

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**

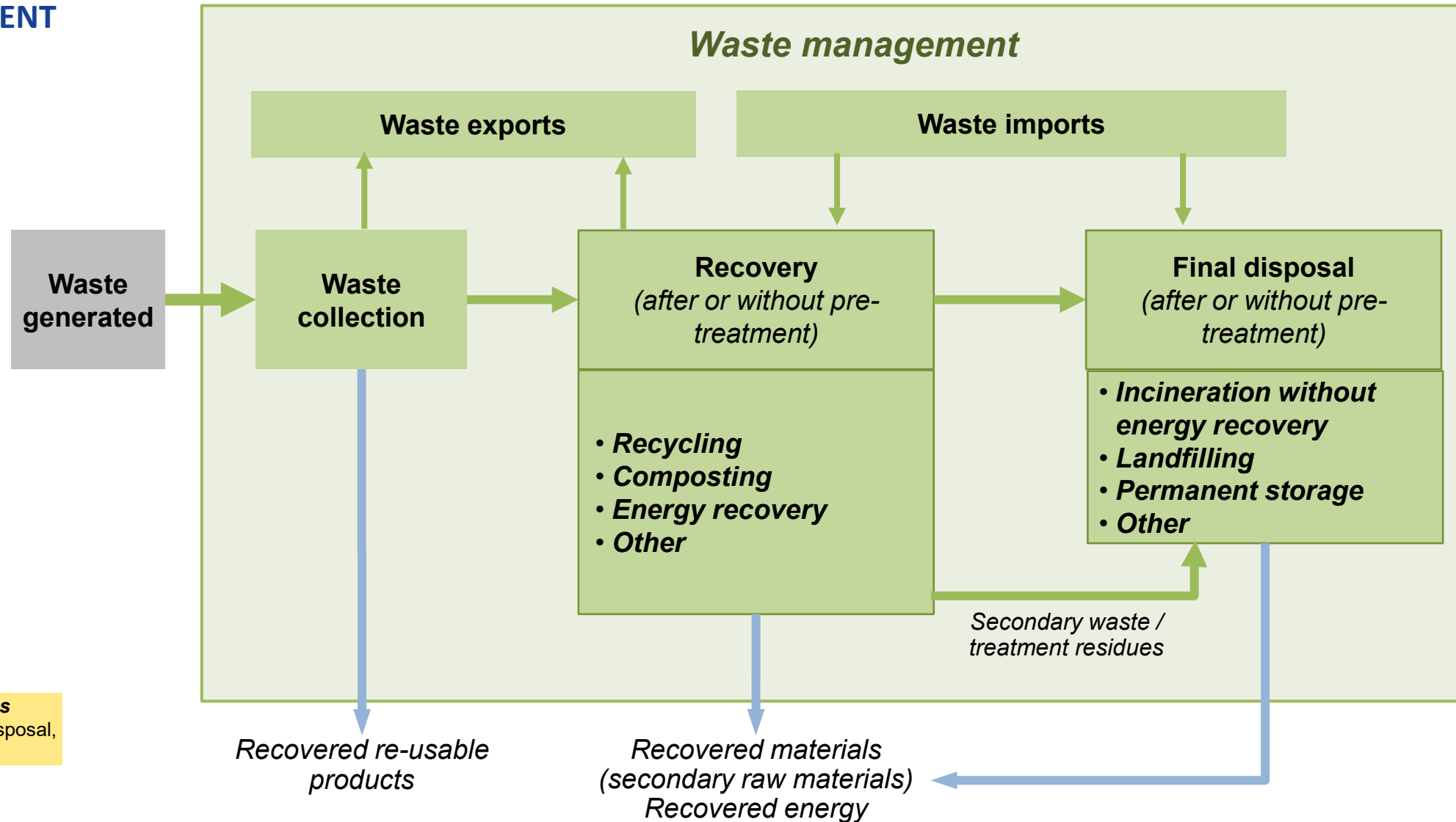
- Municipal waste collection rates
- Municipal waste destinations (recycling, waste-to-energy, landfilling, uncontrolled disposal)
 - Municipal waste recycled
 - Municipal waste treated by waste-to-energy plants
 - Municipal waste (MSW) landfilling rates
 - Uncontrolled disposal of municipal waste
-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

- **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 of MW collected (by or on behalf of municipalities) in total amounts of MW generated

• Calculation:

$$= \frac{\text{Total MSW collected (tonnes)}}{\text{Total MSW generated (tonnes)}} \times 100 (\%)$$



- Units: tonnes, percent
- Includes 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 sources and providers**

- Data on formal waste collection and management: municipal bodies; private contractors; ministries; NSO
- Data on informal collection: NGOs; community organizations, compliance and enforcement agencies

- **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

MUNICIPAL WASTE DESTINATIONS

• Definition

Amount and proportion 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.
 - 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
- Units: tonnes, percent, percent change

• 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

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 (in mass units) 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: 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

