

Session 5.1: Manual on the Basic Set of Environment Statistics: Waste Statistics

Regional Workshop on Environment Statistics and Climate Change Statistics for the Caribbean Community (CARICOM) Region

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FDES Topics 3.3.1 Generation of waste

Sub-component 3.3: Generation and Management of Waste

Topic	Statistics and Related Information	Category of Measurement
	(Bold Text - Core Set/Tier 1 ; Regular Text - Tier 2; <i>Italicized Text - Tier 3</i>)	

Topic 3.3.1: Generation of waste	a.	Amount of waste generated by source	Mass
	b.	Amount of waste generated by waste category	Mass
	c.	Amount of hazardous waste generated	Mass

Methodological Guidance

- European Commission: European List of Waste, pursuant to European Waste Framework Directive
- Eurostat: Environmental Data Centre on Waste
- Eurostat: European Waste Classification for Statistics (EWC-Stat), version 4 (Waste categories)
- Basel Convention: Waste categories and hazardous characteristics
- Eurostat: Manual on Waste Statistics
- Eurostat: Guidance on classification of waste according to EWC-Stat categories
- SEEA Central Framework (2012)
- UNSD: Environment Statistics Section-Waste Questionnaire

FDES Topic 3.3.2 Management of waste

a.	Municipal waste	<ul style="list-style-type: none"> By type of treatment and disposal (e.g., reuse, recycling, composting, incineration, landfilling, other) By type of waste, when possible National Sub-national 	<p>Eurostat: Environmental Data Centre on Waste</p> <ul style="list-style-type: none"> Eurostat metadata: Organisation for Economic Co-operation and Development (OECD)/Eurostat definition of municipal waste UNSD: Environment Statistics Section-Waste Questionnaire Basel Convention: Waste categories and hazardous characteristics Eurostat: EWC-Stat, version 4 (Waste categories) European Commission: European Waste Framework Directive (Waste treatment operations) Eurostat: Manual on Waste Statistics Eurostat: Guidance on classification of waste according to EWC-Stat categories Rotterdam Convention
	1. Total municipal waste collected		
	2. Amount of municipal waste collected		
	3. Number of municipal waste treatment operations		
	4. Capacity of municipal waste treatment operations		
b.	Hazardous waste		
	1. Total hazardous waste collected		
	2. Amount of hazardous waste collected		
	3. Number of hazardous waste treatment operations		
	4. Capacity of hazardous waste treatment operations		
c.	Other/industrial waste		
	1. Total other/industrial waste collected		
	2. Amount of other/industrial waste collected		
	3. Number of other/industrial waste treatment operations		
	4. Capacity of other/industrial waste treatment operations		
d.	Amount of recycled waste	<ul style="list-style-type: none"> By specific waste streams (e.g., e-waste, packaging) By waste category, National, Sub-national 	
e.	Imports of waste	<ul style="list-style-type: none"> By waste category (e.g., chemical waste, municipal) 	
f.	Exports of waste		
g.	Imports of hazardous waste		
h.	Exports of hazardous waste		

2A. Waste issues: management

- Waste management policy to develop and maintain collection, treatment and disposal systems
- Fueled by urbanization, population growth and economic development



