

# REGIONAL TRAINING ON THE PRODUCTION AND USE OF WASTE AND CIRCULAR ECONOMY STATISTICS AND INDICATORS

## SESSION 5: STATISTICS AND INDICATORS ON WASTE MANAGEMENT

20-21 June 2024, Vienna International Centre (VIC), Vienna

Regional Training - Session 5: Statistics and indicators on waste management

## SESSION 5: STATISTICS AND INDICATORS ON WASTE MANAGEMENT

### In this presentation:

- **Municipal waste**

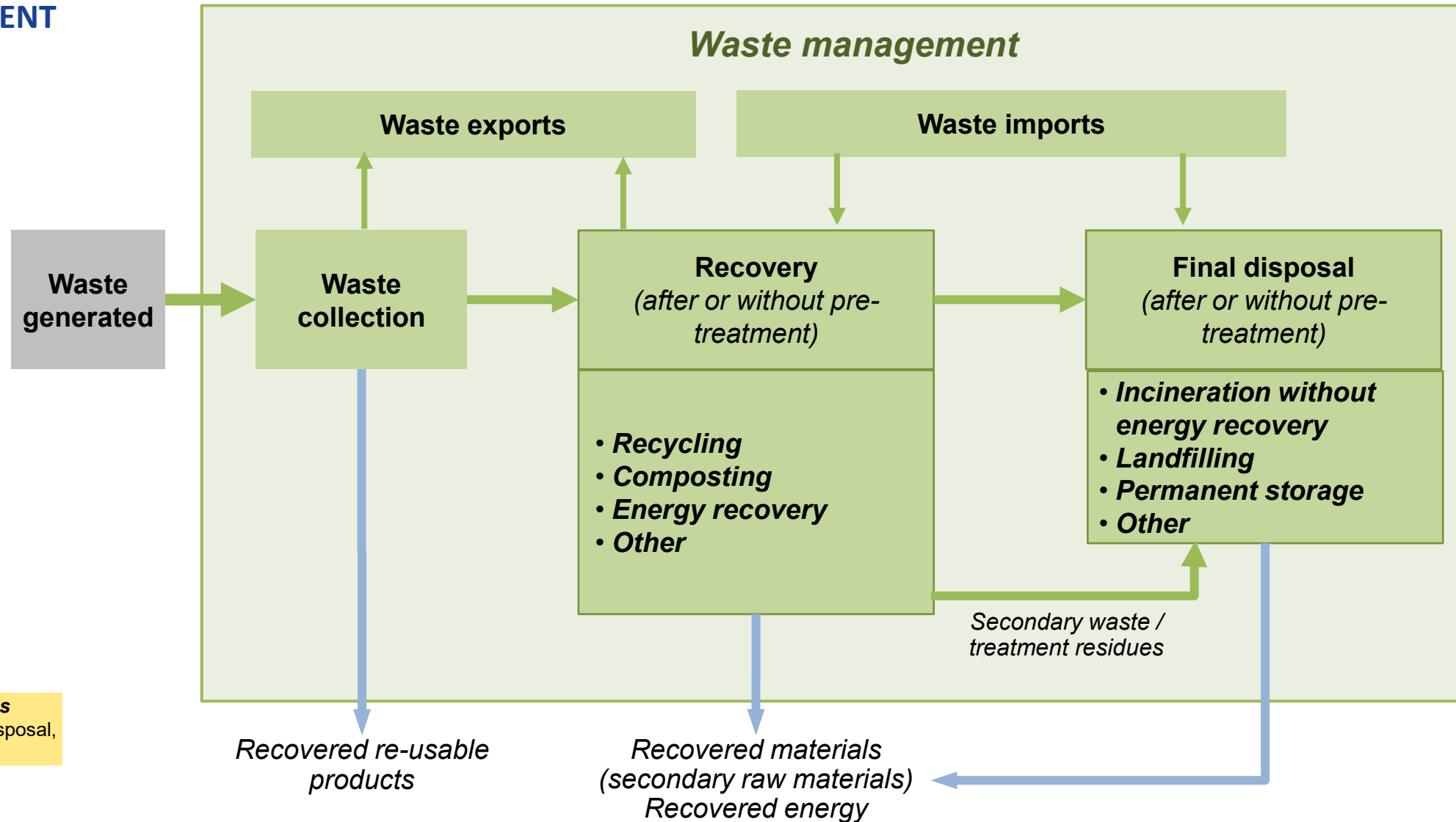
- Municipal waste collection rates
- Municipal waste destinations (recycling, waste-to-energy, landfilling, uncontrolled disposal)
  - Municipal waste recycled
  - Municipal waste treated by waste-to-energy plants
  - Municipal waste (MSW) landfilling rates
  - Uncontrolled disposal of municipal waste
- Proportion of municipal solid waste regularly collected and with adequate final discharge out of total municipal solid waste generated, by cities (SDG 11.6.1)

- **Total waste**

- National recycling rate, tons of material recycled (SDG 12.5.1)
- Recovery rate of construction and demolition waste
- Diversion of waste from landfill

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## WASTE MANAGEMENT



Set of lawful activities carried out by economic units of the formal sector, both public and private, for the purpose of the collection, transportation, and treatment of waste, including final disposal and after-care of disposal sites

**Excludes other waste-related activities**  
Uncontrolled waste picking, recovery, disposal, exports/imports

# MUNICIPAL WASTE

## MUNICIPAL WASTE COLLECTION RATES (1)

### • Definition

**Proportion (in %) of MW collected in total amounts of MW generated**

#### • Calculation:

- Amounts (in mass units) of MW collected over total amount of MW generated.
- $$= \frac{\text{Total MSW collected (tonnes)}}{\text{Total MSW generated (tonnes)}} \times 100 (\%)$$
- Units: metric tonnes, percent, percent change
- Covers waste collection by or on behalf of municipalities, including collection by the private sector
- Includes collection of mixed waste and separate collection of fractions for recovery operations (through door-to-door collection and/or through voluntary deposits)
- To be complemented with information on informal collection (waste picking)

### • Purpose and use

- Important traditional waste management indicator
- Monitors the effectiveness of collection services
- Helps identify uncollected amounts of waste

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## MUNICIPAL WASTE COLLECTION RATES (2)

- **Data quality and measurement issues**

- Differences due to the scope of separate collection, i.e. fractions collected separately for recovery operations (through door-to-door collection and/or through voluntary deposits).
- Voluntary deposits include: drop off locations such as 'bring site' recycling points, container parks, civic amenity sites
- Whether deposits in shops through take-back schemes (EPR) should be included is not specified in international questionnaires (but is mentioned in EU WFD)

## MUNICIPAL WASTE DESTINATIONS

### • Definition

#### **Amount and proportion (in %) of MW treated by destination in total amount of waste generated**

##### • Calculation:

- Amounts (in mass units) of MW treated by recovery and disposal facilities (by type of operation) over total amount of MW generated.
- Units: tonnes, percent, percent change
- Should account for imports/exports for treatment → amounts treated + amounts exported for treatment – amounts imported for treatment
- Could be calculated by using amounts collected instead of generated as a denominator
- Should cover all major recovery and disposal operations: recycling, composting, waste-to-energy, other recovery, incineration without energy recovery, landfilling
- Should distinguish between controlled and uncontrolled treatment

### • Purpose and use

- Gives an overview of the different treatment methods used in a country
- Helps monitor the efficiency of management practices in a country
- To be used with specific management indicators (recycling rate, landfill rate, ...) to guide decisions on management infrastructure and target setting
- To be complemented with information on treatment costs and treatment capacity