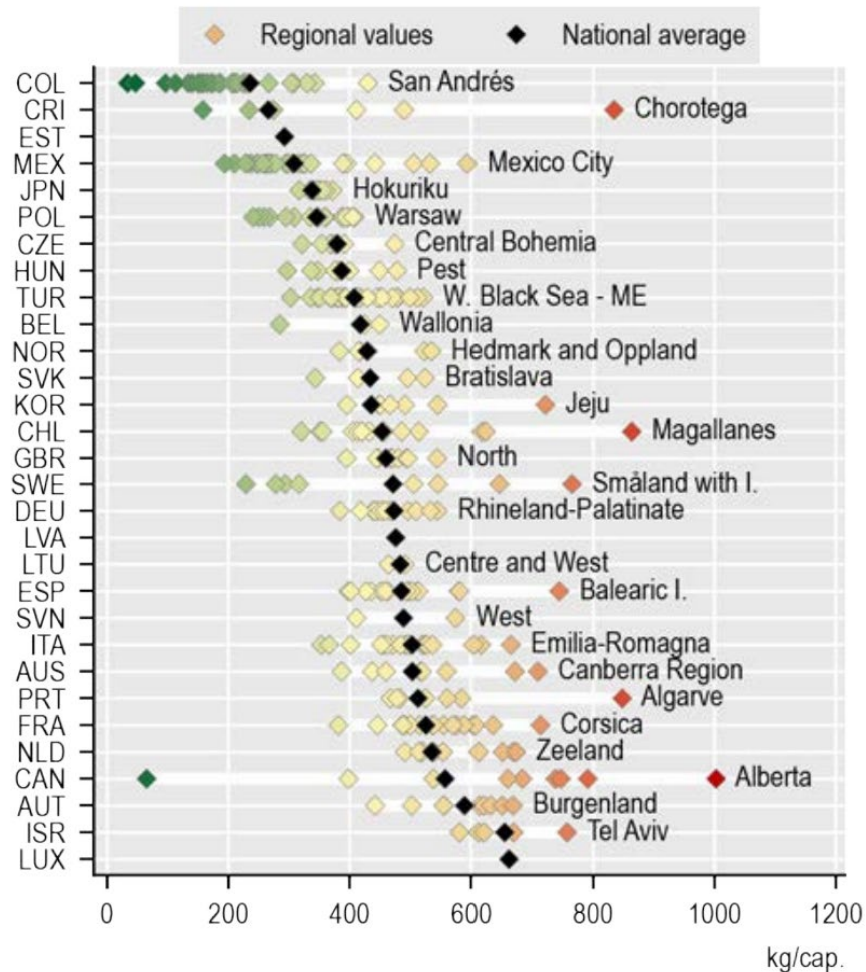
- Differences depending on the point where the amounts of “MW recycled” are measured
 - MW collected for recycling, i.e. separate collection
 - Separate collection is not the same as recycling, as waste can be recovered following pre-treatment of mixed wastes and be recycled, resulting in potentially 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

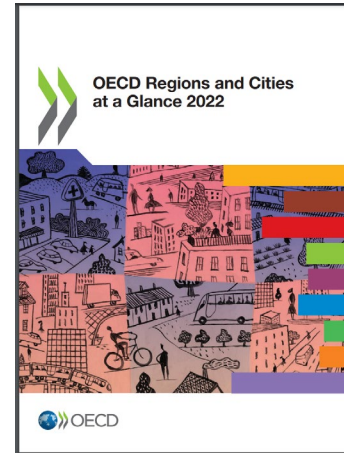
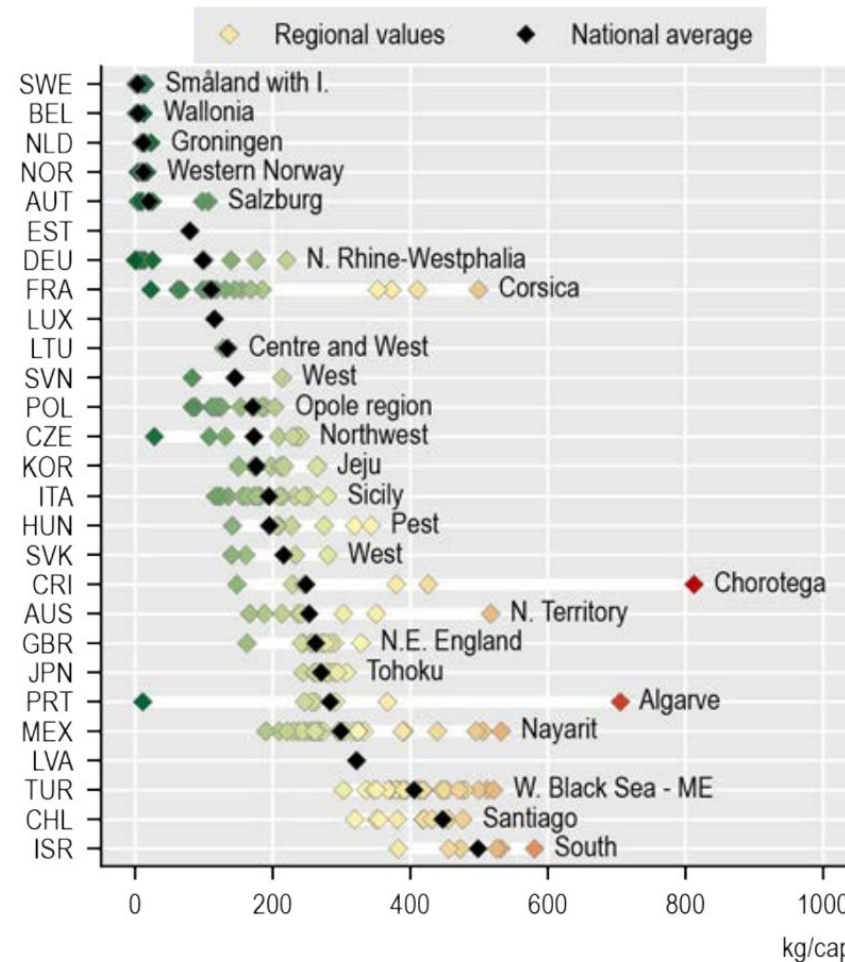
2.12. Municipal waste per capita

