						
Continuous monitoring and feedback in the value chain						
Develop a case story and report to extend and expand						
E-waste Streamlining						
Map available and potential e-waste collection points and stakeholders, e.g., scrap stores, PMC ward office, gardens						
Identify places for satellite centers (scrap stores, ward offices, gardens, malls) for collection as per required criteria across Pune						
Set-up and support satellite centers for neighborhood collection of e-waste across Pune						
Action plan for drop-off facilities for individuals and V-collects for societies and bulk generators						
IEC campaign design and implementation round satellite centers for collection						
Operate the mechanism for collecting and handing over e-waste to authorized waste processing centers						
Formalisation of Scrap Recyclers						
Survey and map supply chain (e.g., location, volumes and plastic categories handled, support needed, reasons for informality, suggestions for improvement in compliance)						
Develop terms of registration and incentives for informal scrap value chain actors						
Calculate MSP rate for all plastic categories for all actors in the supply chain						
Propose mechanism for registration, support and incentives for integration of informal scrap-value chain actors within the plastic management system						
Plan and set up infrastructure, operations support (PMC, MPCB) for plastics sorting, storage (dependent on funder, requirements under EPR, and total budget available)						
Create opportunities to connect, collaborate among waste pickers, scrap stores and other actors in the value chain for MSP, EPR and other mutual benefits						
Develop and disseminate case stories and reports to extend and expand the system and arrange conference to share learnings with civil society actors, experts, government agencies						

REQUIRED STUDIES

SEMESTER 1 SEMESTER 2 SEMESTER 3 SEMESTER 4 SEMESTER 5 SEMESTER 6

Litter-free City Outreach and Co-creation

Perception studies of different categories of waste generators, factors that influence decisions on segregation and composting and application of agent-based modelling approach to the promotion of good practices in waste management and circular economy.

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Organic Waste Stream

Promoting composting

Feasibility of community composting initiatives in community spaces

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Stakeholder consultations around reframing the Incentives on composting

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Value differentiation in segregated and unsegregated waste, impact on quality of recyclable materials, initiatives for more clean recyclable materials, value degradation due to mixing in organic materials

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Biochar Garden Waste

Scientific studies required to see whether PMC and MPCB can take into consideration Biochar as disposable technology

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Project feasibility discussion between city officials on benefits of introducing biochar production compared to existing biomass management methods in the city

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Specialized Treatment Stream

Plastic Management and Recycling

Studies around incentivizing informal-sector workers and entities for formalization

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Possibility of treating food delivery MLP differently and exploring removal of MLP with the help of licensed delivery agents, hotel association and sustainability initiatives in the food/hotel sector

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Explore the scope for EPR in MLP reduction

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Sanitary Waste Segregation and SAP Recovery

Needs-assessment study of best-possible design for retrofitting arrangement on PMC waste collection vehicle can with trial and error, Identification of appropriate place, understanding of hardware material required, e.g., container, plastic bags, weighing machine, required workforce, the provision in the current of vendors and further contracts can be made

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Explore the scope for EPR in different aspects of sanitary waste reduction and management

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E-waste Streamlining

Field studies and stakeholder deliberations for streamlining e-waste management

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Preparation of guidance materials and dissemination online, in print and another form and curation of outreach workshops with e-waste aggregators, residents' associations, institutions

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Explore the scope for EPR in different aspects of e-waste reduction and management.

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Formalisation of Scrap Recyclers

Assess possibility of creating a legal mandate for scrap store and aggregator as material recovery facility

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Health and safety status and concerns of workers at scrap facilities

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Explore expansion of EPR to different scrap materials

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Annexes

Annex 1 – Case Studies

V-collect



All across the city, reusable items lie unused in the middle class and higher-income households, businesses, and offices and get disposed of as waste after their utility has declined due to lack of upkeep /use or immediate users. V- Collect is a joint initiative of PMC and SWaCH Plus to promote reuse, recycle, recovery, reduce behaviour and culture in the community by providing a collection service at the doorstep for Bulk Generators / Societies of items such as clothes, toys, utensils, tools, furniture, etc. that can be reused by others who need them, at minimal prices. These items are made of complex materials, and their channelization in this manner leads to reduction of waste, promotion of reuse of items, as well as a reduction in the production of new items and adheres completely to the 3R principle.