## MUNICIPAL WASTE DESTINATIONS

- **Data quality and measurement issues**

- Differences depending on the point where the amounts of MW are measured
  - At the point of collection: data often come from waste collectors; do not reflect amounts actually treated → e.g. full allocation to a given treatment operation (e.g. recycling) overestimates the amounts treated.
  - At the point of reception (recommended option). Note that pre-treatment and preparatory operations prior to any recovery or disposal operation are not reported; only amounts received at the treatment facility are reported.
- Risk of double counting
  - Concerning the residue or rejects from recovery facilities and the amount of waste recovered from disposal facilities going to recovery. These amounts need to be deducted from the sum of waste received by both recovery and disposal facilities.
- Identifying the municipal proportion in multi-stream treatment plants is not easy
- Inclusion or exclusion of imports/exports for treatment: fate of waste exported for treatment not always known
- Variations in proportions over can be due to amounts of waste temporarily stored



## MUNICIPAL WASTE RECYCLED

### • Definition

**Amount (in mass units) and proportion (in %) of MW recycled in total amounts of MW generated**

#### • Calculation

- Amounts (in mass units) of MW received by recycling facilities over total amounts of MW generated

- Should account for imports/exports for treatment

→ amounts treated + amounts exported for treatment – amounts imported for treatment

$$\rightarrow \text{in line with SDG 12.5.1} = \frac{(\text{MW recycled} + \text{MW exported for recycling} - \text{MW imported for recycling}) \times 100}{\text{Total MW generated}}$$

- Could be calculated by using amounts collected instead of generated as a denominator

- Units: metric tonnes, percent, percent change

- To be broken down by type of material or product (paper, glass, metals, plastic, bio-waste, e-waste, ...)

*N.B. Recycling:  
Includes processing of  
biodegradable waste to  
generate compost or digestate  
Excludes reprocessing of  
biodegradable waste into  
materials which are to be used  
as fuels or other means to  
generate energy*

### • Purpose and use

- Measures progress towards MW reduction objectives; helps monitor compliance with recycling targets
- To be used with other management indicators to guide decisions on management infrastructure and target setting
- Relates to SDG indicator 12.5.1 National Recycling Rate.

## MUNICIPAL WASTE RECYCLED

### • Data quality and measurement issues

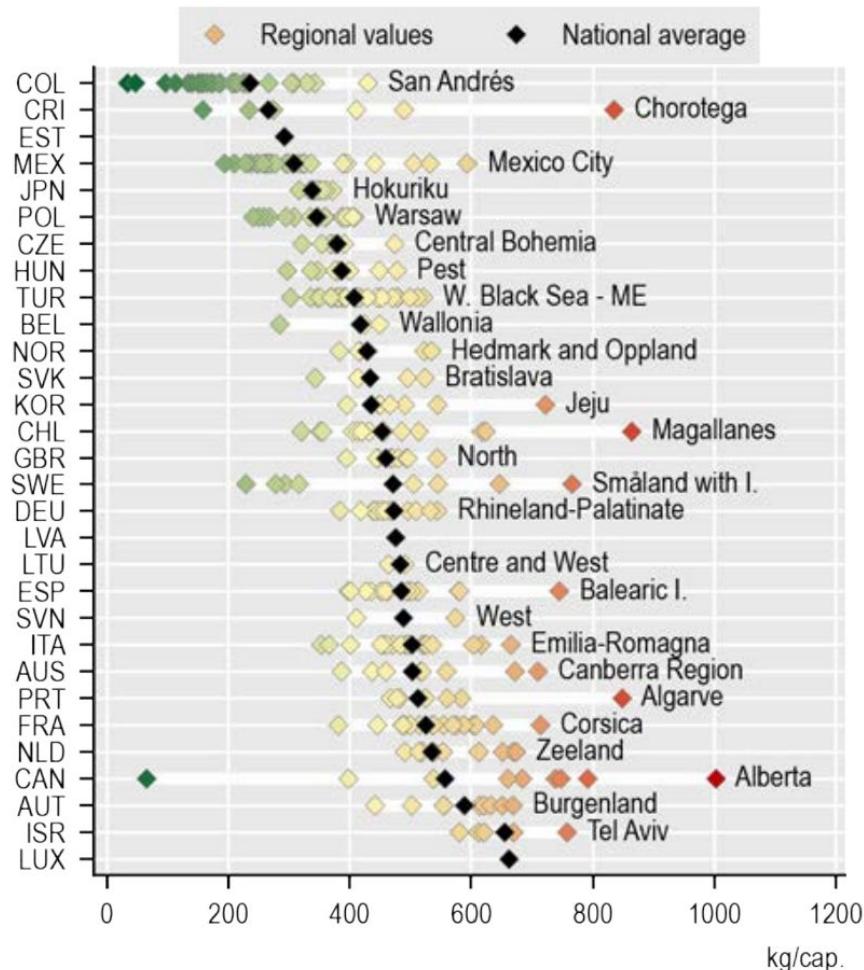
- Differences depending on the point where the amounts of “MW recycled” are measured
  - MW collected for recycling, i.e. separate collection
    - Separate collection is not the same as recycling, as waste can be recovered following pre-treatment of mixed wastes and be recycled, resulting in potentially higher tonnages of recycled amounts compared to separately collected amounts
    - Separately collected MW may contain waste that is not recyclable, that is rejected and redirected to disposal facilities (losses after sorting), resulting in lower amounts of recycling compared to separately collected amounts
  - MW received at recycling (or sorting) facilities (recommended option)
    - Rather close to amounts being recycled, but municipal share of waste received may not be easy to identify
  - Secondary raw materials leaving the recycling facility (ideal option)
    - Very close to amounts of recycled materials, i.e. actually reprocessed into products whether for the original or other purposes, but municipal share may not be easy to identify
  - International questionnaires focus on amounts designated for recycling operations (data reported refer to amounts collected or received)
- Inclusion or exclusion of:
  - amounts imported or exported for recycling
  - recycling at source, e.g. home composting (to be excluded as per definition of “waste”, but is included in EU WFD)
  - recycling activities carried out in the informal sector (to be excluded as per definition of “waste management”, but to be reported in parallel when available)

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## MUNICIPAL WASTE RECYCLING RATE – OECD REGIONS AND CITIES AT A GLANCE

