



USING URBAN THEMATIC ACCOUNTING FOR SDG REPORTING — EXAMPLE OF WASTE SDG 11.6.1

Nao Takeuchi
Urban Basic Services Section
UN-Habitat



**2 billion
w/o waste
collection**

**3 billion
w/o access to
controlled
waste disposal**

**Business-as-
usual:
8 – 10 % of
global GHG
emissions**

SDGS — SHED LIGHT ON WASTE





Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable

Targets

11.6

By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

Indicator

Proportion of municipal solid waste collected and managed in controlled facilities with regards to the total waste generated by the city



Goal 12: Ensure sustainable consumption and production patterns

Targets

12.3

By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.

12.4

By 2030, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.

12.5

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

Indicator

Food loss Index
Food Waste Index

Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment

National recycling rate, tons of material recycled

Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Targets

14.1

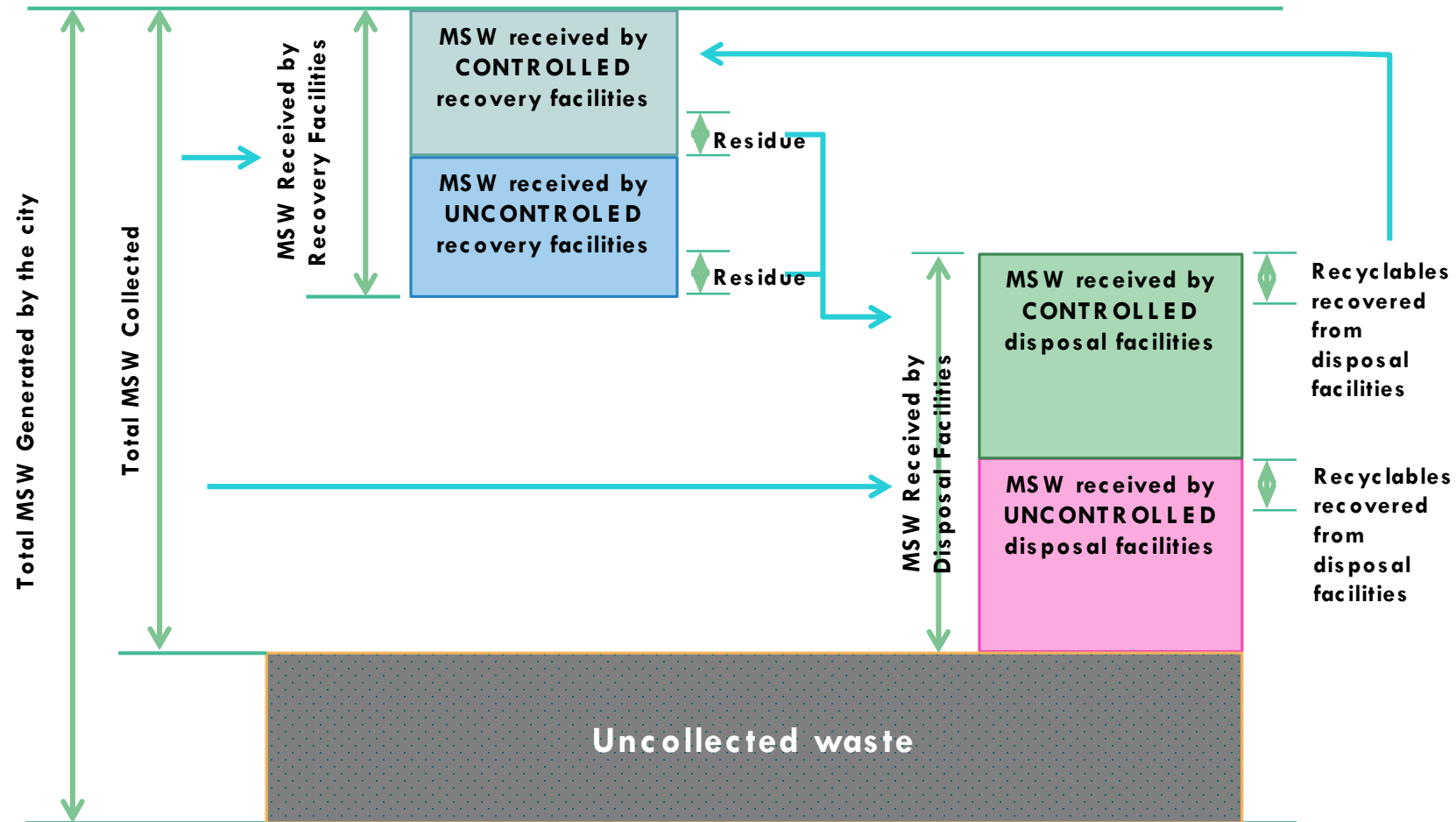
Index of coastal eutrophication and floating plastic debris density

