

Plastic Waste Management Strategy and Action Plan – Commitment and Baseline Assessment

Module III



Session Overview

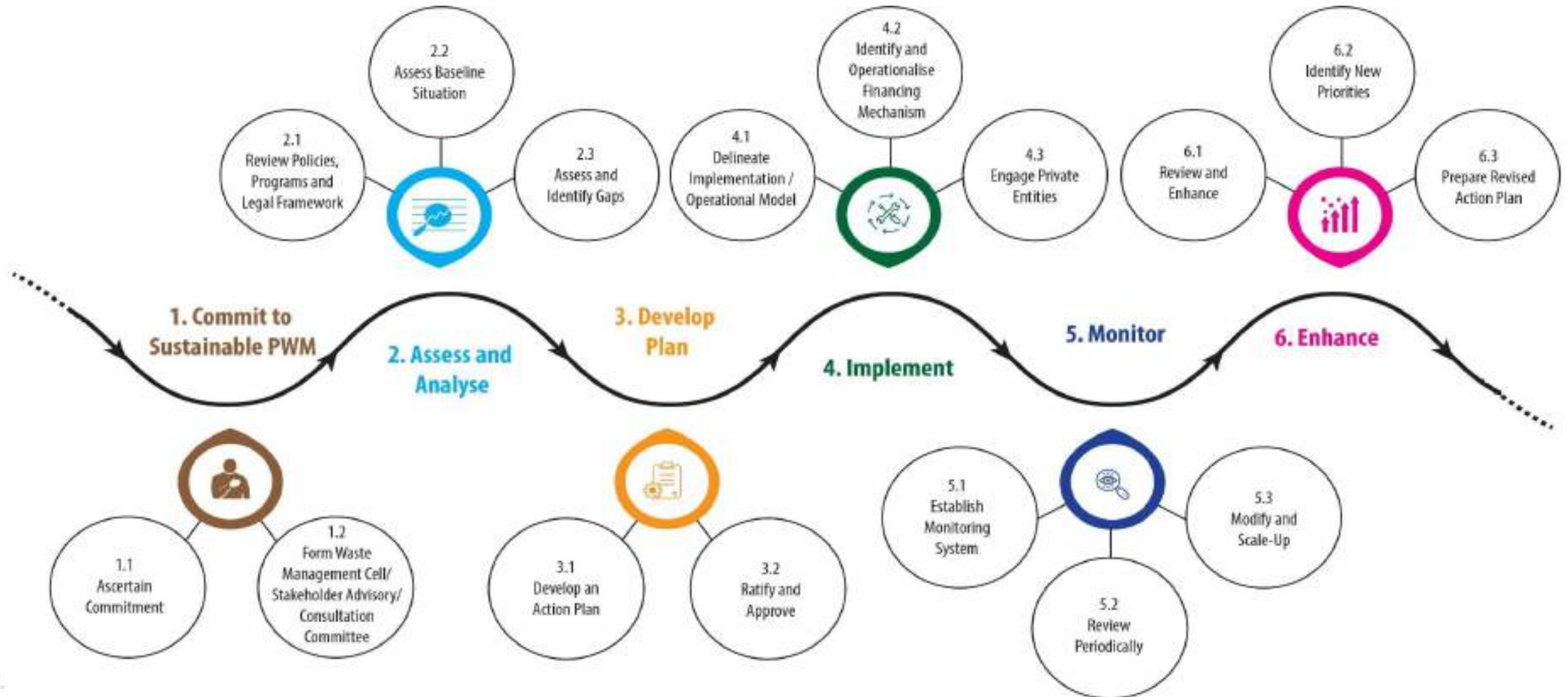
Step by step process for developing strategy and action plan for PWM by local authorities

Detail description and explanation of:

- City commitment to sustainable PWM
- Baseline assessment for developing strategy and action plan for Plastic Waste



Overall process to develop plastic waste management action plan





1. Commit to Sustainable PWM



1.1 Ascertain commitment



Description

- Establish intent of the local authority to prepare and implement a strategy and action plan, through official communication (to the public)

Key Actions

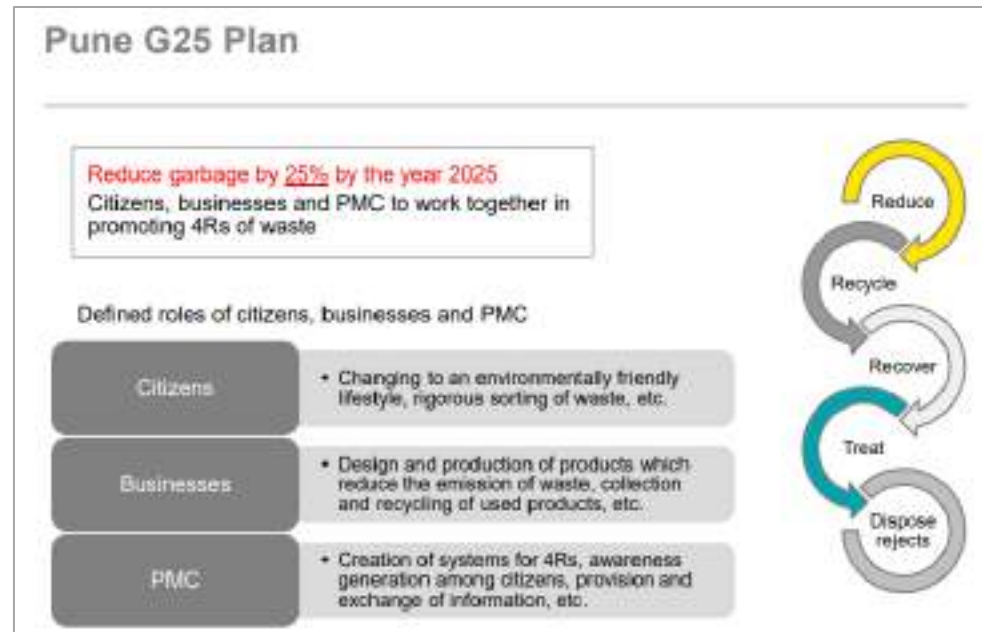
- Announcement/Commitment by political or administrative head of the city to develop and implement a sustainable PWM strategy and action plan
- Publicise PWM goals (identified by city or state)





1.1.1 Establish intent of local authorities

- Announcement/commitment by political or administrative leadership of the city on sustainable PWM goals.
- Example – Pune and Hyderabad city



(Source: PMC-Pune Waste Management Strategy Plan (2017-2025))

KTR sets target to make Hyderabad single-use plastic free

The Hans India
2 Jun 2018 3:52 PM IST

HIGHLIGHTS

Telangana IT Minister KT Rama Rao on Friday flagged off 100 Swachh Auto tippers and 20 electronic vehicles for GHMC employees at People's Plaza in Hyderabad.