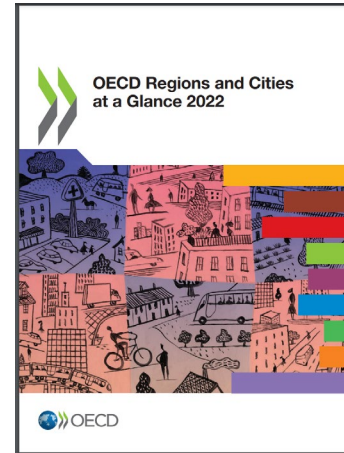
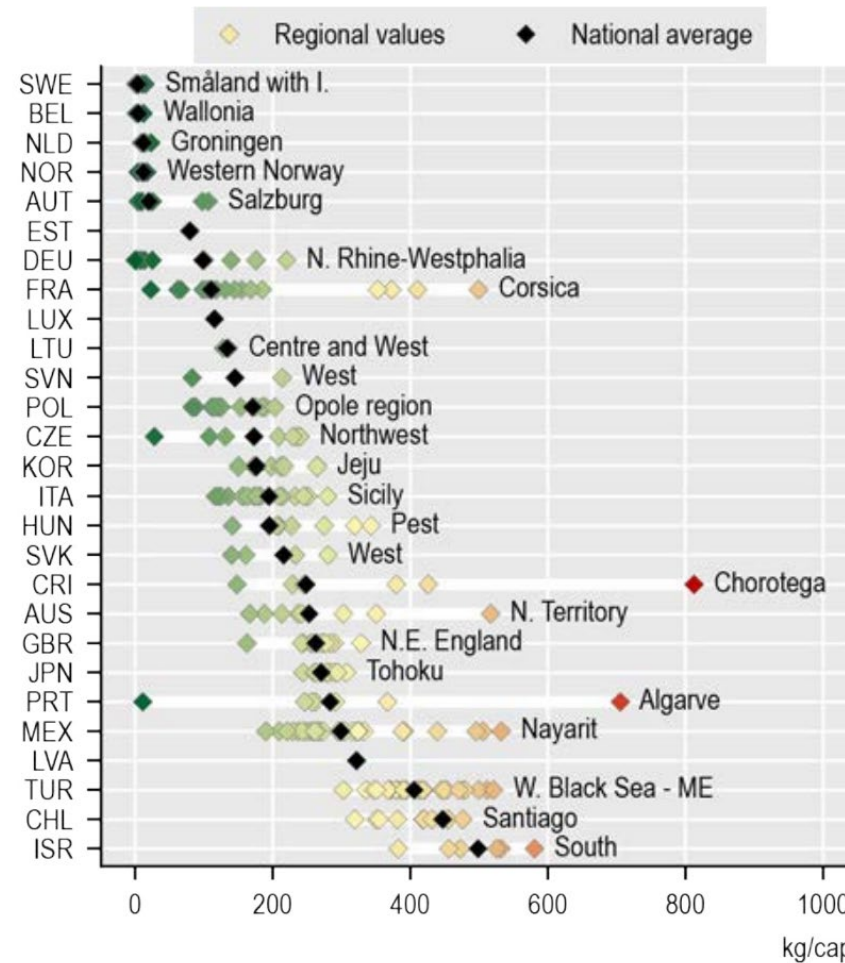
### 2.12. Municipal waste per capita

Municipal waste volume per capita, OECD large regions (TL2), 2020



### 2.13. Non-recycled municipal waste per capita

Non-recycled waste per capita, OECD large regions (TL2), 2020

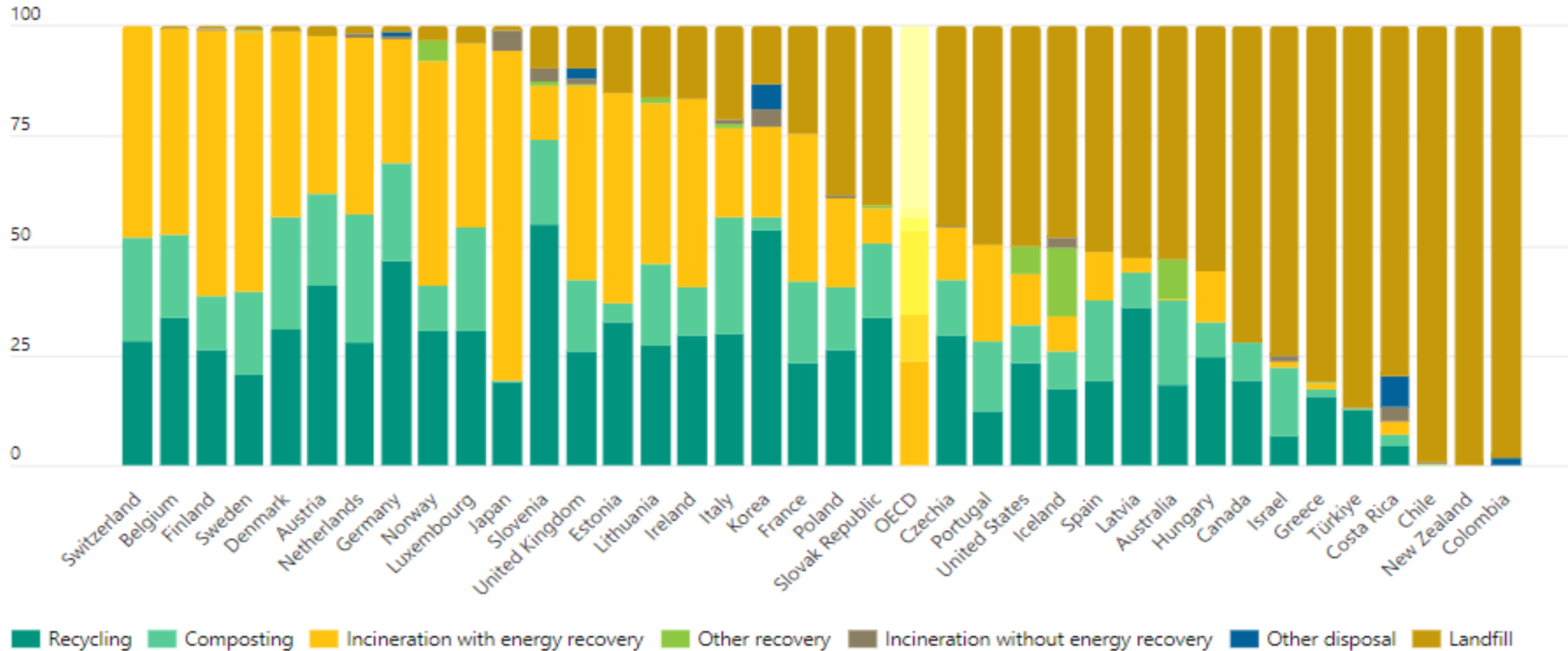


[OECD Regions and Cities at a Glance 2022 | en | OECD](#)

