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

Workshop on Environment Statistics and Information for Sustainable Development in the Arab Region

(Beirut, Lebanon, 12-16 November 2018)

Available at: https://unstats.un.org/unsd/envstats/fdes/manual_bses.cshtml

Contents

Contents

FDES Topics 3.3.1 Generation of waste and Topic 3.3.2 Management of waste

Statistics and Related Information (**Bold Text - Core Set/Tier 1**; Regular Text - Tier 2; *Italicized Text - Tier 3*)		Category of Measurement	Potential Aggregations and Scales	Methodological Guidance
a.	Amount of waste generated by source	Mass	▪ By ISIC economic activity ▪ By households ▪ By tourists ▪ National ▪ Sub-national	▪ 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
b.	Amount of waste generated by waste category	Mass	▪ By waste category (e.g., chemical waste, municipal waste, food waste, combustion waste) ▪ National ▪ Sub-national	
c.	Amount of hazardous waste generated	Mass	▪ By ISIC economic activity ▪ National ▪ Sub-national	

Topic 3.3.2: Management of waste				
a.	Municipal waste		▪ By type of treatment and disposal (e.g., reuse, recycling, composting, incineration, landfilling, other) ▪ By type of waste, when possible ▪ National ▪ Sub-national	▪ Eurostat: Environmental Data Centre on Waste ▪ 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	Mass		
	2. Amount of municipal waste treated by type of treatment and disposal	Mass		
	3. Number of municipal waste treatment and disposal facilities	Number		
	4. Capacity of municipal waste treatment and disposal facilities	Volume		
b.	Hazardous waste			
	1. Total hazardous waste collected	Mass		
	2. Amount of hazardous waste treated by type of treatment and disposal	Mass		
	3. Number of hazardous waste treatment and disposal facilities	Number		
	4. Capacity of hazardous waste treatment and disposal facilities	Volume		
c.	Other/industrial waste			
	1. Total other/industrial waste collected	Mass		
	2. Amount of other/industrial waste treated by type of treatment and disposal	Mass		
	3. Number of other/industrial treatment and disposal facilities	Number		
	4. Capacity of other/industrial waste treatment and disposal facilities	Volume		
d.	Amount of recycled waste	Mass	▪ By specific waste streams (e.g., e-waste, packaging waste, end of life vehicles) ▪ By waste category ▪ National ▪ Sub-national	
e.	Imports of waste	Mass	▪ By waste category (e.g., chemical waste, municipal waste, combustion waste)	
f.	Exports of waste	Mass		
g.	Imports of hazardous waste	Mass		
h.	Exports of hazardous waste	Mass		

2A. Waste issues: management

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

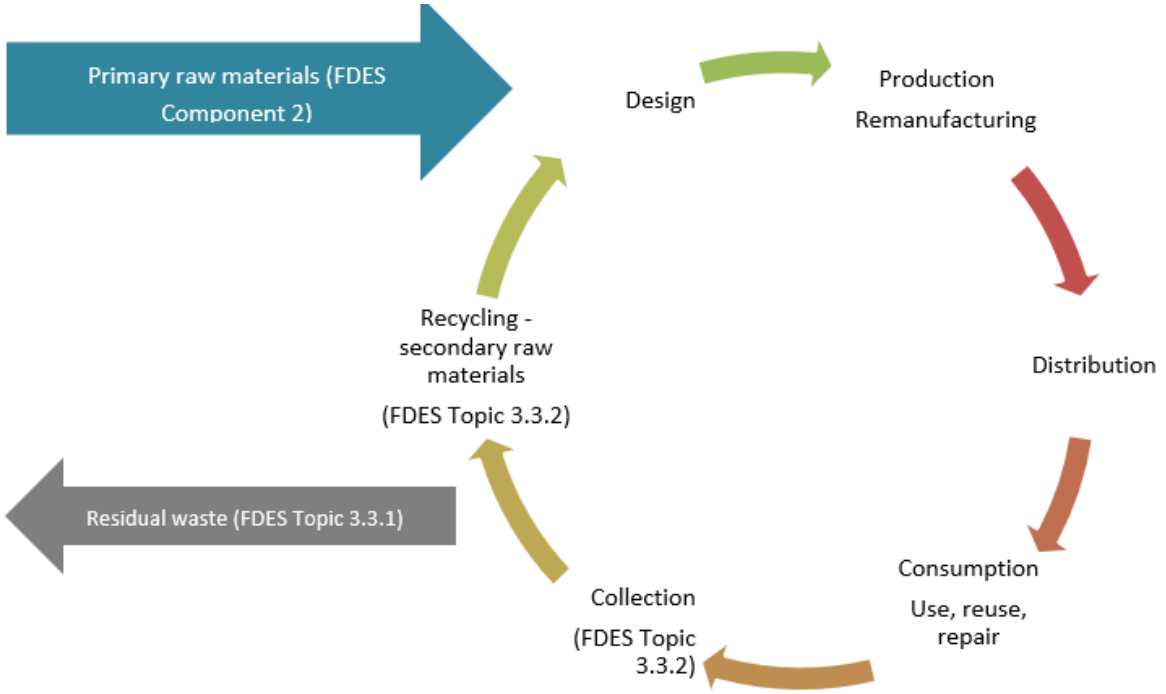
Photo Source: UNEP, Global Waste Management Outlook 2015