Telangana IT Minister KT Rama Rao on Friday flagged off 100 Swachh Auto tippers and 20 electronic vehicles for GHMC employees at People's Plaza in Hyderabad.

Recalling that the GHMC passed a resolution to ban all plastic items, KTR unveiled grand plans to make Hyderabad a 'single use plastic-free city' by 2022.

Single-use plastic items include use and throw products such as glass, plastic carry bag, plate, spoon.

United Nations Environment Programme (UNEP) Executive director, Eric Solheim participated in the event and urged the people to avoid plastic.

Mayor Bonthu Rammoohan, commissioner, GHMC, B Janardhan Reddy and senior officials were also seen in attendance.

(Source: The Hans India, 2 June 2018)



1.2 Form Waste Management Cell/ Stakeholder Advisory/ Consultation Committee



Description

- Institutionalize a waste management cell - mandated to prepare/oversee the preparation of the PWM plan and its implementation.
- Mobilize an advisory/ consultation committee

Key Actions

- Identify core team members of waste management cell, their roles, responsibilities and reporting structure
- Constitute an official stakeholder advisory/consultation committee



1.2.1 Formation of waste management cell

- Identify core team members of the Waste Management Cell, their roles and responsibilities, and reporting structure. In case the city already has an existing SWM department, the department can take up the role of the Cell as well.
- Political or administrative head of the local authority should chair the Cell.
- Members of the Cell may consist of
 - Commissioner/Chief Executive as Chair
 - Head of the SWM department
 - Environmental Engineer in the SWM department
 - Engineer of Town and Country Planning
 - Engineer of Public Works Department
 - Head of Accounts Department



1.2.1 Formation of waste management cell

- A Nodal Officer to be identified who can act as the focal point for developing the Strategy.
- Specific responsibilities of the Chair, Nodal Officer and Members should be clearly defined.
- Key persons to be consulted by core team before finalization of the draft plan

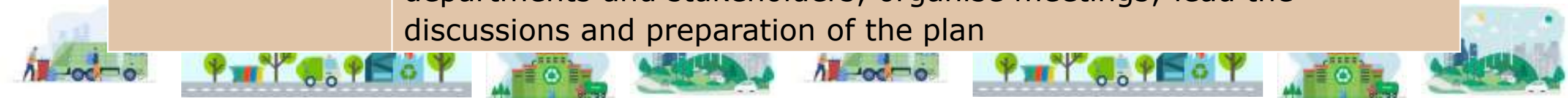


(Adapted from: CPHEEO Manual on Municipal Solid Waste Management, 2016)



1.2.2 Responsibilities of waste management cell

Waste Management Cell	Key Responsibilities
Chair	Responsible and accountable for PWM Plan; overall supervision of preparation and implementation
Members	<ul style="list-style-type: none">● Establish baseline and analyze gaps in PWM service provision● Inform the planning process with field level consultations and information● Assess options and suggest viable alternatives to be ratified by the stakeholders● Identify viable locations for establishing PWM facilities and ensuring appropriate land use controls
Nodal Officer	Coordinate development of the plan, in consultation with different departments and stakeholders; organise meetings; lead the discussions and preparation of the plan