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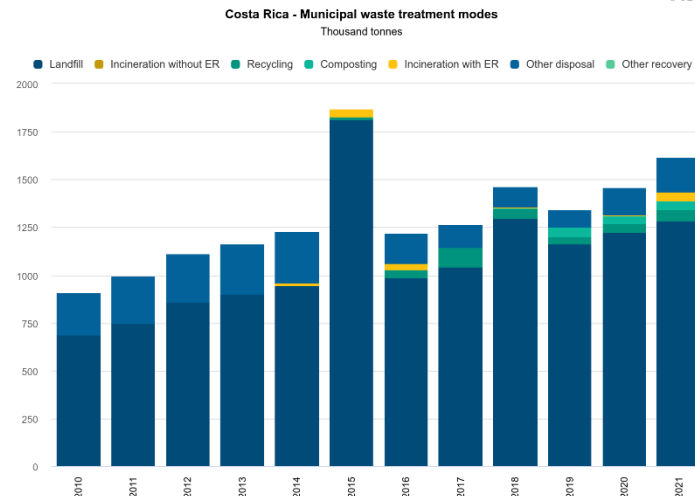
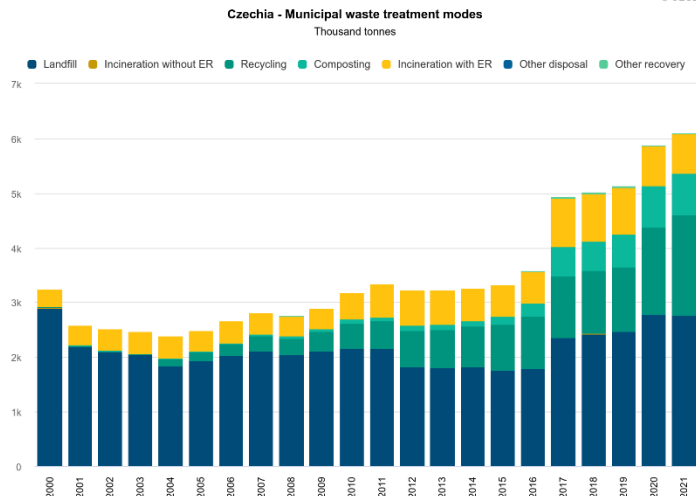
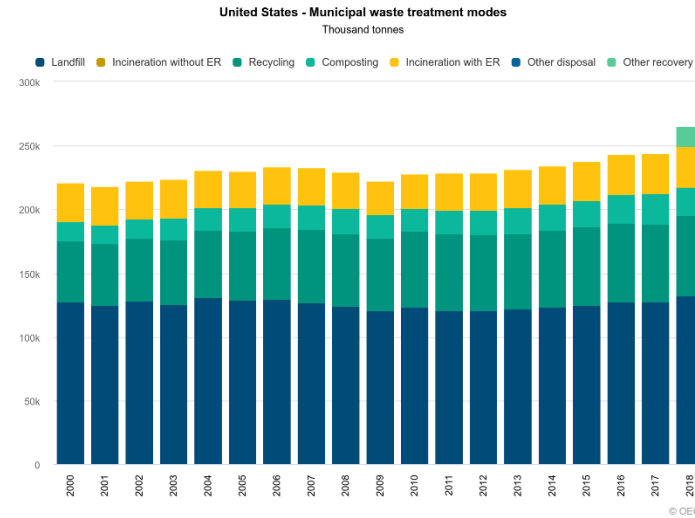
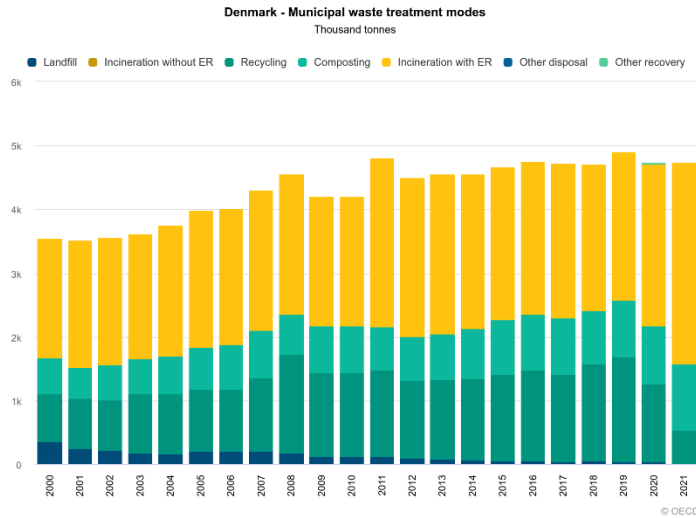
## MUNICIPAL WASTE DESTINATIONS BY TREATMENT OPERATION – OECD ENVIRONMENT AT A GLANCE

Percentage of total treatment, 2022 or latest available year



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## MUNICIPAL WASTE DESTINATIONS BY TREATMENT OPERATION – OECD EAG COUNTRY PROFILES

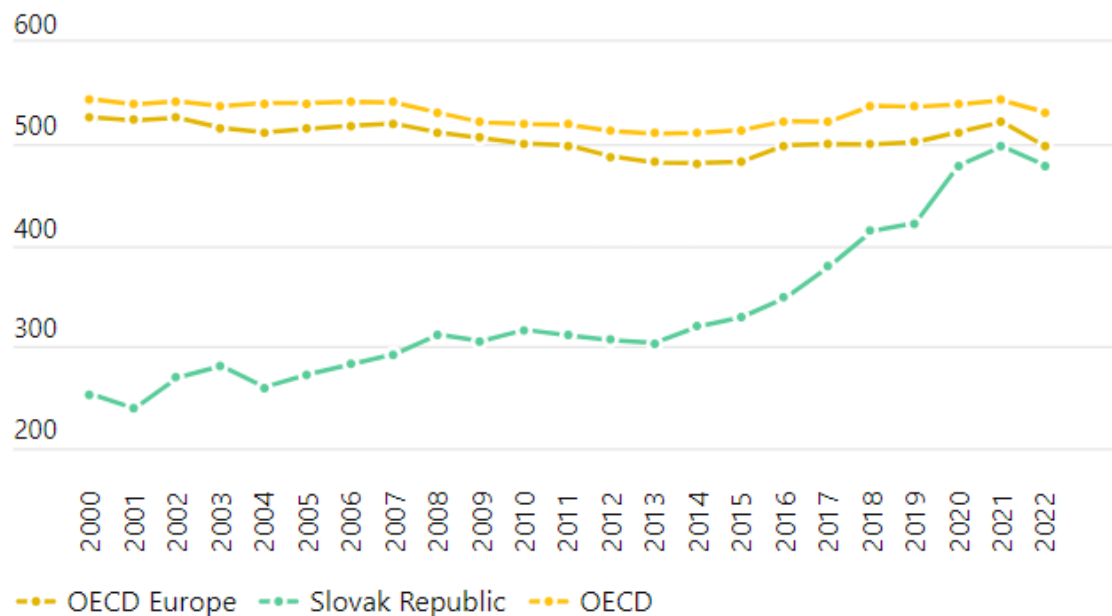


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## MUNICIPAL WASTE – OECD ENVIRONMENT AT A GLANCE COUNTRY PROFILES

### Municipal waste

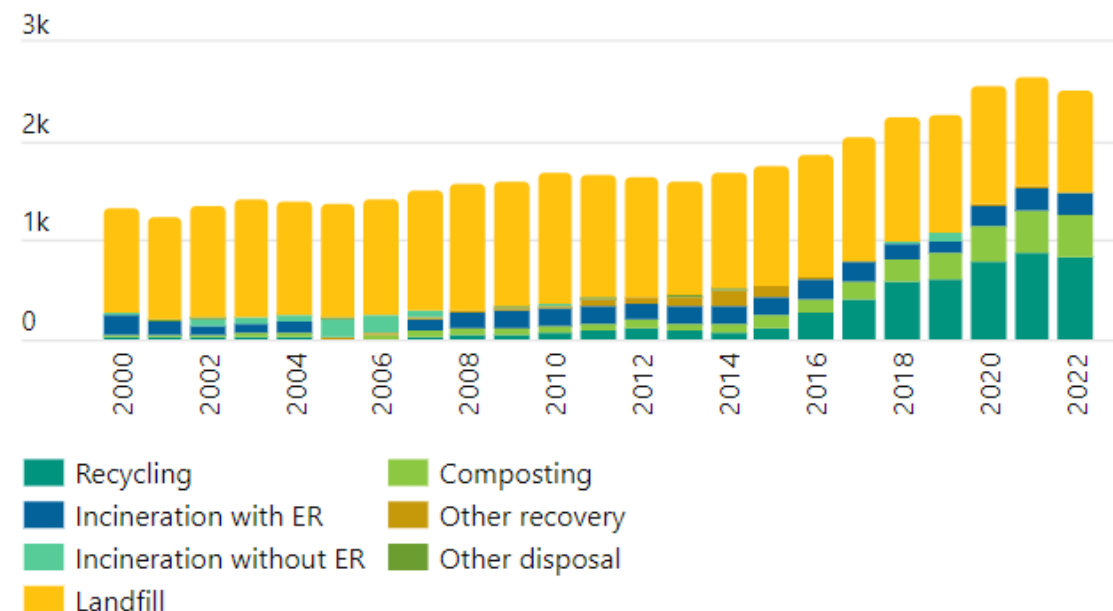
**Municipal waste generation intensity**  
Kilogramme per person



Note: [Country notes](#).