Photo Source: UNEP, *Global Waste Management Outlook 2015*



2A. Waste issues: health and environment

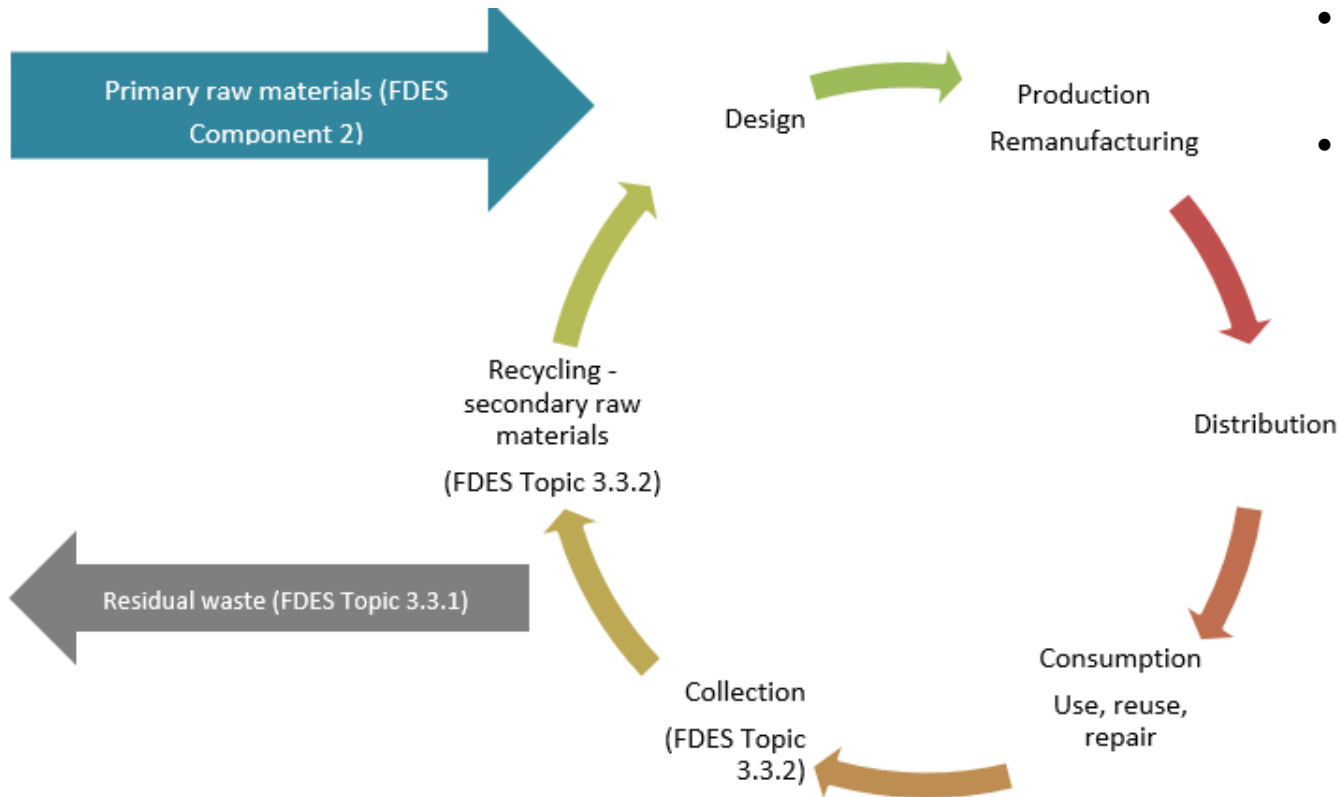
- Problems for health and environment
- Uncontrolled waste – associated with air pollution, water pollution, soil contamination



Photo Sources: UNEP and UNEP, *Global Waste Management Outlook 2015*



2A. Waste issues: circular economy



- Concept of resource use in the economy
- Economic processes:
 - preserve natural capital
 - optimise resource yields
 - better manage resource use and renewables



2A. Waste issues

- Operating in a circular economy requires:
 - Reduction of waste generated
 - Increase in share of waste recycled and reused as material or energy
 - Focus on sustainable consumption and production