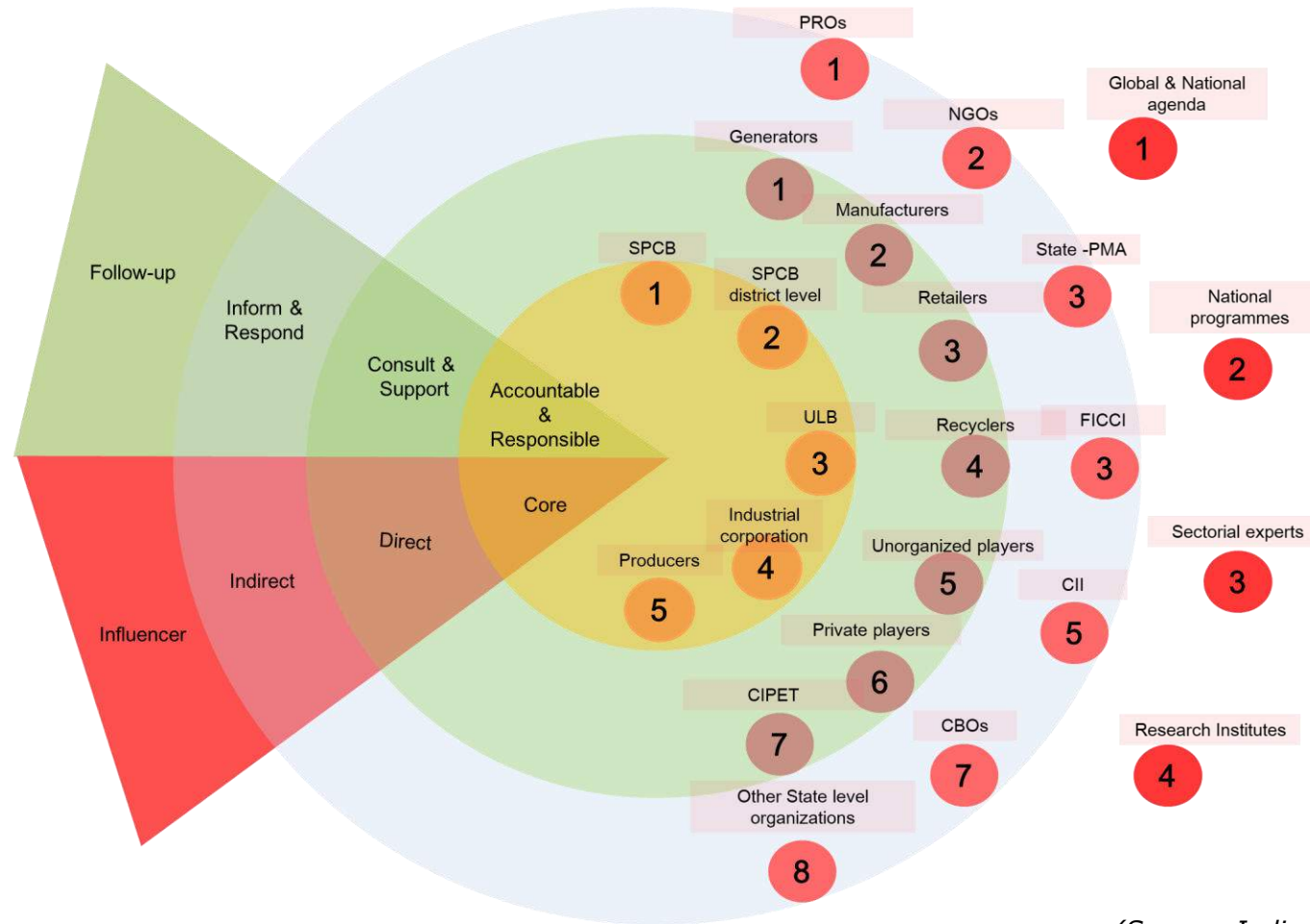


1.2.3 Constitute stakeholder advisory/consultation committee

- A range of sectors and issues need to be considered when developing plastic waste management strategy and action plan.
- Stakeholders may include
 - government agencies dealing with plastic waste
 - research institutes
 - private sector
 - recyclers
 - research institutions
 - local NGOs, CBOs, SHGs
 - technology providers
- At least two stakeholder consultations to be organised before finalization of plastic waste management strategy and action plan.



1.2.4 Stakeholder mapping and analysis methods



(Source: Indicative stakeholder mapping for Hyderabad city as an example developed by ICLEI South Asia, 2019)





2. Assess and Analyse



2.1 Review: Policies, Programs and Legal Framework



Description

- Review policies, programs, and legal frameworks concerning the national, state, district, and city-level priorities regarding plastic waste management.

Key Actions

- Literature review
- Assessment of the implementation status, issues, delays, gaps and other relevant aspects in accordance with existing rules and regulations, pertaining to PWM



2.1.2 Identify and review national and state policies/strategies and their goals



- Plastic Waste Management Rules, 2016
- Solid Waste Management Rules, 2016
- Plastic Waste Management (Amendment) Rules, 2018
- Extended Producers Responsibility Guidelines, 2020
- CPHEEO Guidelines on Usage of Refuse Derived Fuel in Various Industries
- Guidelines for Swachh Bharat Mission- Urban, 2017
- National Urban Sanitation Policy, 2008
- State Level/Regional/District SWM related policies/regulations/guidelines
- Indian Standards (IS) on plastic resin code, use of recycled plastic etc.

Local Authorities should assess their current compliance and identify time-bound targets





2.2 Assess Baseline Situation

Description

- Assess the baseline situation of waste management, especially plastic waste in the city

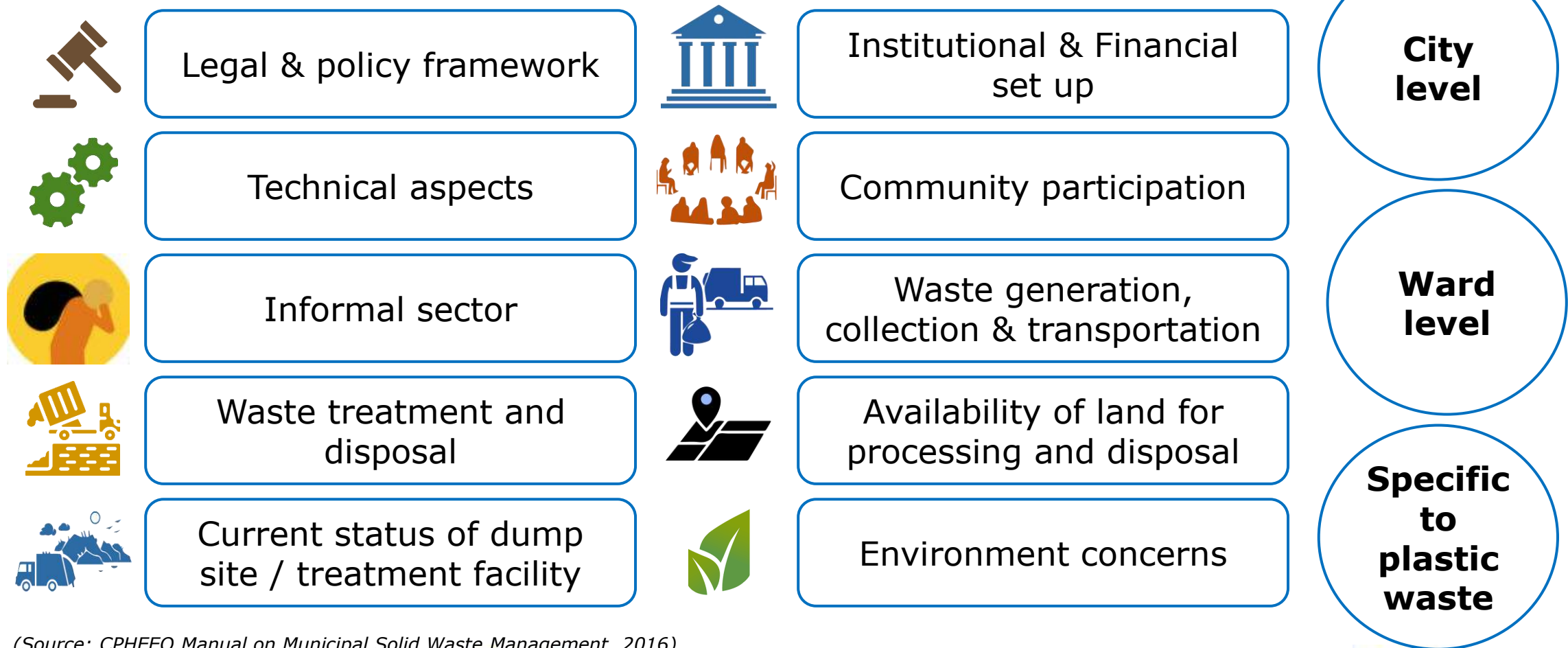
Key Actions

- Plastic waste and other components of MSW generation, quantification, and characterization (including brand audit)