Source: OECD, "Waste - Municipal waste: generation and treatment", OECD Environment Statistics (database), <https://doi.org/10.1787/data-00601-en>

**Municipal waste treatment operations**  
Thousand tonnes



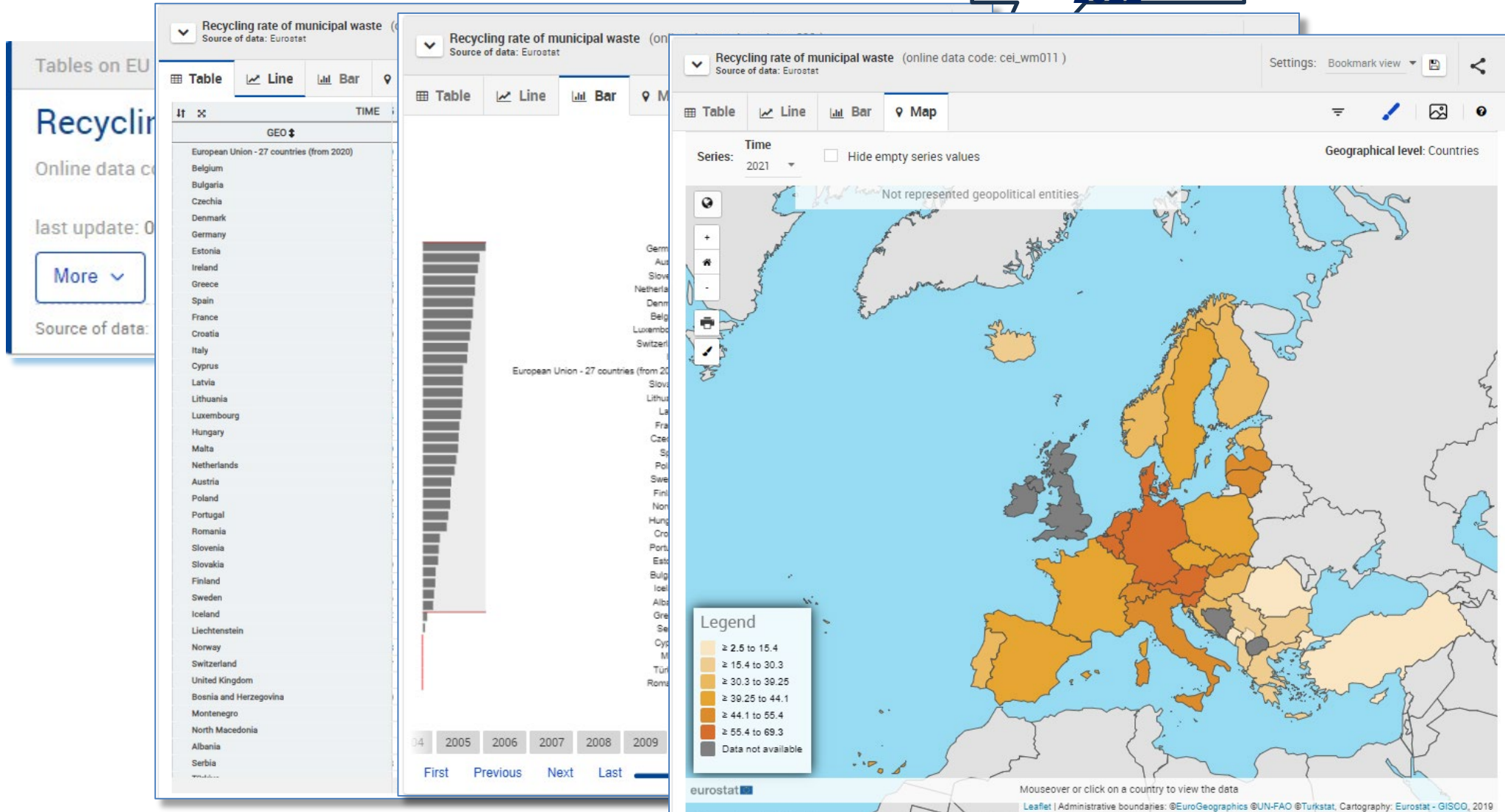
Note: ER = energy recovery, [Country notes](#).

Source: OECD, "Waste - Municipal waste: generation and treatment", OECD Environment Statistics (database), <https://doi.org/10.1787/data-00601-en>

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# MUNICIPAL WASTE RECYCLING RATE - EUROSTAT

= 48.6 % in 2022



## MUNICIPAL WASTE TREATED BY WASTE-TO-ENERGY PLANTS

### • Definition

**Amount (in mass units) and proportion (in %) of MW treated by waste-to-energy plants in total amounts of MW generated**

- Calculation:
  - Amounts (in mass units) of MW received by waste-to-energy plants over total amounts (in mass units) of MW generated
  - Units: metric tonnes; percent; percent change
  - Could be calculated by using amounts collected instead of generated as a denominator
  - Waste-to-energy plants: WtE incineration; co-processing; anaerobic digestion (biogas)
- **Purpose and use**
  - Helps monitor compliance with national recovery and incineration targets
  - To be used with other management indicators to guide decisions on management infrastructure and target setting
- **Data quality and measurement issues**
  - Differences due to different measurement scope
    - Should account for total amount of waste that has actually been subject to energy recovery
    - Often reported as incineration with energy recovery → important to track all components



## MUNICIPAL WASTE LANDFILLING RATES

### • Definition

**Proportion (in %) of MW landfilled in total amounts of MW generated**

- Calculation
  - Amount (in mass units) of MW received by landfill facilities minus amounts of sorting rejects and treatment residues being subsequently landfilled over total amounts (in mass units) of MW generated
  - Unit: tonnes, percent, percent change
  - Could be calculated by using amounts collected instead of generated as a denominator
  - Should distinguish between controlled and uncontrolled treatment
- Purpose and use
  - Important traditional waste management indicator
  - Helps monitor progress towards MW landfill objectives and compliance with national landfill targets
  - To be used with other management indicators to guide decisions on management infrastructure and target setting
  - To be complemented with information on treatment costs and illegal deposits
- Data quality and measurement issues
  - Differences depending on the point where the amounts of “MW landfilled” are measured
  - Differences due to the inclusion or exclusion of uncontrolled landfilling
  - Risk of double counting concerning residues or rejects from recovery facilities and residues from other disposal operations (e.g. incineration residues) which are subsequently landfilled. These amounts need to be deducted

## MUNICIPAL SOLID WASTE - UNCONTROLLED DISPOSAL

### • Definition

**Amounts (in mass units) and proportion (in %) of MW treated in uncontrolled disposal facilities in total MW generated**

- Calculation:
  - Amount (in mass units) of MW received by uncontrolled disposal facilities over total amounts (in mass units) of MW generated
  - Unit: metric tonnes, percent
  - Could be calculated by using amounts collected instead of generated as a denominator
  - Uncontrolled disposal of waste includes informal and illegal disposal, e.g. open burning of waste, dumping of waste in the environment or at a non-controlled site. No harmonised definition exists.