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

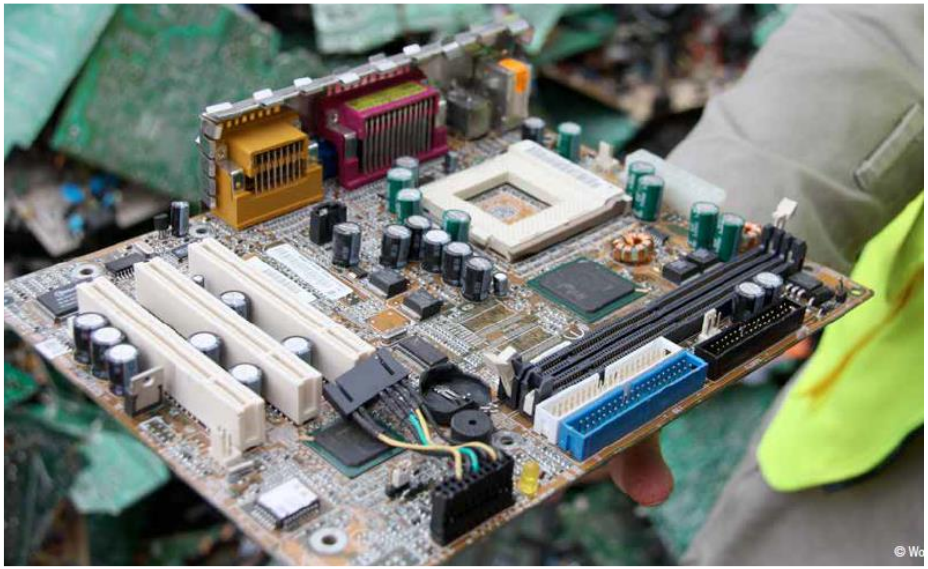
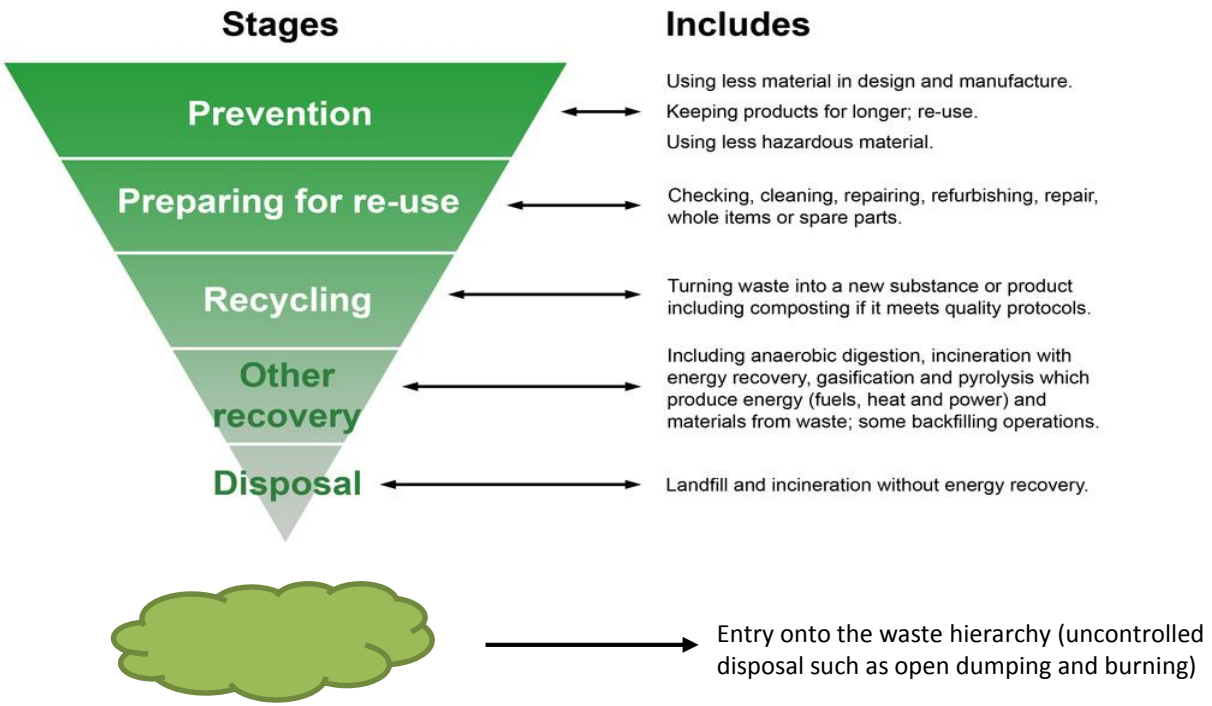