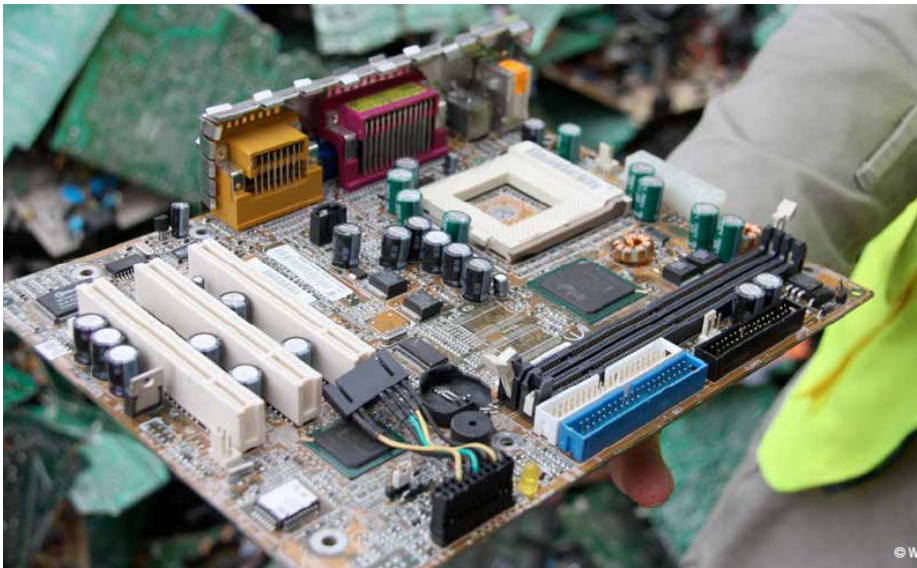


Photo Source: UNEP, *Global Waste Management Outlook 2015*

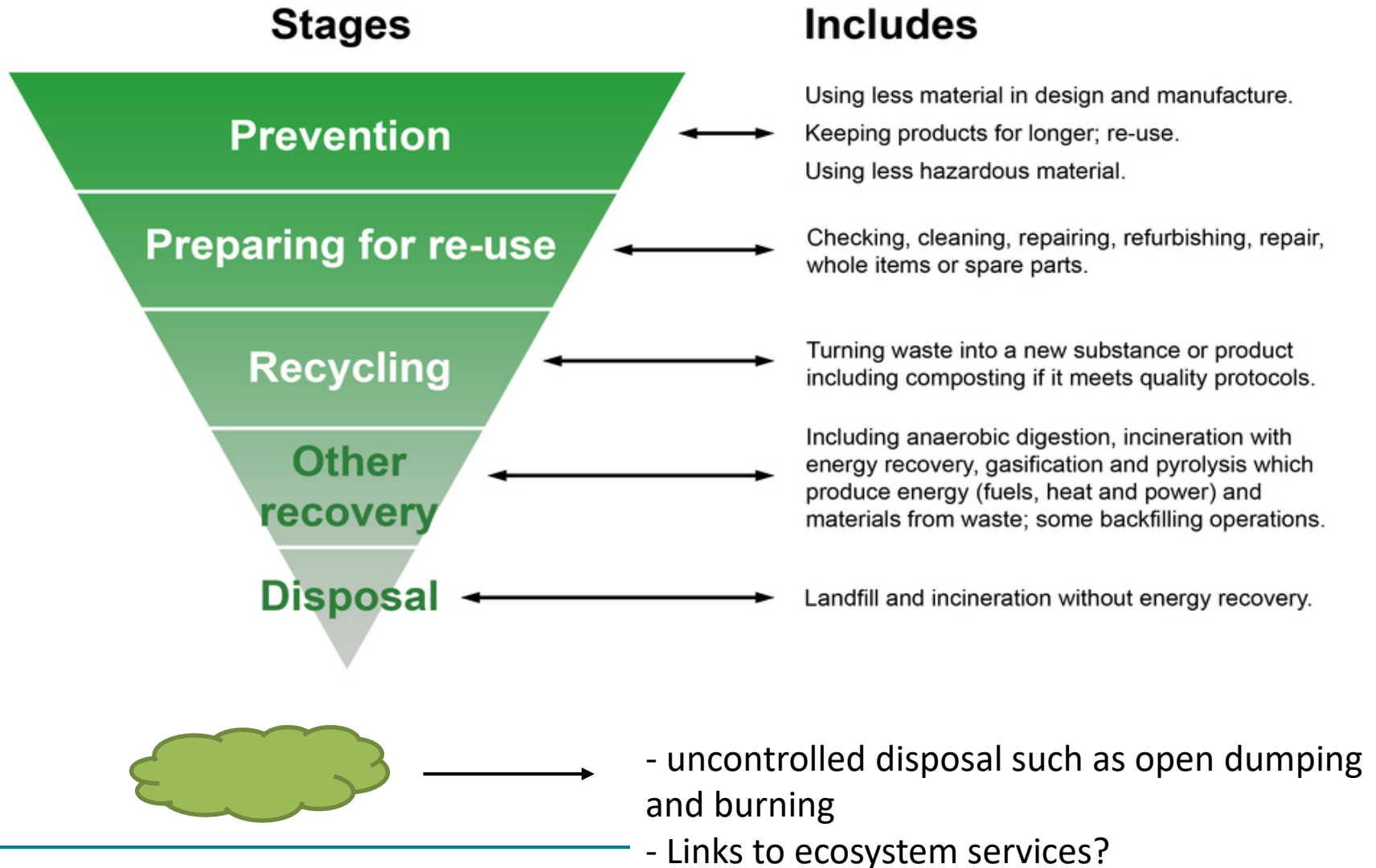


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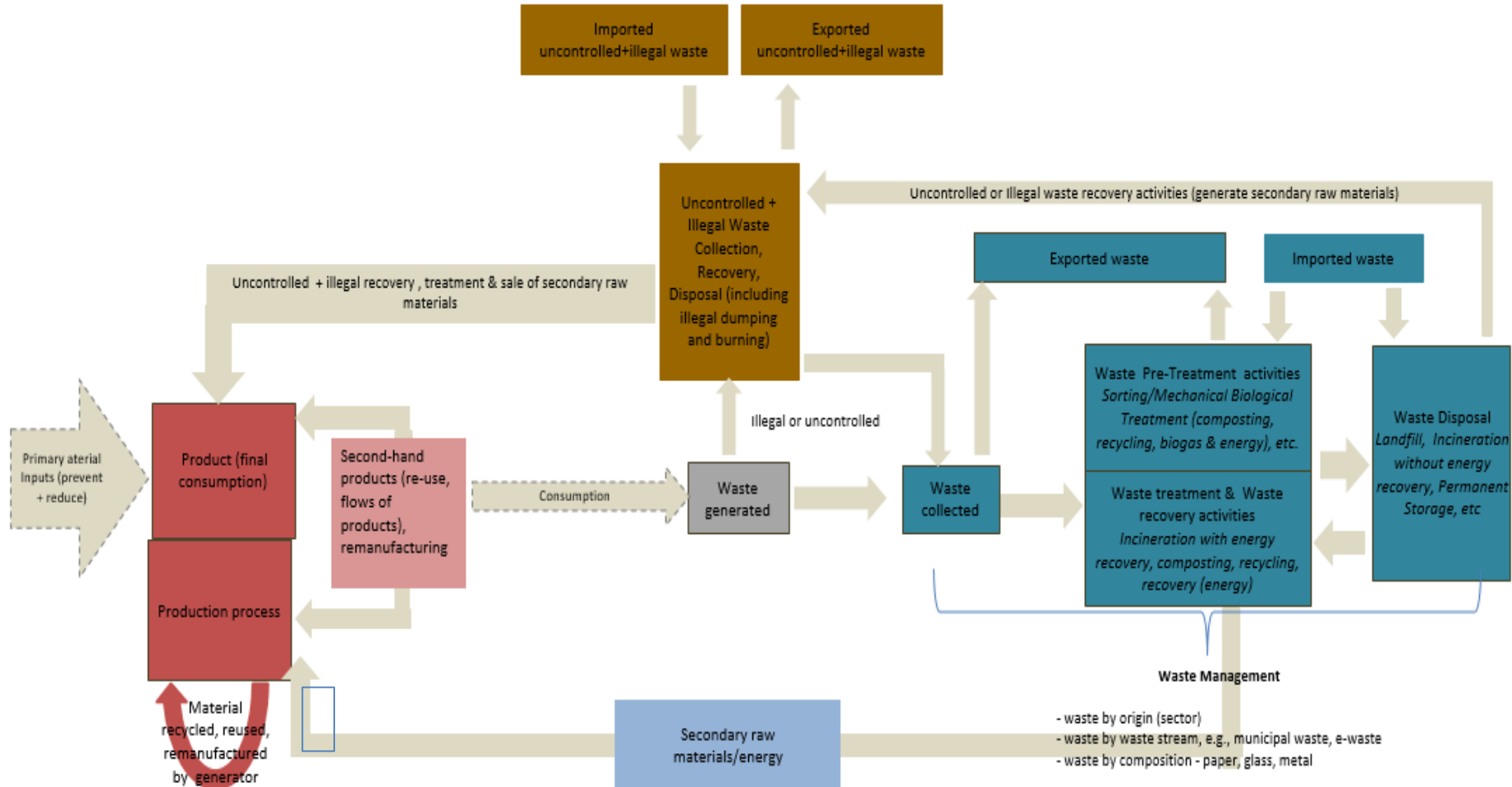


2A. Waste issues: the Waste Management Hierarchy

- Frames waste management options based on environmental impact and



2B. Flows of waste



LEGEND

(Formal) Waste Management

Uncontrolled+Illegal Waste Related Activities

by material components, nature of hazards, 'end-of-waste status'