### • Purpose and use

- Helps identify needs for upgrading existing facilities and for better control mechanisms (permitting; technical control procedures in compliance with national law)
- Helps identify potential risks for human health and the environment
- Related to SDG indicator 11.6.1

### • Data quality and measurement issues

- Information on uncontrolled disposal is not easy to obtain. Data sources include compliance and enforcement agencies and research studies. Accounting for rejects and treatment residues being subsequently incinerated or landfilled is not easy

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## MUNICIPAL WASTE - PROPORTION OF MSW COLLECTED AND MANAGED IN CONTROLLED FACILITIES OUT OF TOTAL MSW WASTE GENERATED, BY CITIES (SDG 11.6.1)

### • Definition

**Proportion (in %) of MSW collected and managed in controlled facilities in total MSW generated, in a city**

#### • Calculation:

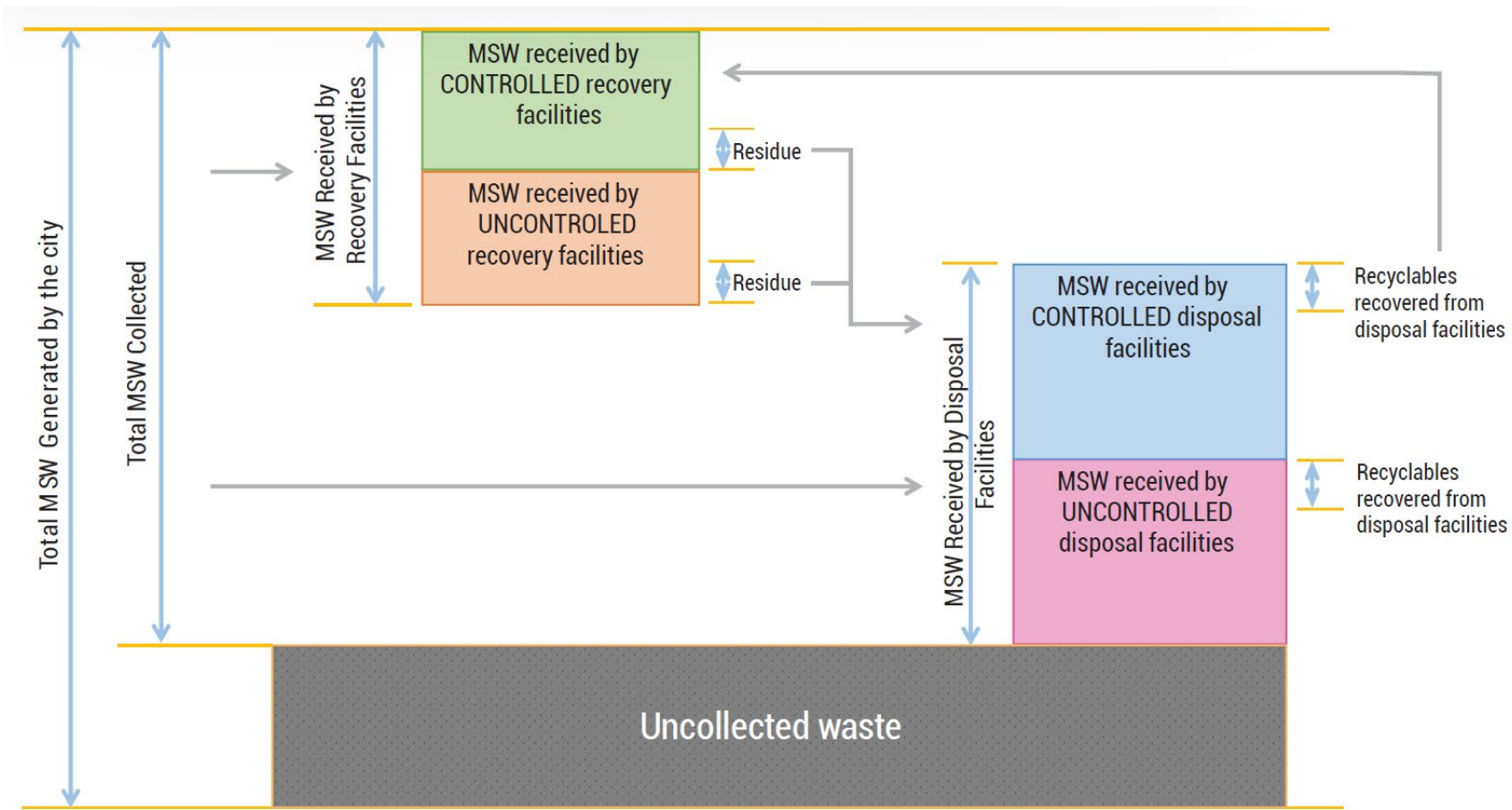
- $SDG\ 11.6.1 = \frac{\text{Total MSW collected and managed in controlled facilities (t/day)}}{\text{Total MSW generated (t/day)}} \times 100 (\%)$
- Units: metric tonnes; percent
- Could be calculated by using amounts collected instead of generated as a denominator
- Relates to national-level indicators on uncontrolled disposal of MW and on MW destinations

### • Purpose and use

- Measures progress of the performance of a city's MW management
- Helps identify needs for upgrading existing facilities and for better control mechanisms (permitting; technical control procedures in compliance with national law)
- Helps identify potential risks for human health and the environment in the city territory

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## MUNICIPAL WASTE - SDG 11.6.1 : CONCEPT FIGURE (UN-HABITAT)



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## **MUNICIPAL WASTE - PROPORTION OF MSW COLLECTED AND MANAGED IN CONTROLLED FACILITIES OUT OF TOTAL MSW WASTE GENERATED, BY CITIES (SDG 11.6.1)**

- **Definitions (for reference)**

- **Total MSW Collected**
  - UNECE framework: refers to the amount of municipal waste collected by or on behalf of municipalities, as well as municipal waste collected by the private sector. It includes mixed waste, and fractions collected separately for recovery operations (through door-to-door collection and/or through voluntary deposits).
  - SDG [UNHabitat]: refers to the amount of MSW generated that is moved from the point of generation, such as specific addresses or designated collection points, to facilities where the waste is recovered or disposed, regardless of collection modality (e.g., by municipal governments, non-state actors or informal sector). The remaining share of MSW generated is considered “uncollected”.
- **MSW Managed in Controlled Facilities**
  - SDG [UNHabitat]: refers to MSW collected and transported to recovery and disposal facilities with basic, improved or full control according to the Ladder of waste management facilities’ control level. The facility has the level of control, where it checks the most boxes. Note that the emphasis is on operational control rather than engineering/design. A facility that is constructed to a high standard, but not operated in compliance with Level 3 (or above) standard is not regarded as a controlled facility

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## **MUNICIPAL WASTE - PROPORTION OF MSW COLLECTED AND MANAGED IN CONTROLLED FACILITIES OUT OF TOTAL MSW WASTE GENERATED, BY CITIES (SDG 11.6.1)**

### **• Data sources and providers**

- International sources: Municipal waste data (from the OECD/Eurostat and UNSD/UNEP data collection)
- Data providers: Ministries (environment, planning, urban), NSO, local authorities, cities, waste management companies (public, private) + NGOs
- Local data aggregated by the ministries and agencies in charge of environmental protection
- Collection tools: Household surveys (integrated into national census) or global household surveys e.g. Demographic and Health Survey or UNICEF's Multiple Indicator Cluster Surveys. // household surveys and other complimentary surveys are being conducted for the estimation of municipal waste generation per capita.

### **• Practical guide for countris: [Waste Wise Cities Tool \(WaCT\)](#) – UN-Habitat**

- 7 step guide to collect data on MSW generated, collected, and managed in controlled facilities.
- Provides a household survey guide for total MSW generation, a questionnaire to identify the MSW recovery chain and criteria to check the environmental control level of waste management facilities in a city.