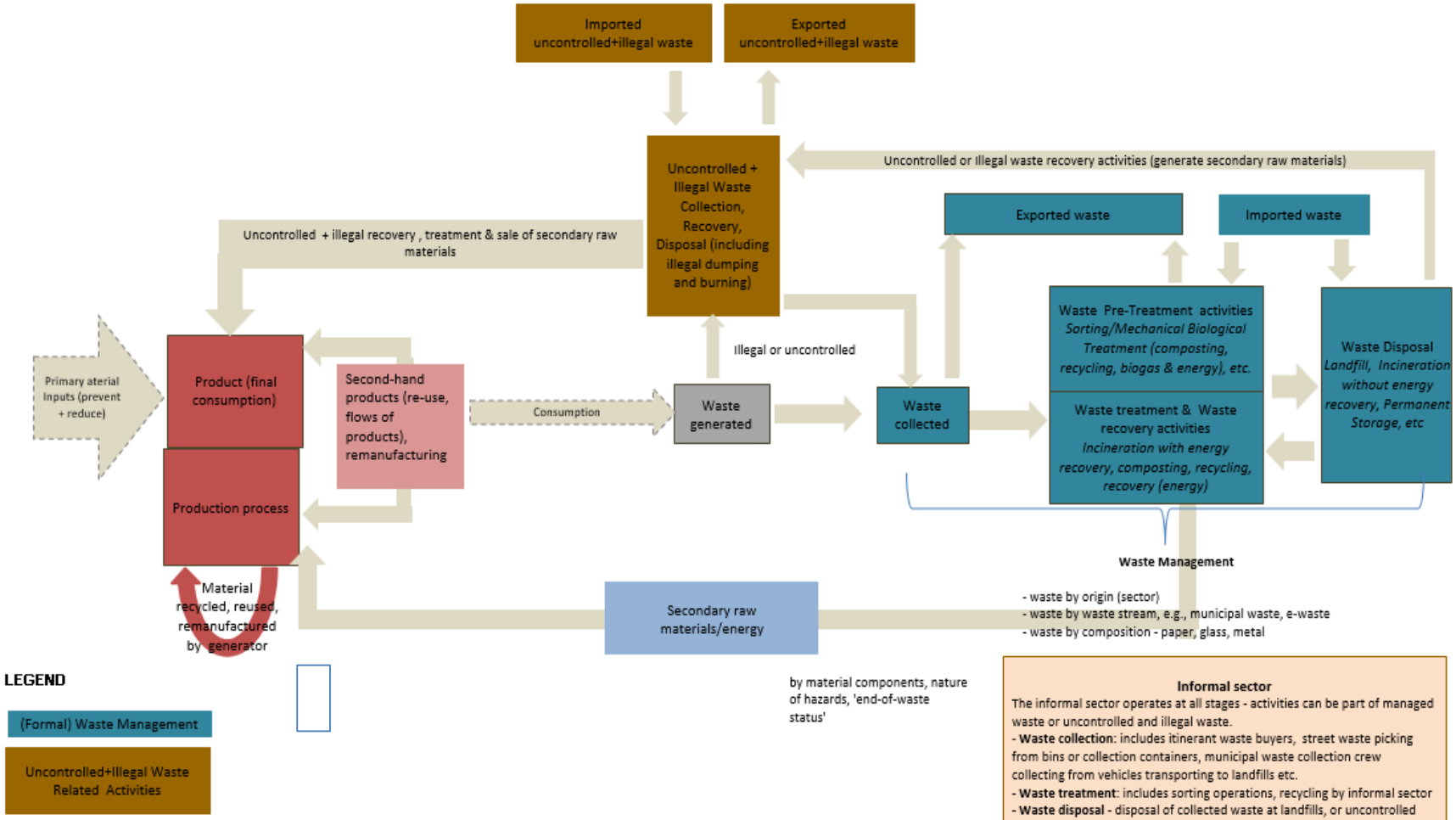
Photo Source: UNEP, Global Waste Management Outlook 2015