2.2.1 Assess baseline



(Source: CPHEEO Manual on Municipal Solid Waste Management, 2016)



2.2.2 Sources of secondary data

Likely that a high proportion of data required is already available

Potential sources are:

- Administrative records
- Secondary sources – project reports, DPRs, master plans, research reports, programme status reports, etc.



2.2.2 Sources of secondary data (Contd.)

Baseline Data for PWM can be also found:

Census and District Census Book	Government of India Census- Available Online
National Sample Survey Organization (NSSO) Data	Ministry of Statistics and Programme Implementation, Government of India
City Development Plan / City Sanitation plans /Master Plan	Local Authority
Swachh Sarvekshan annual reports	Ministry of Housing and Urban Affairs
Maps	Local Authority, Town and Country Planning Organisation, Development Authority
Annual reports on PWM/SWM, EPR implementation status, status of registered plastic waste recycling and processing units	Central /State Pollution Control Board
Private operators records and reports	Local Authority or Association of Private Operators



2.2.3 Sources of primary data

When the existing data is insufficient, data can be collected through different methods

I. Primary survey

1. Quantification survey
2. Physical and Chemical Characterization

II. Interviews

1. One to one interviews
2. Focus group discussions
3. Stake holder consultations

III. Observations

1. Reconnaissance survey
2. Review of pilot interventions



Plastic waste quantification and characterization

- Representative Data collection - The collection of primary data from the entire planning area is not possible, representative samples may be collected.
- Sampling for waste quantification from different sectors
 - Short term planning
 - Long term planning
- Physical and Chemical Characterization of Plastic Waste

(Source: CPHEEO Manual on Municipal Solid Waste Management, 2016)



Parameters- Plastic waste characterization

Plastic segregated from the sample shall be further categorized (based on resin code) and weighed into seven types:

- Polyethylene Terephthalate (PET)
- High Density Polyethylene (HDPE),
- Polyvinyl Chloride (PVC),
- Low Density Polyethylene (LDPE),
- Polypropylene (PP),
- Polystyrene (PS),
- Others (includes multi-layer plastics, thermo plastics etc.).



(Source: <https://www.southernwasteandrecycling.com/blog/2015/08/characterizing-the-different-types-of-industrial-waste/>
<https://www.brownrecycling.co.uk/recycling/plastic-recycling/>)



Parameters - Plastic waste characterization

Moisture %	Sulphur %
Volatile Matter %	Chlorides as Cl mg/kg
Fixed Carbon %	Gross Calorific value K Cal/kg
Ash %	Net calorific Value K Cal/kg
Carbon %	Total Nitrogen %
Hydrogen %	Phosphorous as P ₂ O ₅ %
Oxygen %	Potassium as K ₂ O %
Nitrogen %	Carbon Nitrogen (C:N) Ratio

- Chemical analysis helps in selecting the appropriate processing technology
- Calorific value of plastic waste is an important parameter for selecting recycling technology
- Chemical analysis should be performed in a laboratory accredited by the Ministry of Environment, Forests and Climate Change (MoEF&CC)

(Source: CPHEEO Manual on Municipal Solid Waste Management, 2016)



Waste Quantification: Tools and techniques for short term planning

- Select at least 100 representative sampling locations per 1,00,000 population that include:
 - Households of low, mid, and high-income levels;
 - Secondary collection points
 - Processing and dumping site.
 - Commercial establishments and markets
 - Institution and offices
 - Small and medium-sized enterprises;
 - Others - hotels; function halls; vegetable markets; sports complexes or facilities; places of worship (temples, mosques, etc.); and other significant representative groups

The average plastic amounts to **6.92% i.e. 6% to 7%** of total waste generated in Indian cities as per the report "Assessment and Quantification of Plastics Waste Generation in Major Cities" by CPCB in 2015.

It is essential to consider socio-economic conditions while planning, as they have a direct impact on per capita waste generation and composition.

(Source: CPHEEO Manual on Municipal Solid Waste Management, 2016)