### **• Data quality and measurement issues**

- Many cities report the proportion of collected MSW in their own term
- May include waste collected but not reaching a treatment facility

# TOTAL WASTE

## NATIONAL RECYCLING RATE (SDG 12.5.1)

### • Definition

**The proportion (in %) of material recycled out of total waste generated in the country**

#### • Calculation:

- Amount of material recycled in the country plus amounts exported for recycling minus material imported intended for recycling out of total waste generated in the country

$$\text{SDG 12.5.1} = \frac{(\text{Material recycled} + \text{Material exported intended for recycling} - \text{Material imported intended for recycling}) \times 100}{\text{Total waste generated}}$$

- Unit: metric tonnes, percent, percent change
- Should cover waste from all economic activities (excluding ISIC 38 - recovery) and households
- To be broken down by type of material or waste: e.g. e-waste, plastic waste, municipal waste, other (packaging waste, metal waste, food waste, ...)
- Could exclude major mineral waste (cf definition in EU Circular Economy Monitoring Framework)

### • Purpose and use

- Helps measure progress towards sustainable consumption & production and compliance with recycling targets
- Informs resource efficiency and CE policies
- Is a core CE indicator (OECD, UNECE) and part of the EU Circular Economy Monitoring Framework



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## NATIONAL RECYCLING RATE (SDG 12.5.1)

### • Data quality and measurement issues

- Differences due to the scope of waste covered, e.g. secondary waste
  - The SDG indicator focuses on primary waste (excluding ISIC 38 - recovery)
  - The EU indicator *includes waste from waste treatment* (secondary waste)
- Differences due to the scope of waste covered, e.g. mineral waste
  - The weight of total waste generated is mainly driven by mineral waste from construction & demolition and from mining activities, and the latter widely varies significantly across countries
  - The inclusion or exclusion of major mineral waste affects international comparability
  - The EU indicator *excludes most mineral waste*

See metadata:

[https://ec.europa.eu/eurostat/cache/metadata/en/c\\_ei\\_wm010\\_esmsip2.htm](https://ec.europa.eu/eurostat/cache/metadata/en/c_ei_wm010_esmsip2.htm)

#### **EU indicator**

#### **Which “Major mineral wastes” are excluded?**

- EWC-Stat 12.1: Mineral waste from construction and demolition
- EWC-Stat 12.2, 12.3, 12.5: Other mineral wastes
- EWC-Stat 12.6: Soils
- EWC-Stat 12.7: Dredging spoils

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## NATIONAL RECYCLING RATE

### RECYCLING RATE OF ALL WASTE, EXCLUDING MAJOR MINERAL WASTE - EUROSTAT

The screenshot shows the Eurostat Data Browser interface. At the top left is the 'eurostat' logo, followed by 'Data Browser' and a search bar. A navigation bar contains 'ALL DATA', 'RECENTLY UPDATED', 'DOWNLOADS', 'Info', and a help icon. The breadcrumb trail reads 'Tables on EU policy > Circular economy indicators > Waste management'. The main title is 'Recycling rate of all waste excluding major mineral waste'. Below the title, it shows 'Online data code: cei\_wm010', 'DOI: 10.2908/cei\_wm010', and 'last update: 03/01/2024 23:00'. There are links for 'Dataset information' and 'Explanatory texts'. The view is set to 'CUSTOM DATASET' with a 'More' dropdown menu. At the bottom, it says 'Source of data: Eurostat (env\_wasoper)' and 'Add to My datasets'.

**eurostat** Data Browser Search ...

ALL DATA RECENTLY UPDATED DOWNLOADS Info ?

Tables on EU policy > Circular economy indicators > Waste management

### Recycling rate of all waste excluding major mineral waste

Online data code: cei\_wm010 DOI: 10.2908/cei\_wm010 last update: 03/01/2024 23:00

view: CUSTOM DATASET

More

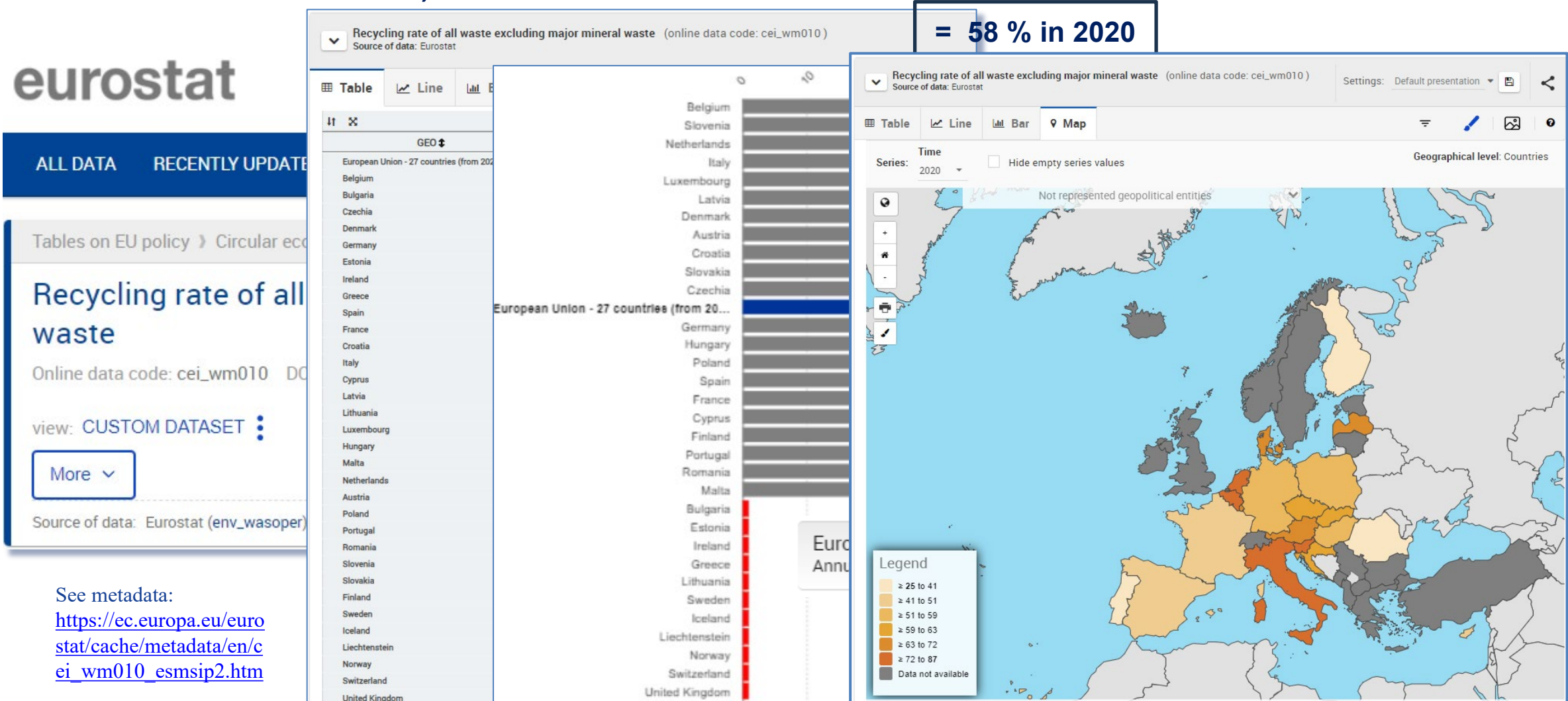
Source of data: Eurostat (env\_wasoper) + Add to 'My datasets'

- Dataset information
- Explanatory texts

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## NATIONAL RECYCLING RATE

### RECYCLING RATE OF ALL WASTE, EXCLUDING MAJOR MINERAL WASTE - EUROSTAT



See metadata:

[https://ec.europa.eu/eurostat/cache/metadata/en/cei\\_wm010\\_esmsip2.htm](https://ec.europa.eu/eurostat/cache/metadata/en/cei_wm010_esmsip2.htm)