2A. Waste issues: the Waste Management Hierarchy

- Frames waste management options based on environmental impact and material resource consumption in line with circular economy principles
- Waste management hierarchy focuses on prevention and re-use, with disposal at the bottom of the hierarchy

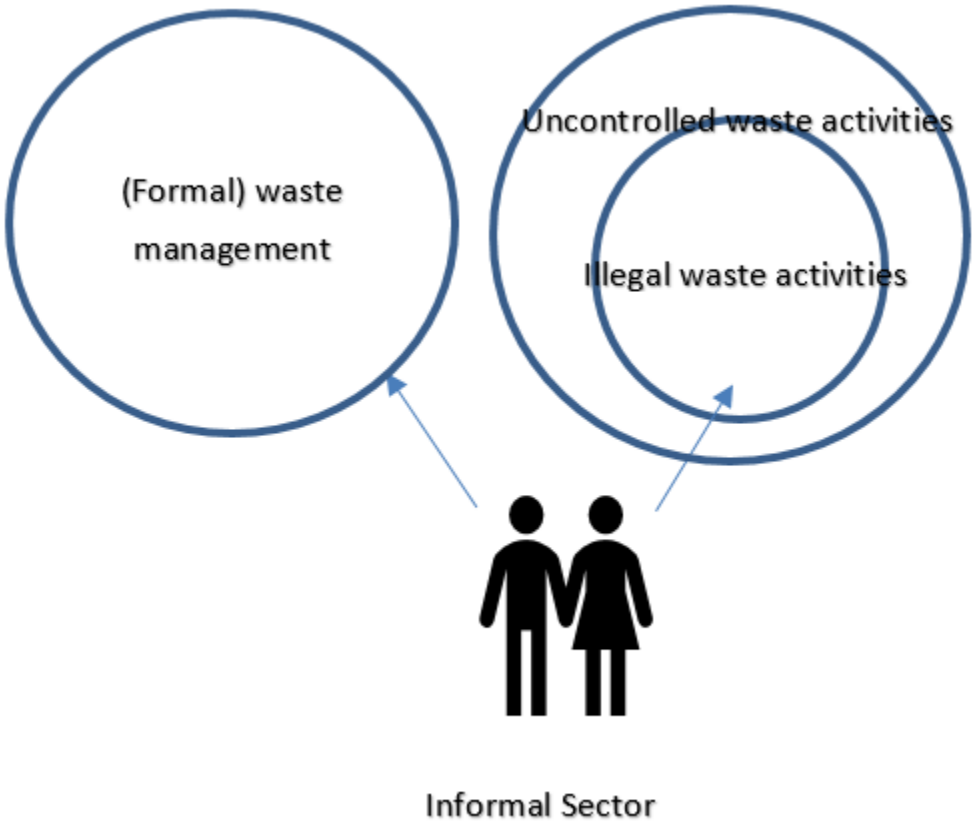


2B. Flows of waste



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). It also includes 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.,*

- Waste generated – includes exports but excludes imports
- Waste treated or disposed *in a country* – includes imports but excludes exports
- Municipal waste treatment - *managed in a country* (UNSD/UNEP) – includes imports but excludes exports
- Municipal waste treatment – *which was generated in a country* – includes exports for treatment but excludes imports for treatment (allows comparison with data on waste generation)
- **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 but cannot be used outside those countries.