Indicator

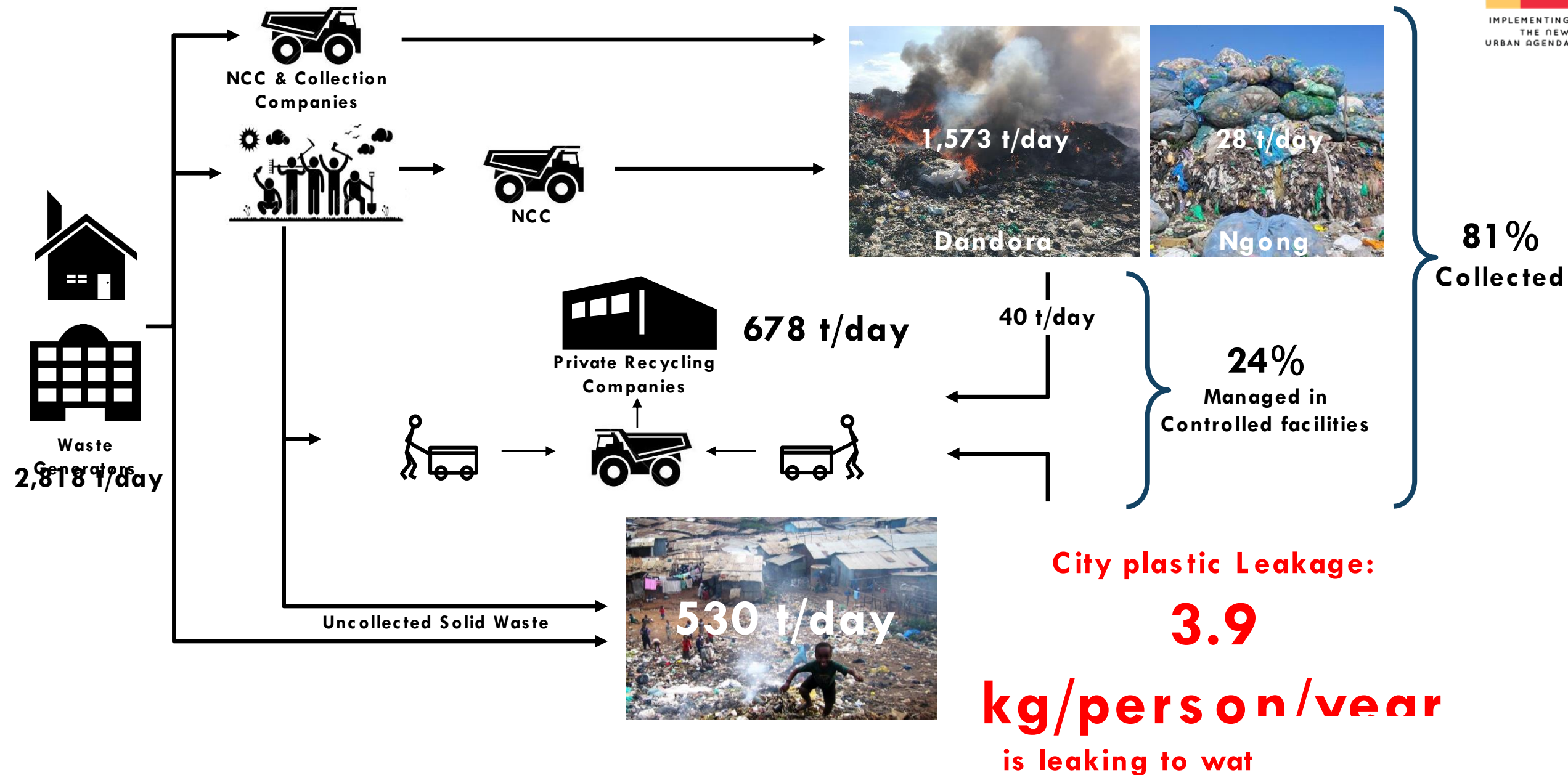
Tier 3. awaiting the development of internationally established methodology and standards

WHAT WASTE WISE CITIES TOOL (WACT) MEASURES?

% of MSW collected and managed in controlled facilities out of total MSW generated by the city