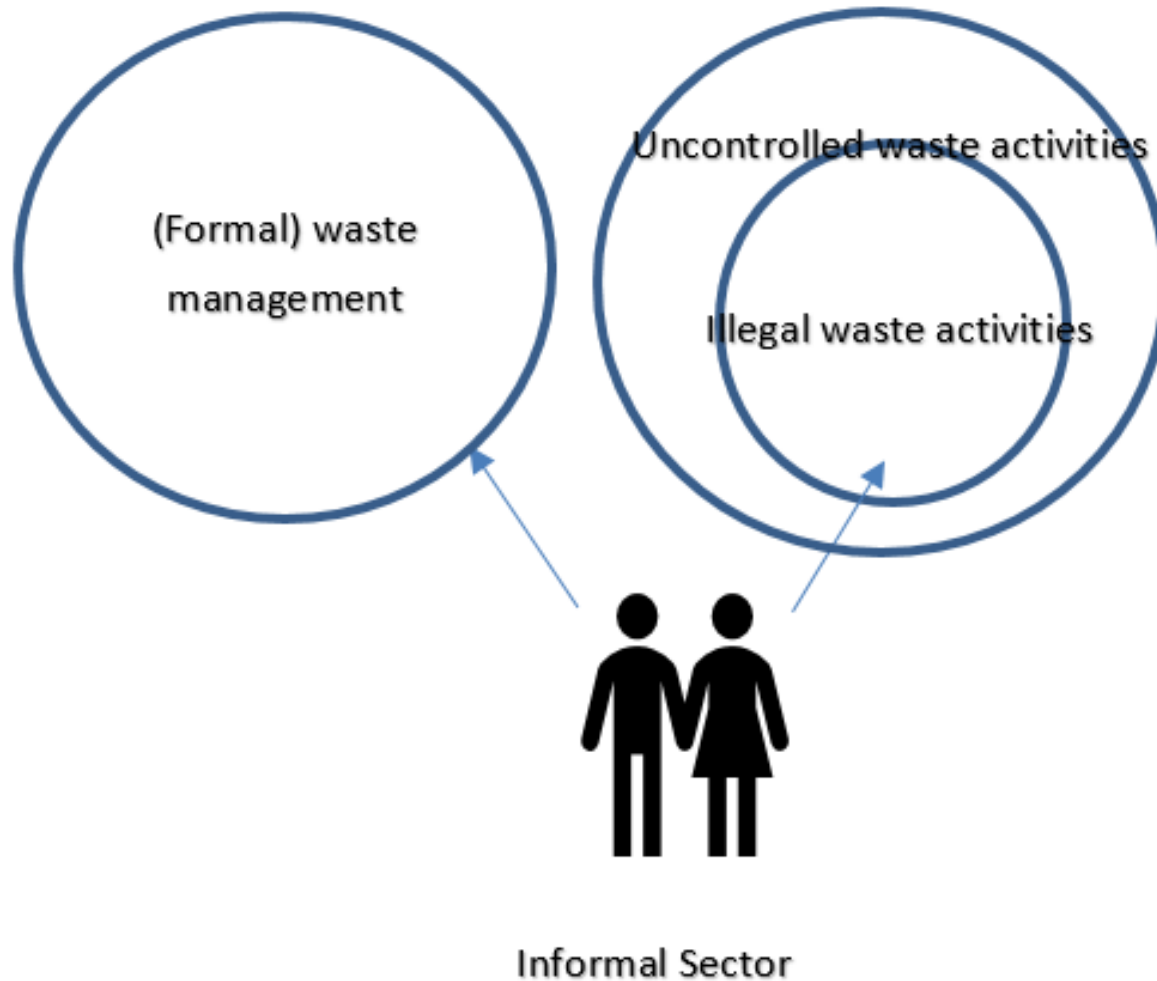
Informal sector

The informal sector operates at all stages - activities can be part of managed waste or uncontrolled and illegal waste.

- **Waste collection:** includes itinerant waste buyers, street waste picking from bins or collection containers, municipal waste collection crew collecting from vehicles transporting to landfills etc.

- **Waste treatment:** includes sorting operations, recycling by informal sector
- **Waste disposal:** disposal of collected waste at landfills, or uncontrolled disposal, or disposal of residues from recycling

2C. Actors in waste management and waste activities *(Formal) waste management, uncontrolled and illegal activities, and the informal sector*



3A. Concepts in waste statistics: Waste

Waste

Source: UNSD/UNEP Questionnaire 2018 on Environment Statistics

Materials that are not prime products (i.e., products produced for the market) for which the generator has no further use for his own purpose of production, transformation or consumption, and which he discards, or intends or is required to discard. It excludes material directly recycled or reused at the place of generation (i.e., establishment) and waste materials that are directly discharged into ambient water or air as wastewater or air pollution.



3B. Concepts in waste statistics: Waste stream

Waste streams

Source: Joint OECD/Eurostat Questionnaire on the State of the Environment

- Applied to statistics on waste generated and waste treated and disposed
- Examples of streams
 - Construction/demolition wastes
 - Dredged spoils
 - Sewage sludges
 - Excess manure
 - End of life vehicles
 - Used tyres
 - Electric and electronic scrap (i.e., WEEE)
 - Food waste
 - Mineral and synthetic oils



3C. Concepts in waste statistics: Composition of waste

Waste composition

Source: UNSD/UNEP Questionnaire 2018 on Environment Statistics

- Composition is the material content of the waste
- Applied mainly to municipal waste collected
 - Paper, paperboard
 - Textiles
 - Plastics
 - Glass
 - Metals
 - Other inorganic materials
 - Organic material *of which*
 - Food and garden waste



Source: Edwin Murimi, Nairobi City Council



3D. Concepts in waste statistics: Sources of waste

Sources of waste/economic activity

Source: UNSD/UNEP Questionnaire 2018 on Environment Statistics

- Applied to waste generated

ISIC Rev. 4

- Agriculture, forestry and fishing (ISIC 01-03)
- Mining and quarrying (ISIC 05-09)
- Manufacturing (ISIC 10-33)
- Electricity, gas, steam and air conditioning supply (ISIC 35)
- Construction (ISIC 41-43)
- Other economic activities excluding ISIC 38
- Households

“ISIC 38 Waste collection, treatment and disposal activities; materials recovery” is usually excluded to avoid double counting



3E. Concepts in waste statistics: Waste treatment and disposal

Waste treatment and disposal methods

Source: UNSD/UNEP Questionnaire 2018 on Environment Statistics

- Applied to waste treated and disposed
 - **Recycling** - reprocessing of waste material in a production process that diverts it from the waste stream, except reuse as fuel. Both reprocessing as the same type of product, and for different purposes should be included. Recycling within industrial plants i.e., at the place of generation should be excluded.
 - **Composting** - refers to a biological process that submits biodegradable waste to anaerobic (biomethanization) or aerobic decomposition, and that results in a product that is recovered and can be used to increase soil fertility (products are compost and biogas).
 - **Incineration** - consists in the controlled combustion of waste with or without energy recovery. Energy recovery means that evolving thermal energy is used for the production of steam, hot water or electric energy.
 - With energy recovery
 - Without energy recovery
 - **Landfilling** - the final placement of waste into or onto the land in a controlled or uncontrolled way. The definition covers both landfilling in internal sites (i.e., where a generator of waste is carrying out its own waste disposal at the place of generation) and in external sites.
 - **Other** - any final treatment or disposal different from recycling, incineration and landfilling.
 - Countries with **pre-treatment** may list these separately.