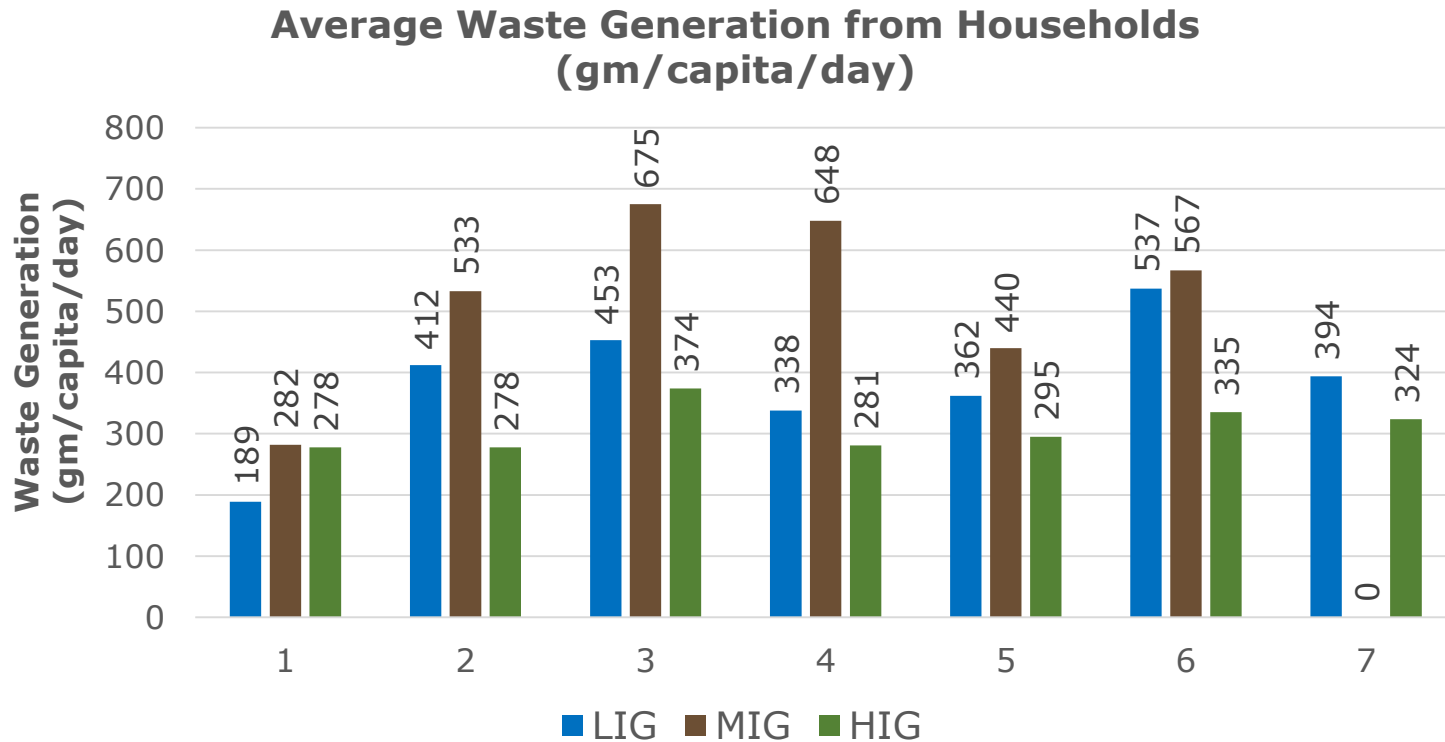


Waste Quantification: Tools and techniques for short term planning (Contd.)

- Storage bags to be distributed to each waste generator that can be handed over to the specified waste collector on the subsequent day in the morning.
- The waste collected in the bags may be collected and weighed daily for a minimum of 3–7 days.
- Since most of the Indian households do not segregate plastic from other waste. Therefore, it is important to conduct quantification survey for complete municipal waste.



Result of sample survey in Greater Hyderabad Municipal Corporation (GHMC)



LIG: average waste generation (gm/capita/day):

384

MIG: average waste generation (gm/capita/day):

524

HIG: average waste generation (gm/capita/day):

309

(Source: Survey conducted by ICLEI South Asia, 2019)





Waste Quantification Survey Conducted in GHMC

Waste Quantification: Long term planning

- Waste quantities should be aggregated over the 7-day period, weighed, and averaged for representative locations within the local authority jurisdiction, in each of the 3 main seasons viz. summer, winter and rainy seasons.
- These quantities can then be extrapolated to the entire city and per capita generation assessed.
- This should be repeated once every 3–5 years at the time of the review.

(Source: CPHEEO Manual on Municipal Solid Waste Management, 2016)



Waste characterization

Physical Characterization - Density of Waste, Moisture Content, Calorific Value, Biochemical Characteristics

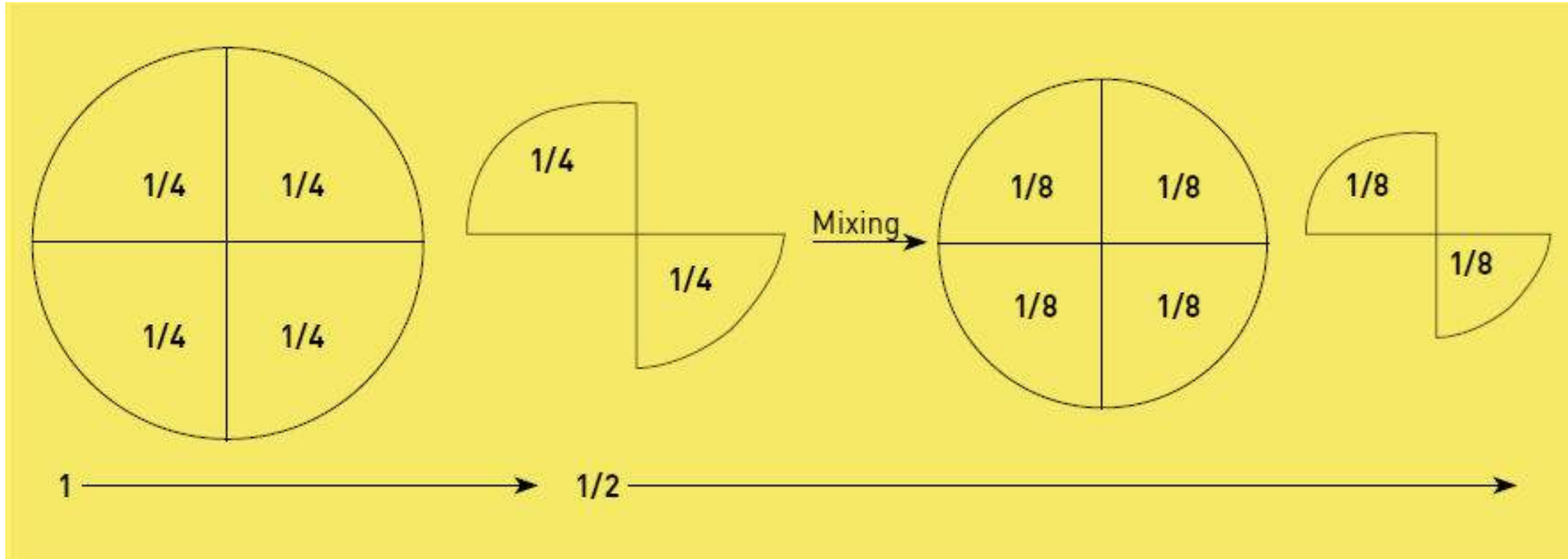
- Take 10 kg of municipal waste sourced from random entities in an identified sampling location.
- Samples from all heterogeneous sampling points shall be mixed thoroughly and is placed as a uniform heap.
- The heap is divided into four portions using straight lines perpendicular to each other.
- Waste from opposing corners of the divided heap is removed to leave half of the original sample. The remaining portions are again thoroughly mixed and the quartering process is repeated until a desired size is obtained.
- The last remaining opposing fractions of waste shall be mixed and analysed for identifying physical and chemical properties of the waste.
- The same fraction to be used for characterizing plastic waste

(Source: CPHEEO Manual on Municipal Solid Waste Management, 2016)



Waste characterization (Contd.)