Municipal Solid Waste Flow in Nairobi

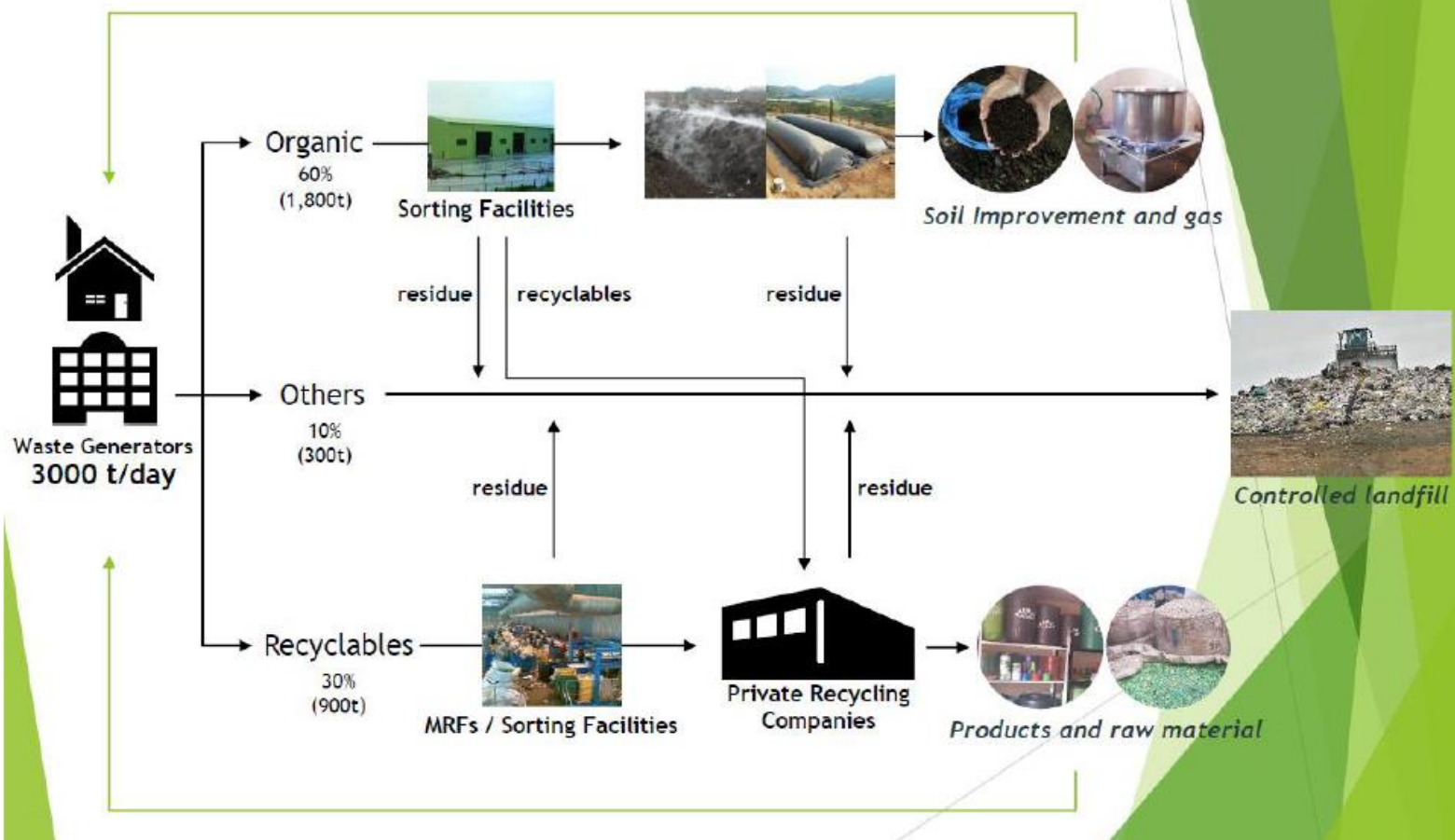


NAIROBI LOCAL WASTE STAKEHOLDER WORKSHOP

Identify key intervention areas with stakeholders



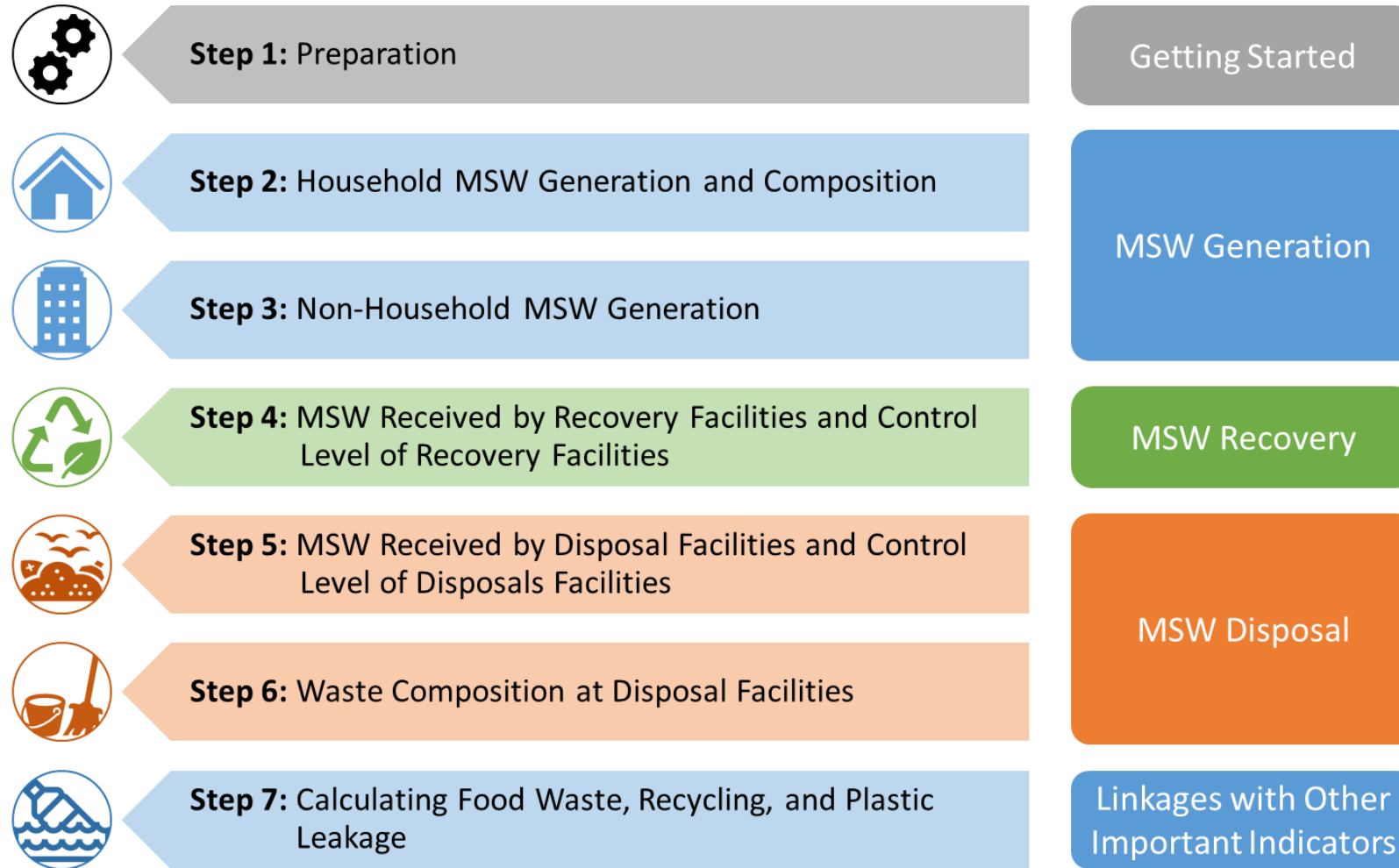
Future Waste Flow of Nairobi





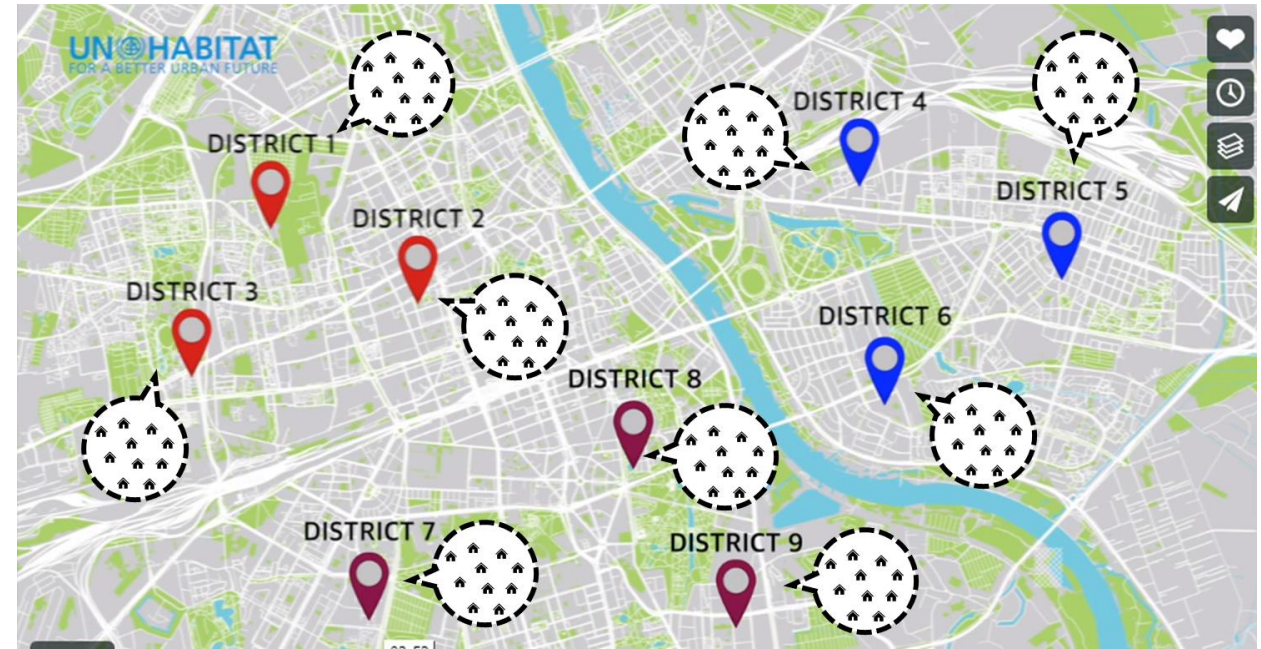
 Nairobi City County
 Sustainable Waste
 Management Action
 Plan 2020 -2022

SDG 11.6.1 STEPS



STEP 2: HOUSEHOLD MSW GENERATION AND COMPOSITION

- Waste sampling from 10 household from 3 survey areas per income groups (high, middle and low income groups)
- To obtain representative sample, 7 days' sample from each household to be collected
- Collected samples weighed to obtain average waste generation per capita
- After weighing, waste composition is measured for each income groups



Family
4 members

Day 1



Discard!