4A. FDES Waste Statistics

Generation of waste (Topic 3.3.1)

- **Amount of waste generated by source (FDES 3.3.1.a):** The amount of waste (expressed in unit of weight) that is generated before collection or treatment, by source. Source refers to the ISIC rev. 4 mentioned under 3D.
- **Amount of waste generated by waste category (FDES 3.3.1.b):** The amount of waste expressed in unit of weight that is generated before any collection or treatment is applied, by waste category.
- **Amount of hazardous waste generated (FDES 3.3.1.c):** The amount of hazardous waste (expressed in unit of weight) generated before any collection or treatment is applied.



4B. Management of waste (Topic 3.3.2)

- FDES identifies statistics for waste management for municipal waste, hazardous waste and other/industrial waste
- Source: UNSD/UNEP Questionnaire 2018 on Environment Statistics
- **Municipal waste:** Municipal waste, collected **by or on behalf of** municipalities, by **public or private enterprises**, includes waste originating from:
 - households, commerce and trade, small businesses, office buildings and institutions (schools, hospitals, government buildings).
 - bulky waste (e.g., white goods, old furniture, mattresses) and
 - waste from selected municipal services, e.g., waste from park and garden maintenance,
 - waste from street cleaning services (street sweepings, the content of litter containers, market cleansing waste), if managed as waste.
- *The definition excludes waste from municipal sewage network and treatment, municipal construction and demolition waste.*
- Household vs municipal waste: concepts overlap but municipal waste includes non-household waste. Some countries can only supply statistics for household waste.



4B. Management of waste (Topic 3.3.2)

Hazardous waste

- Waste that, due to its toxic or other hazardous character, requires special management and is controlled by law in many countries.
- Defined by the Basel Convention, a multilateral environmental agreement adopted in 1989, entering into force in 1992, which focuses on the control of transboundary movements of hazardous waste across international borders .
 - [Article 1 and Annex](#) list hazardous wastes
- **Other/industrial waste:** of all the waste that is not included in the previous two categories, namely, that is not hazardous and not collected by the municipal waste collection system. Other/industrial waste can be generated by all economic activities.



4B.1, 4B.2, 4B.3: Management of Waste (FDES 3.3.2.a, 3.3.2.b, 3.3.2.c)

- **Total (*municipal/hazardous/other/industrial*) waste collected (FDES 3.3.2.a.1, 3.3.2.b.1, 3.3.2.c.1):** The amount of (municipal/hazardous/other/industrial) waste collected for treatment or disposal measured by weight.
- **Amount of (*municipal/hazardous/other/industrial*) waste treated by type of treatment and disposal (FDES 3.3.2.a.2, 3.3.2.b.2, 3.3.2.c.2):** Amount of (municipal/hazardous/other/industrial) waste collected that has been treated and disposed of, expressed in unit of weight.
- **Number of (*municipal/hazardous/other/industrial*) waste treatment and disposal facilities (FDES 3.3.2.a.3, 3.3.2.b.3, 3.3.2.c.3):** Number of (municipal/hazardous/other/industrial) waste treatment and disposal facilities should be specified by type of treatment.
- **Capacity of (*municipal/hazardous/other/industrial*) waste treatment and disposal facilities (FDES 3.3.2.a.4, 3.3.2.b.4, 3.3.2.c.4):** The capacities of (municipal/hazardous/other/industrial) waste treatment and disposal facilities should be disaggregated by type of treatment.



4C. Management of waste and the waste hierarchy

Prevention	Component 2: Environmental resources and their use Material flow accounting
Reuse	Occurs before waste enters the waste stream
Recycling	FDES 3.3.2.a.2, 3.3.2.b.2, 3.3.2.c.2 Recycling Composting (aerobic and anaerobic, i.e., methanisation)
Energy recovery	FDES 3.3.2.a.2, 3.3.2.b.2, 3.3.2.c.2 Incineration with energy recovery
Disposal	FDES 3.3.2.a.2, 3.3.2.b.2, 3.3.2.c.2 Incineration Landfilling Controlled landfilling Other



4D. Recycling (FDES 3.3.2.d)

- **Amount of recycled waste (FDES 3.3.2.d):** Recycled waste is waste material reprocessed in a production process that diverts it from the waste stream, except reuse as fuel. Both reprocessing as the same type of product, and for different purposes should be included. Recycling within industrial plants i.e., at the place of generation should be excluded.