Quartering and Coning method



(Source: CPHEEO Manual on Municipal Solid Waste Management, 2016)



Quartering and Coning Method



1. Mixing of Waste

2. Segregation of waste in different component



4. Plastic waste segregation based on its resin code

3. Quartering and removal of opposite corner



Brand Audit of plastic waste



Identify, quantify and document the brands found in plastic waste to hold businesses accountable under the EPR framework



Generate important data to call for innovations in product packaging and delivery systems to push for reduction in plastic waste



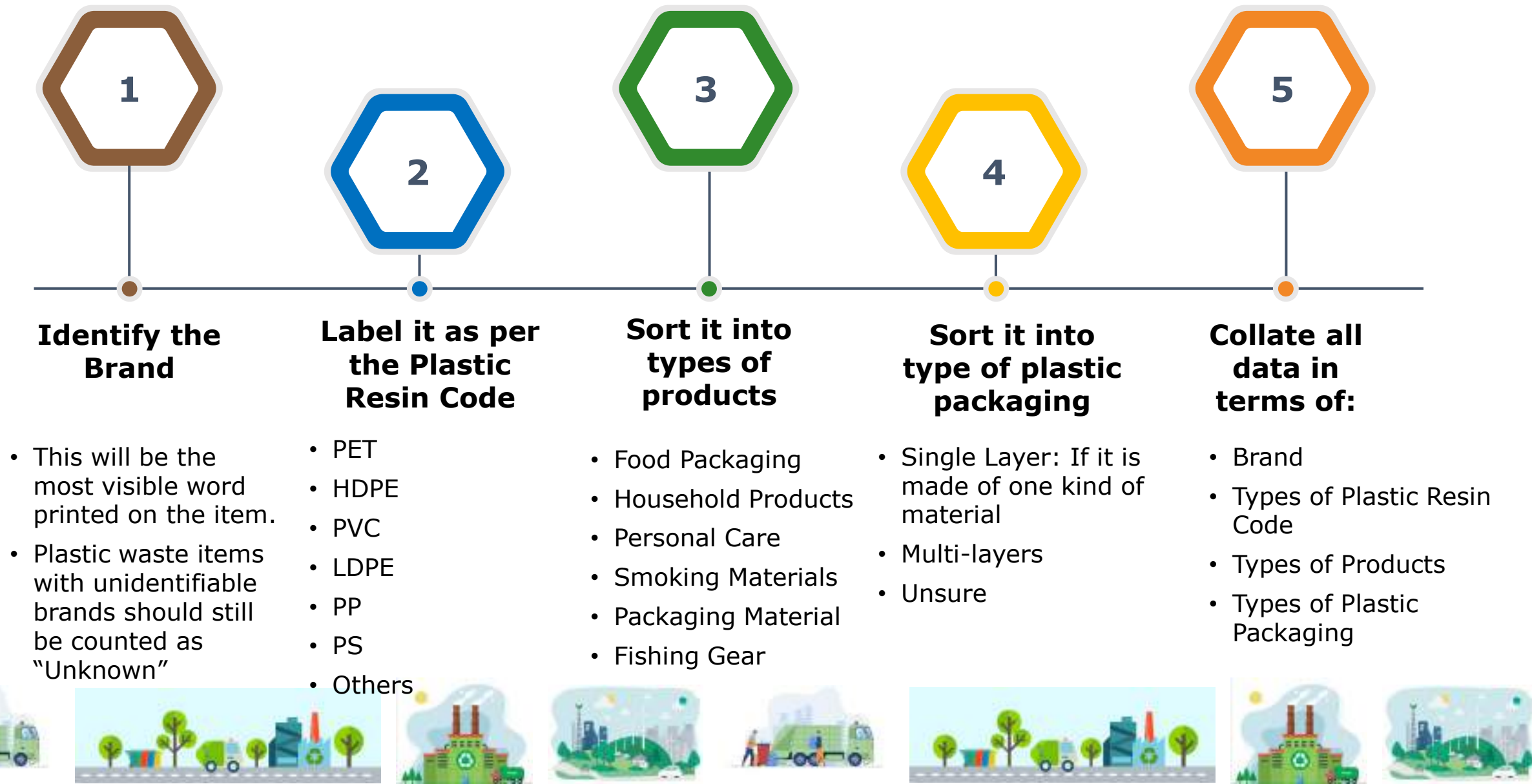
Brand Auditing

Sort waste by **Brands**

Sort waste by **Categories**



How to conduct Brand Auditing?

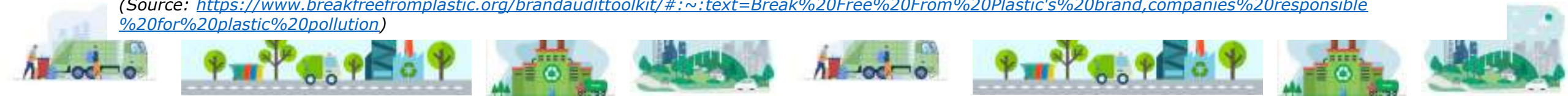


How to conduct Brand Auditing? (Contd.)