Red Dot Aundh Pilot Project



SWaCH, CEE, and PMC have jointly done a pilot project for 35,000 households in the Aundh area for outreach on sanitary waste wrapping, marking, and segregation. The campaign approach that 'Interpersonal Communication can bring the behaviour change' proved effective in the pilot area. In the three months of duration, the project could reach up to 400-450 kg of sanitary waste per day after a rigorous door-to-door campaign. But at the transfer station, on average, about 200-250 kg of segregated sanitary waste. The campaign also highlighted the need for a separate collection facility for the waste pickers (primary collection) and the secondary collection vehicles. A substantial difference was seen between the sanitary waste collected at primary collection (by waste-pickers) and the endpoint of secondary collection (by municipal vehicle), i.e., at the transfer station.

Multi-layer Plastic Recovery



ITC India Limited, the fourth largest (post-consumer) plastic polluter in the country, has partnered with SWaCH and PMC to set up a plastic collection and recycling system to tackle this issue. The system set up directly targets a type of plastic (MLP) that is not handled by the existing sector. The mechanism is set to work directly with and benefit informal waste pickers at a large scale. The case study demonstrates the success of a brand owner working directly with a collective of informal sector waste pickers at a city scale. Currently, an average of 3 tons of low-value plastics get collected every day, and up to April 2021 total of 741 tons of low-value plastics have been sent for recycling. MLP management is likely to be scaled up under the existing initiative in the coming months. Over 1,000 MT of multi-layered plastics have been diverted away from the landfill, and over 1,000 waste pickers have been incorporated into the system.

RecyCole Thermocol



A joint initiative of the PMC, SWaCH, and KK Nag Private Limited for recycling Thermocol. Through RecyCole, segregated Thermocol is collected at the doorstep of generators and handed over to PMC vehicles, and stored separately at ramps in municipal waste facilities. The aggregated Thermocol is handed over to KK Nag Pvt. Ltd for recycling. For example, in June 2021, 1.7 tons of Thermocol were sent for recycling.

Annex 2 – Relevant Regulations

Studies required for the project are shown as following table. Particularly, some main consideration required during implementation of Action are listed as follows:

ACTIONS	REGULATIONS
Litter-free City outreach and co-creation	
Litter-free City outreach and co-creation	<p>Solid Waste Management Rules, 2016 states that PMC is expected to:</p> <ul style="list-style-type: none"> • Create public awareness through information, education, and communication campaign and educate the waste generators on the following; namely: • not to litter; • minimize generation of waste; • reuse the waste to the extent possible; • practice segregation of waste into biodegradable, non-biodegradable (recyclable and combustible), sanitary waste, and domestic hazardous wastes at source; • practice home composting, vermicomposting, bio-gas generation, or community level composting; • wrap securely used sanitary waste as and when generated in the pouches provided by the brand owners or a suitable wrapping as prescribed by the local body and place the same in the bin meant for non-biodegradable waste; • storage of segregated waste at source in different bins; • handover segregated waste to waste pickers, waste collectors, recyclers, or waste collection agencies; and • pay monthly user fees or charges to waste collectors or local bodies, or any other person authorized by the regional body for the sustainability of solid waste management.
Organic Stream	
Composting Promotion	<ul style="list-style-type: none"> • Ministry of Chemicals & Fertilizers, Department of Fertilizers, Gol has a policy in place for city composting promotion. • Discontinuation-of-Scheme-(City-Compost).pdf • Policy on Promotion of City Compost.pdf • Identification of Soil Testing Laboratories for testing of City Compost samples (19th December 2019).pdf • City Composed.pdf • Guidelines for Direct Sale of City Compost by Compost manufacturers to farmers in bulk under the policy on Promotion of the City Compost of the Department of Fertilizers (DOF).pdf • Amendment in guidelines dates 10.10.2016 under the policy on promotion of City Compost reg. 0.pdf • Amendment in guidelines dated 09.01.2017 on Bulk Sale of City Compost by Compost marketing companies to farmers under the policy on promotion of City Compost reg. 0.pdf
Bio methanation plants revival	<ul style="list-style-type: none"> • PMC has annual incentives to residential societies in the form of property tax rebates if their compost units are functional • PMC has drafted bylaws to be used by the city related to SWM
Biochar Garden waste	<ul style="list-style-type: none"> • Version 2.1 of the IBI Biochar Standards • Protocol for biochar use in Indian agriculture • Biochar Research Bulletin March 2018.pdf