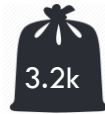
Because ppl put accumulated waste in the bag making the sample not representative

Day 2



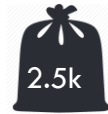
2.4k

Day 3



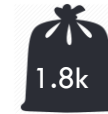
3.2k

Day 4



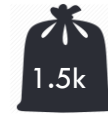
2.5k

Day 5



1.8k

Day 6



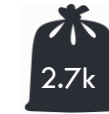
1.5k

Day 7



2.1k

Day 8



2.7k

7 x 4

=

0.57kg/day/pers on

WASTE CHARACTERIZATION INTO 12 TYPES

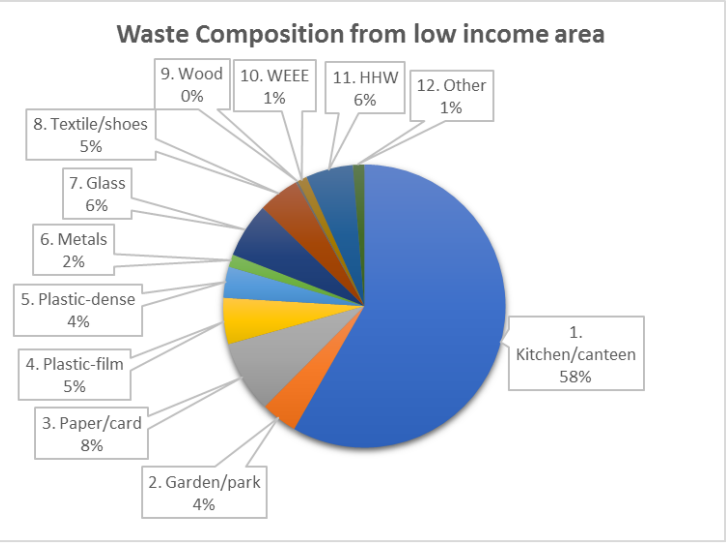
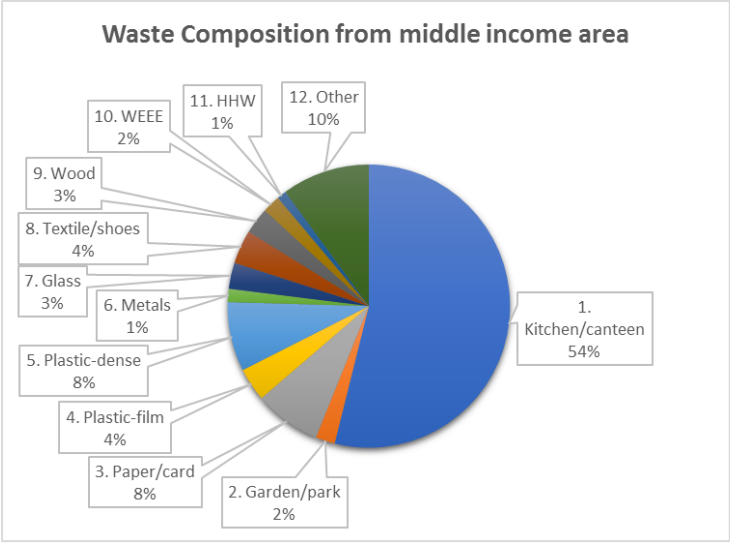
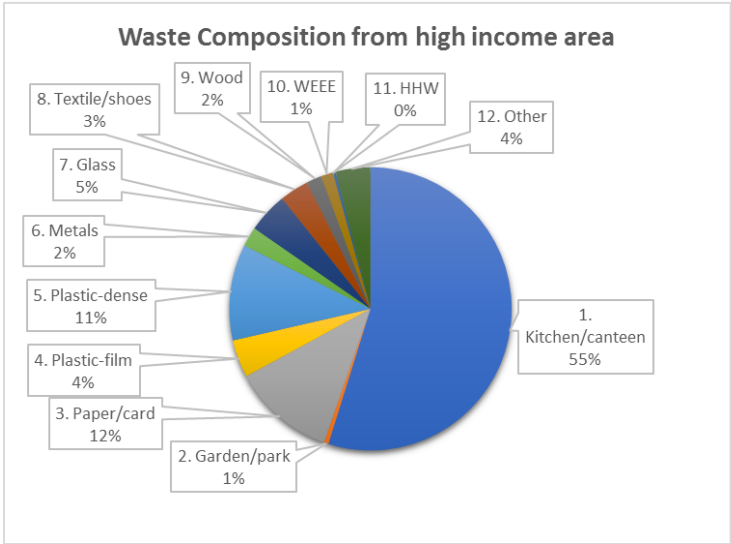
Categories	Examples
Kitchen / Canteen Waste	Bread, coffee grinds, cooked or uncooked food items, food leftovers, fruit and vegetables, meat and fish, pet foods, tea bags
Garden / Park Waste	Flowers; Fruit and vegetable garden waste; Grass Cuttings; Hedge trimmings; Leaves; Pruning; Tree branches; Weeds
Wood	Bottle corks, Cork packaging, Untreated Pallet, Solid timber and timber fragments, Wood from DIY, Wood furniture or toys
Paper / Cardboard	Brochures, magazines, newspapers, cereal packets, Cleaning product cartons, Cards, Books, Tissue Paper, Writing papers
Plastic Film	Biscuit wrappers, Cling film, Compost/peat bags; Crisp packets; Frozen food bags; Cellotape; Shopping Bags, Tarpalins
Plastic Dense	All plastic bottles/jars, Plastic bottles, Food packing trays, Roll on deodorant bottles, Bottle tops, Toothpastes, Plastic toys
Glass	Alcoholic and non-alcoholic drinks bottles, Food jars, Medicine bottles, Cookware, Flat glass, Light bulbs, Mixed broken glass
Textiles	Trousers; Skirts; Socks; Stockings; Tights; Balls of wool; Blankets; Braids; Carpets; Ropes; Rugs; Sheets; Threads; Towels
Metals	Biscuit containers; Packaging for carbonated drinks, Fish, Pet food etc; Aluminium foil sheets; Shoe polish cans; Soft drinks;
Hazardous Household Waste	Batteries/Accumulators;
Complex Products	Composite/Complex Packaging such as Aluminium Foil-coated card, liquid containers e.g. milk; fruit juice; Appliance parts
Other	Boulders; Bricks; Gravel; Pebbles; Sand; Soil; Stones; Ceramics; Clay plant pots; Crockery; Stone/ceramic floor and wall tiles; Children's disposable nappies; Ashes; Sand; Small fragments <10mm of all above categories