4E. Imports and Exports

Imports and Exports *several concepts, e.g.,*

- **Imports of (waste/hazardous) waste (FDES 3.3.2.e, 3.3.2.g):** Quantity of (waste/hazardous waste) that is imported for treatment from outside the country/territory.
- **Exports of (waste/hazardous waste) (FDES 3.3.2.f, 3.3.2.h):** Quantity of (waste/hazardous waste) that is exported for treatment outside the country/territory.



5. International sources and recommendations

5A. Classifications and groupings

- **ISIC Rev 4.** – for sources, i.e., economic sectors of waste generated
- **UNECE Standard Statistical Classification of Wastes 1993 (draft)**
- **European Waste Classification for Statistics (EWC-Stat)** based on the European List of Wastes
 - Used for European countries, waste listed may not be aggregates required elsewhere



5. International sources and recommendations

5B. Reference to international recommendations, frameworks and standards

- UNSD/UNEP Questionnaire 2018 on Environment Statistics
- Joint OECD/Eurostat Questionnaire on Waste Statistics
- Hazardous waste – Basel Convention



5. International sources and recommendations

5C. Sources of global and regional environment statistics and indicators series

- UNSD Environment Statistics and Indicators
<https://unstats.un.org/unsd/envstats/qindicators>
- OECD database
<http://www.oecd.org/env/waste/>
- Eurostat Waste Statistics main tables and database
<https://ec.europa.eu/eurostat/waste>



6. Data collection and sources of data

- **Scope:** the scope comprises waste **generated, treated and disposed**. Inclusion of imports and exports depends on the concept.
 - **Does not cover illegal or uncontrolled** collection, treatment or disposal.
 - Waste collected by informal sector included if it is incorporated into (formal) waste management, and is collected on behalf of municipalities.
- **Statistical unit:** **economic units collecting and treating waste**. Data may be collected from economic units generating waste and from households where special surveys on waste exist.
- **Measurement units:** **Tonnes of normal wet weight per year**. Waste reported in volumes (cubic metres) should be converted to weight (tonnes) by the application of waste conversion factors.



6. Data collection and sources of data

- **Sources and institutions:** waste management data for commercial, industrial and business sectors from **administrative records or enterprise surveys**.
 - **Waste generation is estimated.**
 - **Waste composition is collected periodically using special surveys.**
- **Aggregation:** type of waste or waste stream, **type of treatment or disposal**, ISIC categories and households, national, sub-national
 - **Temporal aspects:** data is usually collected **yearly** but difficulties may arise in obtaining spatially and temporally consistent statistics on waste at the national level.
 - **Spatial aspects:** data is requested **nationally** but is often available only for **specific cities**.
- **Estimation:** **conversion factors for volume to weight**; factors for waste generated
 - Based on special studies which are country specific.
 - Examples included in manual but cannot be used outside **those countries**.