ACTIONS	REGULATIONS
Specialized Treatment Stream	
Plastics management and recycling	<ul style="list-style-type: none"> • Solid Waste Management Rules, 2016 • CPCB's SOP for Extended Producer Responsibility • Standard Operating Procedure for Registration of Producers, Importers & Brand-Owners (PIBOs) Under Plastic Waste Manageme • CPCB is directing all stakeholders and coming up with the latest amendments, directives, laws, and obligation • Guidelines on Extended Producer Responsibility for Plastic Packaging • Draft Plastic Waste Management Rules, 2022 • Draft Notification on Extended Producer Responsibility (EPR) • Plastic Waste Management Rules, 2016, as amended, 2021 • Plastic Waste Management Rules, 2016, as amended, 2018 • Technical Guidelines • Guidelines for Management of sanitary wastes • Guidelines for the Disposal of Non-recyclable Fraction (Multi-layered) Plastic Waste • Consolidated Guidelines for Segregation, Collection, and Disposal of Plastic Waste • Guidelines for Co-processing of Plastic Waste in Cement Kilns • A Document on Guidelines for Disposal of Thermoset Plastic Waste including Sheet molding compound (SMC)/Fiber Reinforced Plastic (FRP) • CPCB has developed the Protocol for Evaluation of Technology for Waste Management
Sanitary waste segregation & SAP recovery	<ul style="list-style-type: none"> • CPCB has issued Guidelines for Management of sanitary wastes. The guidelines mention that producers should explore the possibility of using recyclable materials in their products. Many diapers and menstrual pads brands contain super absorbent polymer, cellulose, and plastics, all of which can be recycled; however, facilities to recover these recyclables have not been set up in India so far.
E-waste streamlining	<ul style="list-style-type: none"> • Field studies and stakeholder deliberations for streamlining e-waste management • Preparation of guidance materials and dissemination online and in print and other forms • Curation of outreach workshops with e-waste aggregators, residents' associations, institutions • Explore the scope for EPR in different aspects of e-waste reduction and management.
Formalisation of Scrap Recyclers	
Formalisation of scrap recyclers	<ul style="list-style-type: none"> • Guidelines on Extended Producer Responsibility for Plastic Packaging • Draft Plastic Waste Management Rules, 2022 • Draft Notification on Extended Producer Responsibility (EPR) • Plastic Waste Management Rules, 2016, as amended, 2021 • Plastic Waste Management Rules, 2016, as amended, 2018

Endnotes

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- ⁶ Sohkhlet and Nagargoje (2020).
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- ¹⁰ Sohkhlet and Nagargoje (2020).
- ¹¹ Resilient Cities Network (2021). Circularity Assessment Protocol: Pune, India <https://resilientcitiesnetwork.org/downloadable-resources/UR/UO/Pune-Report-2021-09-14.pdf>
- ¹² Resilient Cities Network (2021). Circularity Assessment Protocol: Pune, India <https://resilientcitiesnetwork.org/downloadable-resources/UR/UO/Pune-Report-2021-09-14.pdf>
- ¹³ PMC (2019). Pune Resilience Strategy www.pmc.gov.in/sites/default/files/pune-resilience-strategy.pdf
- ¹⁴ Pune's Noble Exchange plant is India's first, real-life, large-scale, demonstrable food-waste-to-compressed-biogas operation
- ¹⁵ [ESR 2020-21 Submitted to GB_O.pdf](#)
- ¹⁶ Nordregio (2018). Stockholm Biochar Project https://nordregio.org/sustainable_cities/stockholm-biochar-project/https://nordregio.org/sustainable_cities/stockholm-biochar-project
- ¹⁷ International Biochar Initiative (n.d.). Biochar Production Technologies <https://biochar-international.org/biochar-production-technologies>
- ¹⁸ International Biochar Initiative (n.d.). Biochar Production Technologies <https://biochar-international.org/biochar-production-technologies>
- ¹⁹ ITC India Limited is the fourth-largest (post-consumer) plastic polluter in the country.
- ²⁰ Author (year). Red Dot IEC Material
- ²¹ Following the precedent of the existing arrangement for EPR for multilayer plastic (MLP) management, it is envisaged that a similar structure may be made with other interested EPR actors for streamlining the management of flexible and other plastics