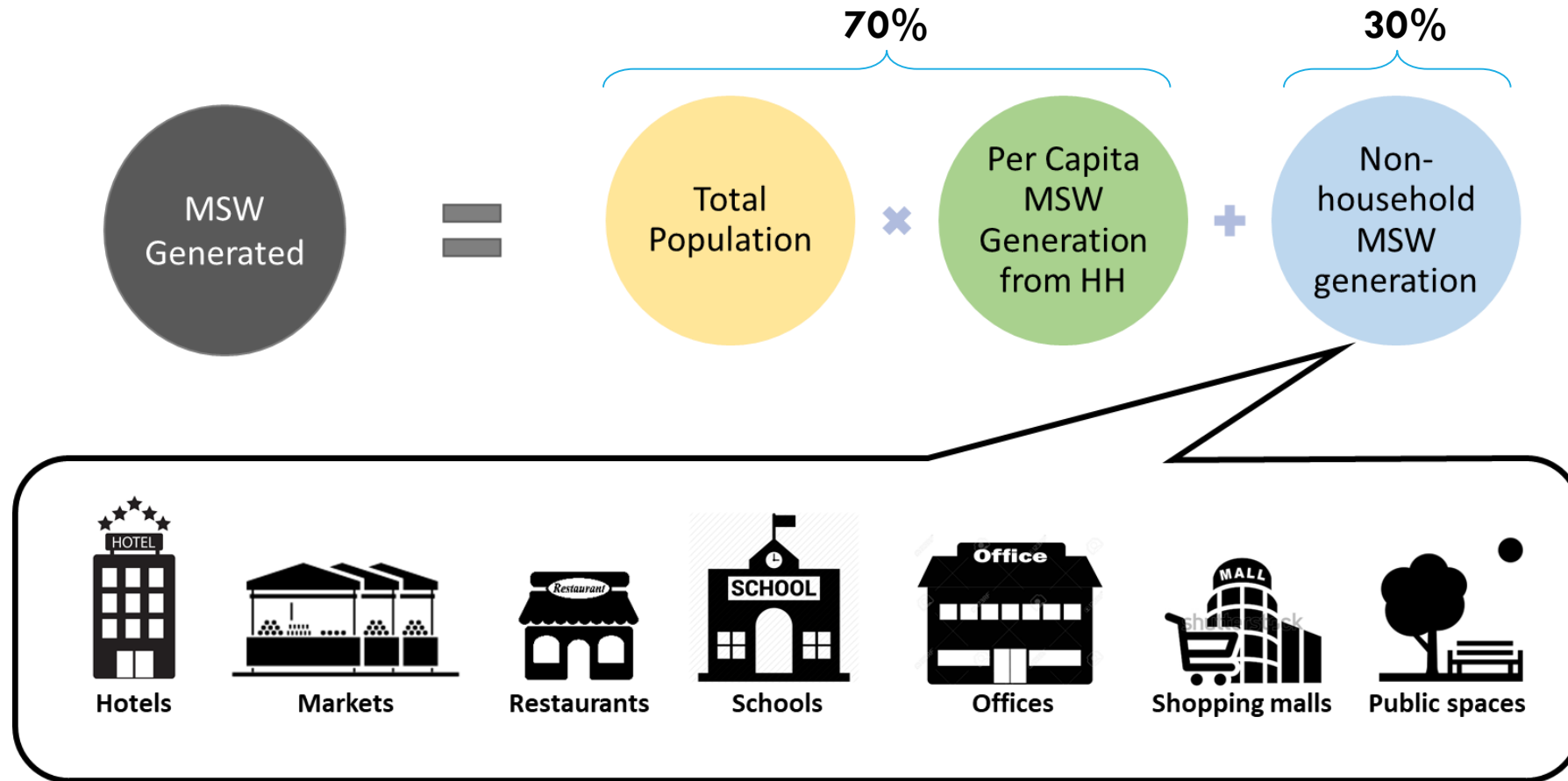
EXAMPLE OF NAIROBI – SURVEY RESULTS OF STEP 2