6. Data collection and sources of data

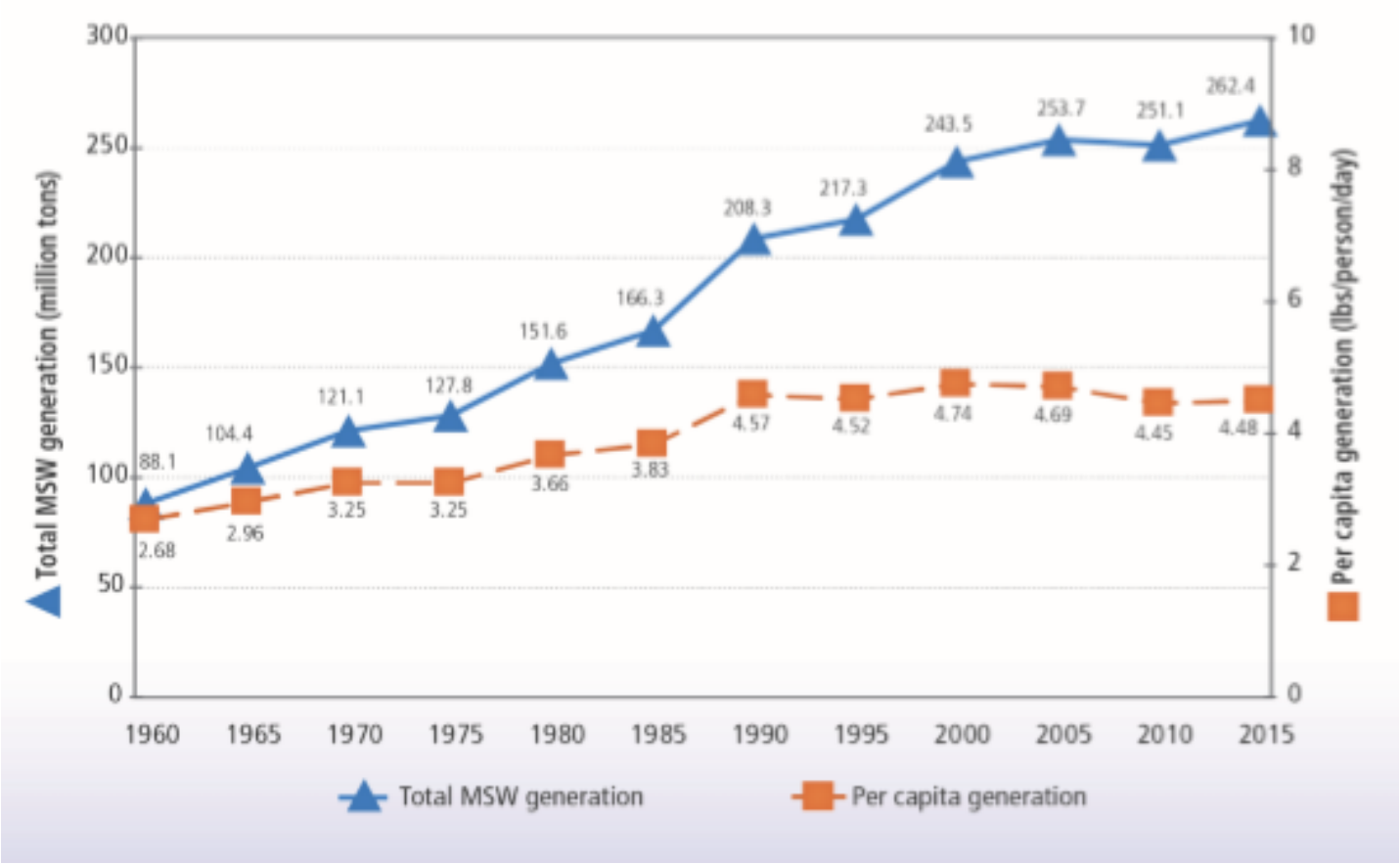
Validation

- 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	
	Waste collection, treatment and disposal industry									
		Incineration								
	Landfill	Total	Of which: Incineration to generate energy	Recycling and reuse	Other treatment	Other industries	Households	Imports of solid waste	Recovered residuals	Total supply
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/