Type of products

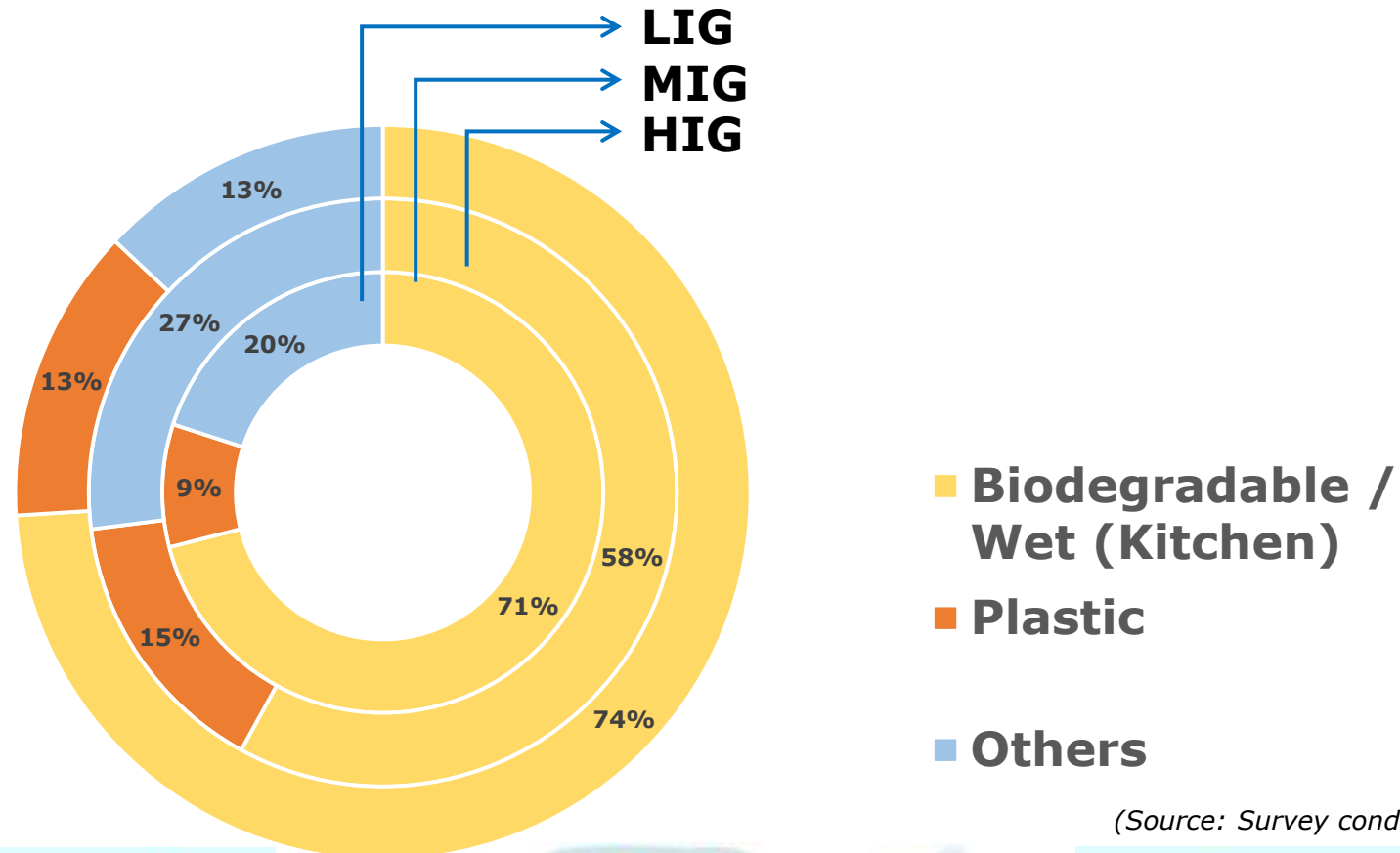


(Source: <https://www.breakfreefromplastic.org/brandaudittoolkit/#:~:text=Break%20Free%20From%20Plastic's%20brand,companies%20responsible%20for%20plastic%20pollution>)



Sample survey in residential areas - GHMC

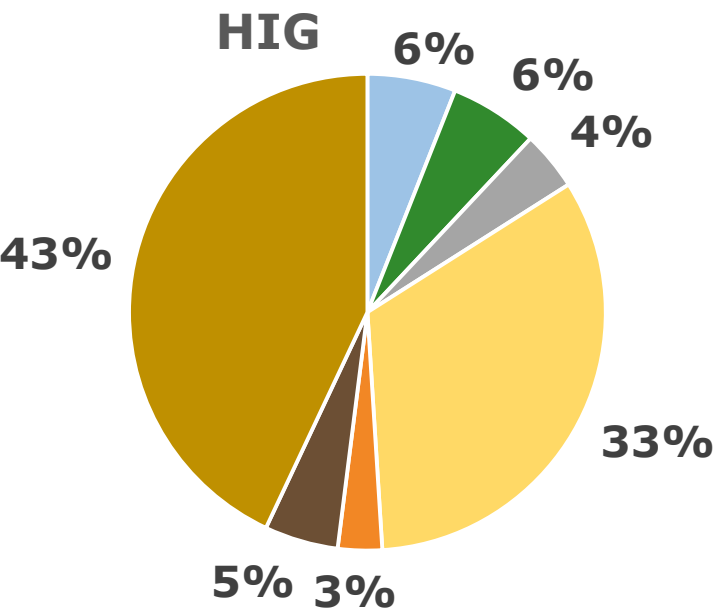
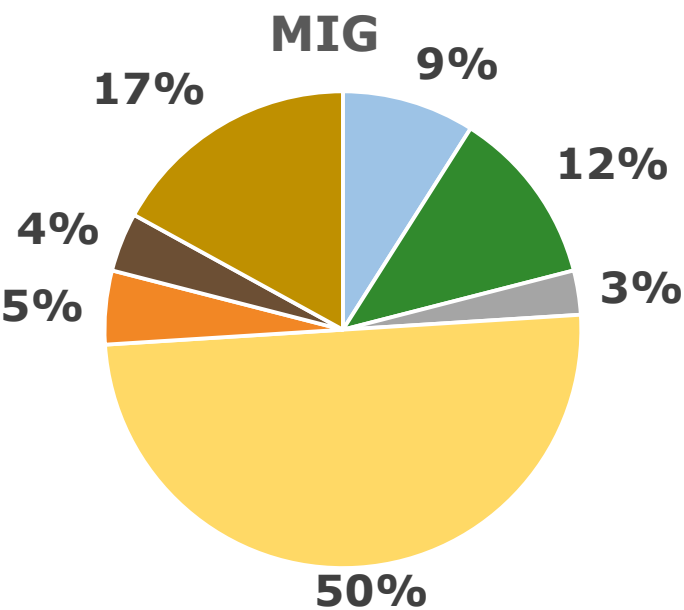
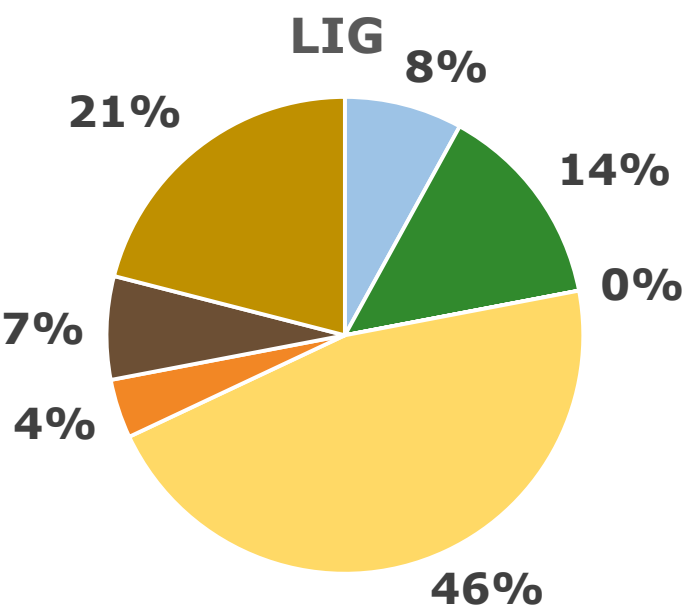
Plastic and other municipal waste composition