Income level	MSW Generation per capita (kg/capita/day)	Population	Population rate	MSW Generation from each income level (t/day)
High Income	0.62	607,174	13%	378
Medium Income	0.89	1,629,660	35%	1,450
Low Income	0.19	2,408,719	52%	462
Total	N/A	4,645,553	100%	2,290

Types	Recyclable waste generation from HH (t/day)
Food waste	1,259
Plastic film	96
Plastic dense	176
Paper and cardboard	198
Glass	90
Total	1,820



STEP 3: NON-HOUSEHOLD MSW GENERATION



$$Total\ MSW = \frac{\text{Total MSW from households}}{70\%}$$

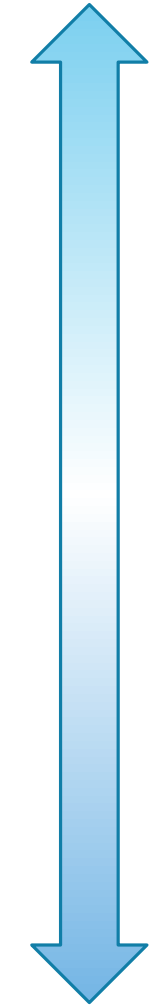
STEP 4: MSW RECEIVED BY RECOVERY FACILITIES & LEVEL OF CONTROL

- Identify recovery facilities during the preparation phase (STEP 1)
- Arrange visits and interviews with identified recovery facilities (Annex 5 of WaCT Step by Step Guide)
- Evaluate the level of control of recovery facilities based on the ladder environmental level of control (ladder provided in to WaCT Step by Step Guide)
- Compile the collected information (in provided file)



IMPORTANT ASPECTS TO UNDERSTAND WASTE RECOVERY CHAIN

Formal



End-of-Chain
Recyclers



Apex Traders



Informal



Example of Plastic

STEP 4: LADDER OF CONTROL LEVEL — RECOVERY FACILITIES

CONTROL LEVEL	Incineration with energy recovery	Other recovery facilities
Full Control	<input type="checkbox"/> Built to and operating in compliance with current national laws and standards including stringent stack and GHG emission criteria <input type="checkbox"/> Emission controls are conducted compliant to environmental standards and results of tests are accessible and transparent to citizens/users <input type="checkbox"/> Fly ash managed as a hazardous waste using the best appropriate technology <input type="checkbox"/> Weighing and recording conducted <input type="checkbox"/> A strong and robust environmental regulator inspects and monitors emissions <input type="checkbox"/> Protection of workers' health and safety	<input type="checkbox"/> Built to and and operating in compliance with current national laws and standards <input type="checkbox"/> Pollution control compliant to environmental standards <input type="checkbox"/> Protection of workers' health and safety <input type="checkbox"/> The nutrient value of biologically treated materials utilized for separate organic waste (e.g. in agriculture/horticulture) <input type="checkbox"/> Materials are extracted, processed according to market specifications, and sold to recycling markets <input type="checkbox"/> Weighing and recording of incoming loads conducted <input type="checkbox"/> All outgoing loads registered by weight and type of destination
Improved Control	N/A	<input type="checkbox"/> Engineered facilities with effective process control <input type="checkbox"/> Pollution control compliant to environmental standards <input type="checkbox"/> Protection of workers' health and safety <input type="checkbox"/> Evidence of materials extracted being delivered into recycling or recovery markets. <input type="checkbox"/> Weighing and recording of incoming and outgoing loads conducted
Basic Control	<input type="checkbox"/> Emission controls to capture particulates <input type="checkbox"/> Trained staff follow set operating procedures <input type="checkbox"/> Equipment maintained <input type="checkbox"/> Ash management carried out <input type="checkbox"/> Weighing and recording conducted	<input type="checkbox"/> Registered facilities with marked boundaries <input type="checkbox"/> Some environmental pollution control <input type="checkbox"/> Provisions made for workers' health and safety <input type="checkbox"/> Weighing and recording of incoming and outgoing loads conducted
Limited Control	N/A	<input type="checkbox"/> Unregistered facilities with distinguishable boundaries <input type="checkbox"/> No environmental pollution control <input type="checkbox"/> No provisions made for workers' health and safety <input type="checkbox"/> Weighing and recording conducted
No Control	<input type="checkbox"/> Uncontrolled burning <input type="checkbox"/> No air/water pollution control	<input type="checkbox"/> Unregistered locations with no distinguishable boundaries <input type="checkbox"/> No provisions made for workers' health and safety <input type="checkbox"/> No environmental pollution control