6. Data collection and sources of data

Validation

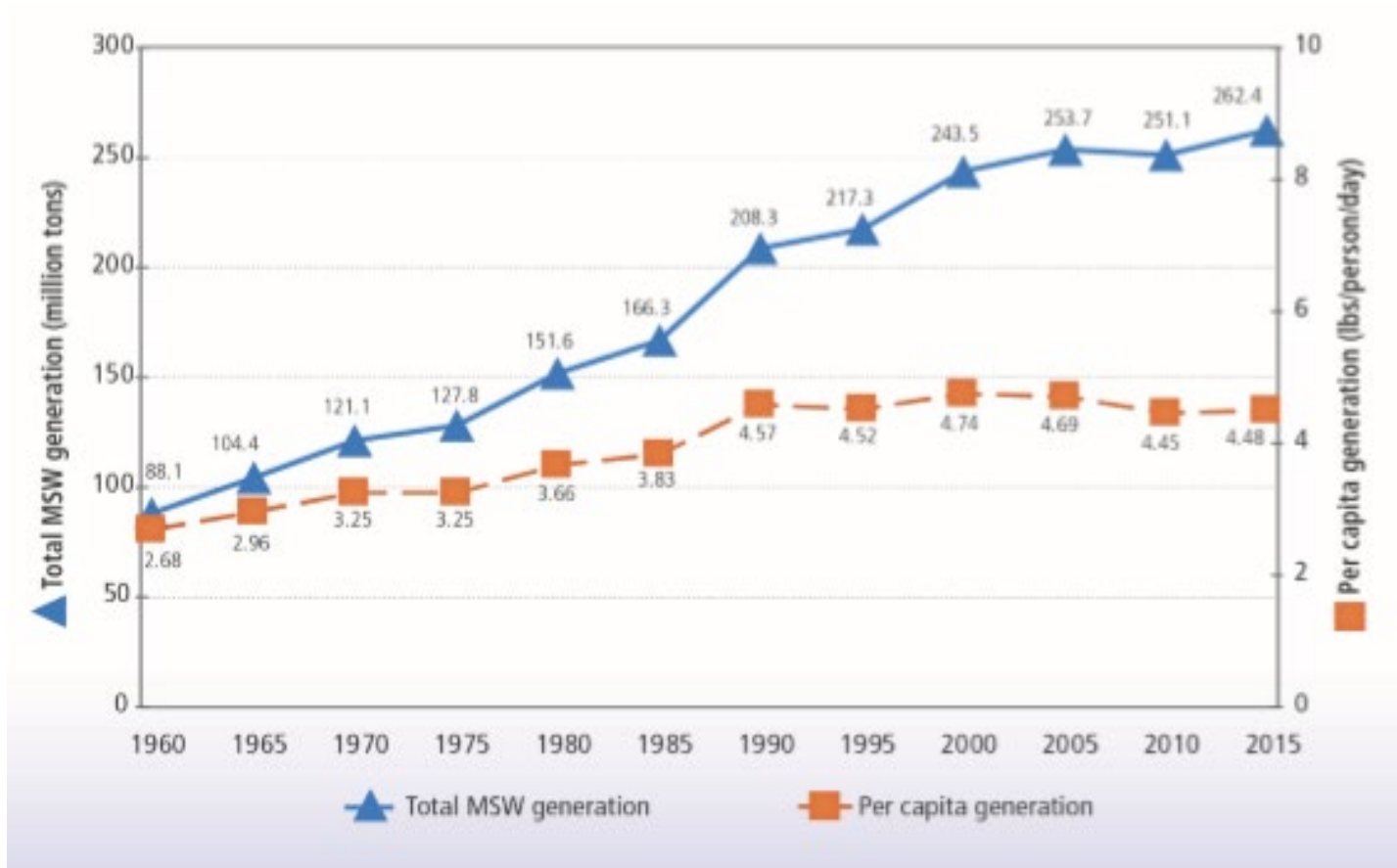
- Unexpected increases or decreases over time, but **series** may vary if there are policy changes or improvements to collection and treatment methods.
- **Outliers** based on indicators, e.g., tonnes of waste per capita.
- Analysis of composition by economic activity to detect misclassification.
- Analysis of the percentage of hazardous waste per economic activity or per waste category to assess the proper distinction in hazardous/non-hazardous.
- Checks of the coherence of data on waste generation and waste treatment.
 - Differences can occur due to import and export of waste or secondary waste being included in waste generation, time lags, drying processes, etc.
 - Waste treated compared to waste treatment capacity.



7. Uses and dissemination

7A. Potential presentation/dissemination formats

USA Municipal Solid Waste Generated 1960-2013



7. Uses and dissemination

7B. SEEA accounts/tables that use these statistics

- SEEA 3.6.5 Solid waste accounts: Physical supply table and Physical use table

	Generation of solid waste						Rest of the world	Flows from the environment		Total supply
	Waste collection, treatment and disposal industry							Imports of solid waste	Recovered residuals	
	Landfill	Incineration					Households			
		Total	Of which: Incineration to generate energy	Recycling and reuse	Other treat- ment	Other indus- tries				
Generation of solid waste residuals										
Chemical and health-care waste				160	1 830	20	140		2 150	
Radioactive waste					5				5	
Metallic waste	40	10			320	70	10		440	
Non-metallic recyclables	30				2 720	2 100	130		4 980	
Discarded equipment and vehicles					140	280	50		470	
Animal and vegetal wastes					10 330	1 700	80		12 110	
Mixed residential and commercial wastes			10	30	4 170	4 660	100	10	8 980	
Mineral wastes and soil				300	29 100	570	170		30 140	
Combustion wastes	4 050	2 000			1 550		240		5 840	
Other wastes					460		40		500	



7. Uses and dissemination

7D. SDG Indicators that incorporate these statistics

Indicator 11.6.1: Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities

Tier II. *Total solid waste regularly collected (3.3.2.a.1 + 3.3.2.b.1 + 3.3.2.c.1) / Total solid waste generated (3.3.1.a)*

Of which adequately discharged is reported using qualitative criteria.

Indicator 12.4.2 Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment

Tier III. Related FDES 2013 statistics are 3.3.1.c. Amount of hazardous waste generated and 3.3.2.b.2 Amount of hazardous waste treated by type of treatment and disposal.

Indicator Number 12.5.1 National recycling rate, tons of material recycled

Tier III. Related statistics from the FDES 2013 are 3.3.2.d. Total waste recycled and 3.3.1.a Total waste generation.



Thank you for your attention!

For more information please contact
the Environment Statistics Section
at the UN Statistics Division:
E-mail: envstats@un.org

website: <https://unstats.un.org/unsd/envstats/>