(Source: Survey conducted by ICLEI South Asia, 2019)



Sample survey in residential areas – GHMC (Contd.)



■ PET ■ HDPE ■ PVC ■ LDPE ■ PP ■ PS ■ Others

(Source: Survey conducted by ICLEI South Asia, 2019)



Chemical analysis of residential waste - GHMC

Characteristics	LIG	MIG	HIG	Average Fraction
Moisture %	48.40	41.30	54.20	47.97
Volatile Matter %	33.85	41.66	27.03	34.18
Fixed Carbon %	1.95	1.48	1.97	1.80
Ash %	15.8	15.56	16.8	16.05
Carbon %	47.89	44.25	45.27	45.80
Hydrogen %	6.23	6.35	5.98	6.19
Oxygen %	31.15	31.67	33.69	32.17
Nitrogen %	1.39	2.15	1.13	1.56
Sulphur %	0.004	0.003	<0.001	0.00



Chemical analysis of residential waste – GHMC (Contd.)

Characteristics	LIG	MIG	HIG	Average Fraction
Chlorides as Cl mg/kg	48.93	47.69	50.34	48.99
Gross Calorific value K Cal/kg	1256	1324	1395	1325.00
Net calorific Value K Cal/kg	1054	1106	1227	1129.00
Total Nitrogen %	0.68	0.72	0.68	0.69
Phosphorous as P ₂ O ₅ %	0.41	0.38	0.45	0.41
Potassium as K ₂ O %	0.32	0.21	0.26	0.26
Carbon Nitrogen (C:N) Ratio	34.26	32.15	30.54	32.32

(Source: Survey conducted by ICLEI South Asia, 2019)



Result of Brand Audit conducted at various point of generation in pilot area - GHMC

Shopkeepers			
Brands	Percentage	Brands	Percentage
PepsiCo	6	Henna Industries	2
Nestle	1	Marico Ltd.	4
Parle Agro	2	Haldiram	1
Britannia	1	Hector Beverage	1
Hindustan Unilever	1	Samsung	1
Cavinkare Ltd.	4	Amul	1
Godrej	4	Other Dairy Brands	1
Garnier	5	Local brands	51
Emami	3	Non-branded packets	8
DS Group	2		



(Source: Survey conducted by ICLEI South Asia, 2019)



Result of Brand Audit conducted at various point of generation in pilot area - GHMC (Contd.)

Birla Temple	
Brands	Percentage
Pepsico	2
Johnson & Johnson	7
ITC	7
Cadbury	3
Haldiram	69
Local brands	7
Nutriline	2

Birla Planetarium	
Brands	Percentage
Pepsico	5
Parle Agro	8
Britannia	13
Hindustan Unilever	1
Tata	5
ITC	3
Marico Ltd.	1
Cadbury	7
Haldiram	9
Heritage	5
Local brands	21
Coffee day	3
Nutriline	1

Haldiram's
Prabhuji

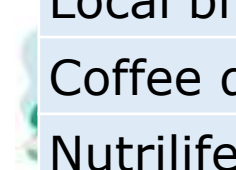


Coca-Cola

Johnson & Johnson



(Source: Survey conducted by ICLEI South Asia, 2019)



Exercise (30 mins)

A collage of expected plastic waste components in the municipal waste stream will be provided.

- Identify and characterize the plastic waste in 7 categories (as per the Plastic Resin Code), co-relate with the number of each item
- Further, categorize these in common brands known to you





END OF MODULE III





Disclaimer

The Training Modules on developing 'Plastic Waste Management Strategy and Action Plan for Urban Local Bodies(ULBs)' is prepared by ICLEI-Local Governments for Sustainability, South Asia under the contract- Development of Knowledge, Training and Capacity Building Materials on Plastic Waste Management based on the activities of GHMC, supported by the IGES Centre Collaborating with UNEP on Environmental Technologies (CCET). The views expressed in this document do not necessarily represent the official decision or stated policy of the United Nations Environment Programme. The citing of trade names in this document does not constitute any endorsement.

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