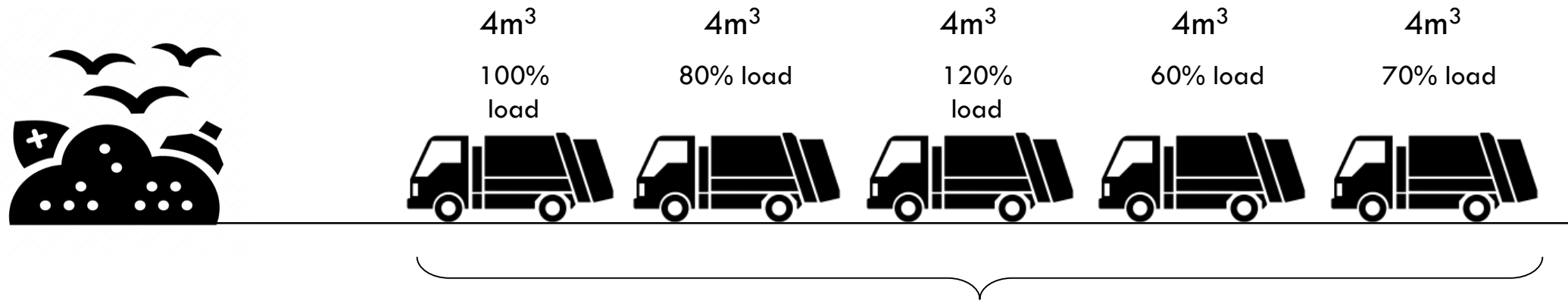
STEP 5: MSW RECEIVED BY DISPOSAL FACILITIES AND LEVEL OF CONTROL

- Identify disposal facilities
- Arrange visits and interviews with identified disposal facilities
 - Obtain records of waste received (weigh bridge record or counting the number of truck)
 - Interview waste pickers (average daily amount of recyclables recovered by one waste picker and the approximate number of waste pickers in the disposal site)
- Evaluate the level of control of disposal facilities
- Compile the collected information (in provided file)



IF THE SITE DOESN'T HAVE A WEIGHBRIDGE....

Count the number of trucks! And get the average density of the waste!



$$4 + 4 \times 0.8 + 4 \times 1.2 + 4 \times 0.6 + 4 \times 0.7 = 17.2\text{m}^3$$



Waste density:

100 litter bin full of garbage is 75kg.
75kg ÷ 100 litre (0.1m³) =

750kg/m³

$$750\text{kg} \times 17.2\text{m}^3 = 12,900\text{kg} = 12.9\text{t}$$

STEP 5: LADDER OF CONTROL LEVEL – DISPOSAL FACILITIES

CONTROL LEVEL	Disposal Facilities	
Full Control	<input type="checkbox"/> Waste daily covered <input type="checkbox"/> Waste compacted <input type="checkbox"/> Site fenced and full 24-hour control of access <input type="checkbox"/> Properly sited, designed and functional sanitary landfill <input type="checkbox"/> Leachate containment and treatment (naturally consolidated clay on the site or constructed liner)	<input type="checkbox"/> Landfill gas collection and flaring and/or utilization <input type="checkbox"/> Site staffed; <input type="checkbox"/> Post closure plan <input type="checkbox"/> Weighing and recording conducted <input type="checkbox"/> Protection of workers' health and safety
Improved Control	<input type="checkbox"/> Waste periodically covered <input type="checkbox"/> Waste compacted <input type="checkbox"/> Site fenced and control of access <input type="checkbox"/> Leachate containment and treatment	<input type="checkbox"/> Landfill gas collection (depending on landfill technology) <input type="checkbox"/> Site staffed <input type="checkbox"/> Weighing and recording conducted <input type="checkbox"/> Protection of workers' health and safety
Basic Control	<input type="checkbox"/> Some use of cover <input type="checkbox"/> Waste compacted <input type="checkbox"/> Sufficient equipment for compaction <input type="checkbox"/> Site fenced and control of access <input type="checkbox"/> No fire/smoke existence	<input type="checkbox"/> Site staffed <input type="checkbox"/> Weighing and recording conducted <input type="checkbox"/> The slope of the landfill is stable, landslides not possible <input type="checkbox"/> Protection of workers' health and safety
Limited Control	<input type="checkbox"/> No cover <input type="checkbox"/> Some compaction <input type="checkbox"/> Some equipment for compaction <input type="checkbox"/> Some level of access control/fencing <input type="checkbox"/> No leachate control	<input type="checkbox"/> Some fire/smoke existence <input type="checkbox"/> Site staffed <input type="checkbox"/> Weighing and recording conducted <input type="checkbox"/> The slope of the landfill is unstable with high possibility of a landslide
No Control	<input type="checkbox"/> No cover <input type="checkbox"/> No compaction <input type="checkbox"/> No/ limited equipment <input type="checkbox"/> No fencing	<input type="checkbox"/> No leachate control <input type="checkbox"/> Fire/smoke existence <input type="checkbox"/> No staff <input type="checkbox"/> The slope of the landfill is unstable with high possibility of a landslide

STEP 7: CALCULATING FOOD WASTE, RECYCLING, AND PLASTIC LEAKAGE



$$SDG\ 12.3.1.b = \frac{\text{Total MSW generated (t/day)} \times \text{proportion of food waste (\%)}}{\text{Total population}} \times 100 (\%)$$



Quantity of material recycled from the MSW stream

$$= \sum \text{Amount of recycled products sold by each of the recovery facilities}$$



- 1) Quantifying plastic leakage from every stage of the MSWM system
- 2) Determining the fates of each flow in the environment (i.e. retained on land, water systems, storm drains or burnt).

<https://plasticpollution.leeds.ac.uk/projects/>



Any question?

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