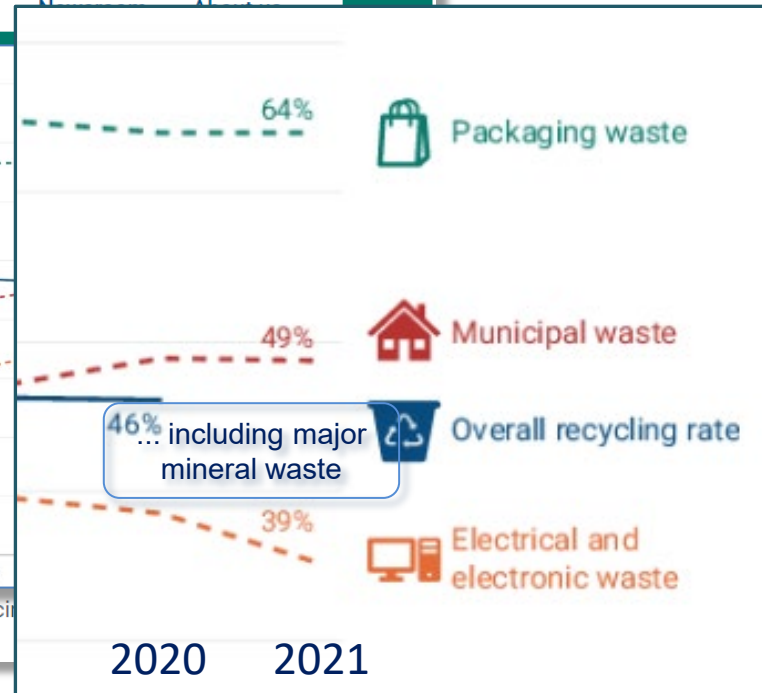
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## NATIONAL RECYCLING RATE - WASTE RECYCLING ANALYSIS - EEA



European Environment Agency

Topics Analysis and data Countries



<https://www.eea.europa.eu/en/analysis/indicators/waste-recycling-in-europe>

<https://www.eea.europa.eu/en/topics/in-depth/waste-and-recycling?activeAccordion=e53c3d45-3510-42da-bd18-cc72d0fb1a7b>

## RECOVERY RATE OF CONSTRUCTION AND DEMOLITION (C&D) WASTE

- **Definition**

**Amounts of construction and demolition waste being recovered compared to total amounts generated**

- Calculation
  - Amounts (in mass units) of C&D waste recovered over total amounts (in mass units) of C&D waste generated
  - Units: percent, percent change
  - Should distinguish between recycling and backfilling
- **Purpose and use**
  - Informs policies that promote a CE
  - Informs policies and decisions concerning sustainable construction and buildings
  - Monitors the fate of C&D waste
  - Helps identify untapped recovery potential

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## RECOVERY RATE OF CONSTRUCTION AND DEMOLITION (C&D) WASTE

### • Data quality and measurement issues

- Difficulties exist with the attribution of C&D waste to waste treatment operations  
→ the fate of C&D waste is not always well known nor monitored
- Major differences among countries in the use of terms & classifications in reporting on the treatment of C&D waste (cf Eurostat exchange of views with countries)  
→ e.g. reported data may confuse C&D waste with waste from construction sector
- Data on amounts and time series affected by time lags between generation and treatment (temporary storage)

### In the EU:

- Publication of the indicator is currently discontinued due to quality and methodological concerns
- Guidance is in preparation on the attribution of “internal recycling”, “treatment on site”, “backfilling”



## DIVERSION OF WASTE FROM LANDFILLS

### • Definition

**A- Amounts of waste deposited in landfills**

**B - Landfill rate, by type of waste category**

- Calculation
  - A- Amounts (in mass units) of waste deposited in landfills, by type of waste category
  - B- Proportion of waste (in %) deposited in landfills, i.e. waste deposited in landfills over total waste generated
  - Units: metric tonnes, percent, percent change
  - Change over time, comparison with reference or base year =!
- Purpose and use
  - Complements the indicator on the national recycling rate
  - Monitors efforts to reduce the amount of waste sent to landfills (cf. the waste hierarchy)
  - Helps identify untapped recoverable materials in waste being disposed of (and lost for the economy)
- Data quality and measurement issues
  - Same issues as for other “management” indicators
  - All waste? Focus on municipal waste? Waste collected and delivered?

## DIVERSION OF WASTE FROM LANDFILL



Topics Analysis and data Countries Newsroom About us

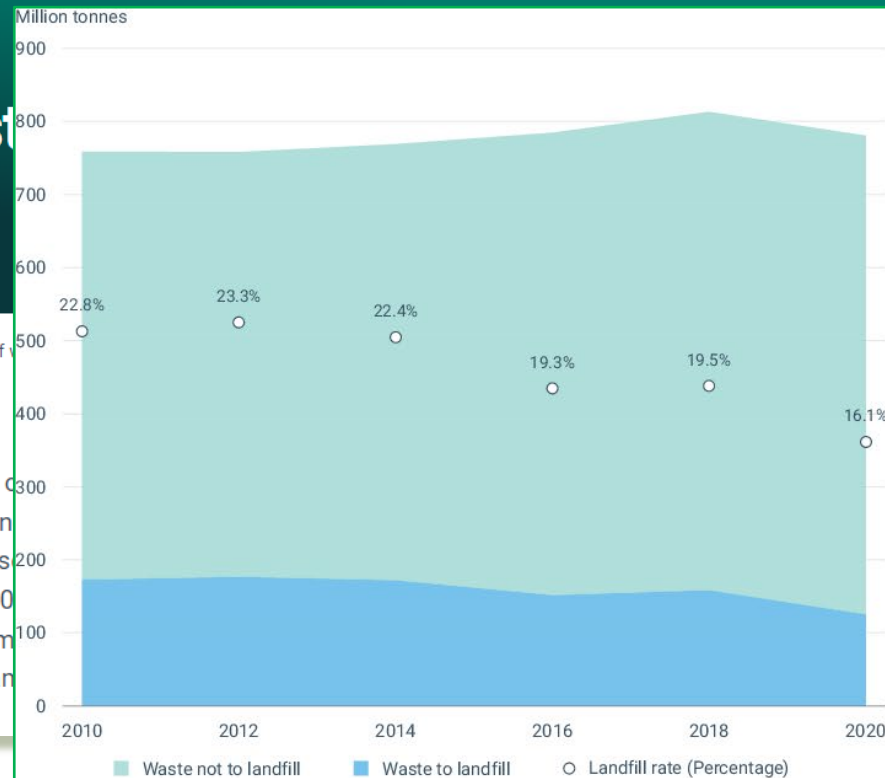
<https://www.eea.europa.eu/en/analysis/indicator/s/diversion-of-waste-from-landfill>

### Diversion of waste from landfill in Europe

Published 22 Jan 2024

Home > Analysis and data > Indicators > Diversion of waste from landfill

A key goal of EU waste policy is to reduce the amount of waste sent to landfill (from 23% to 16% between 2010 and 2020). The amount of waste generated has continued to increase in the same period, equivalent to 10 million tonnes in 2020 compared to 10 million tonnes in 2010, such as (mixed) household and similar waste from landfill. However, the amount of waste sent to landfill has decreased from 170 million tonnes in 2010 to 120 million tonnes in 2020.





## REGIONAL TRAINING ON THE PRODUCTION AND USE OF WASTE AND CIRCULAR ECONOMY STATISTICS AND INDICATORS

# Thank you !

**Working Group on Environmental  
Monitoring and Assessment**

[wgemasec@un.org](mailto:wgemasec@un.org)