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



2.13. Non-recycled municipal waste per capita

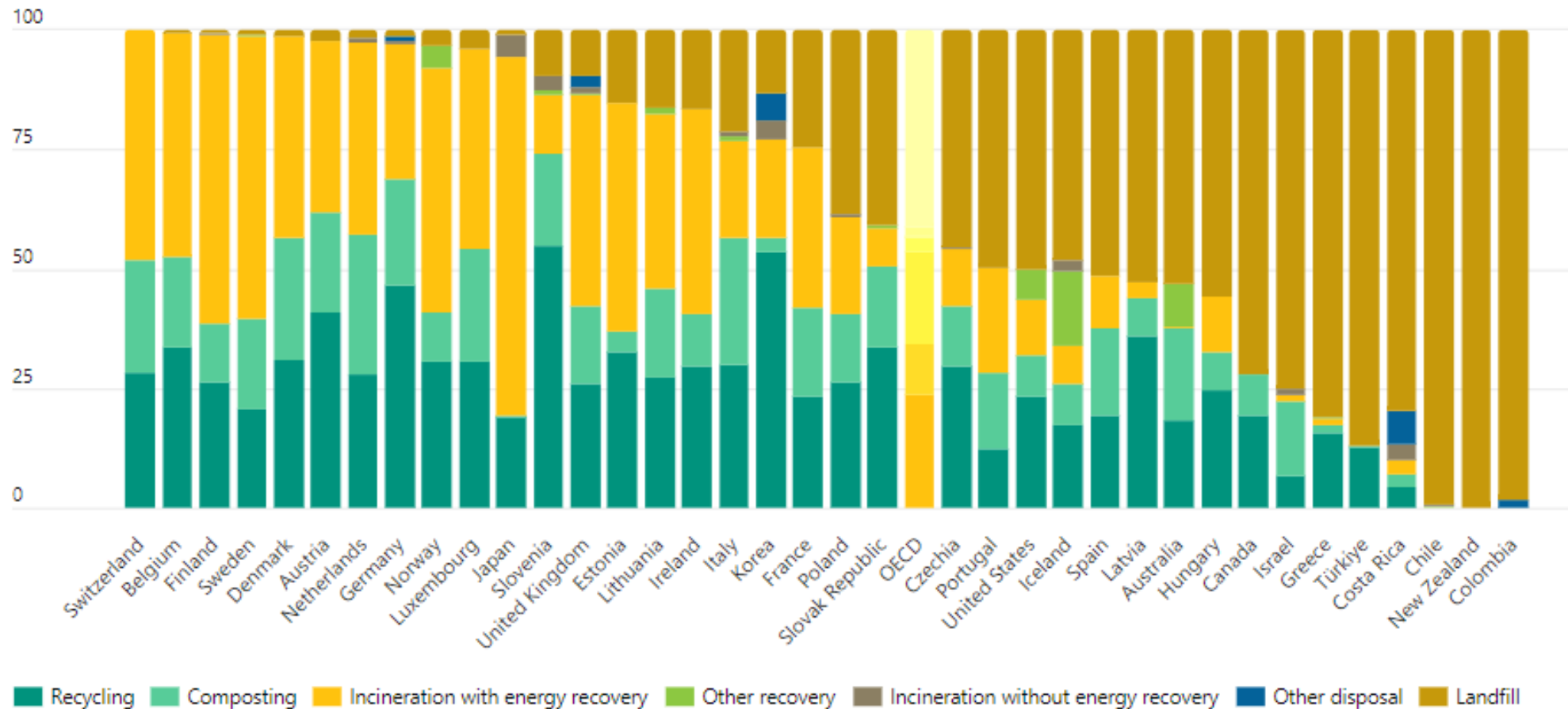
Non-recycled waste per capita, OECD large regions (TL2), 2020



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

Percentage of total treatment, 2022 or latest available year

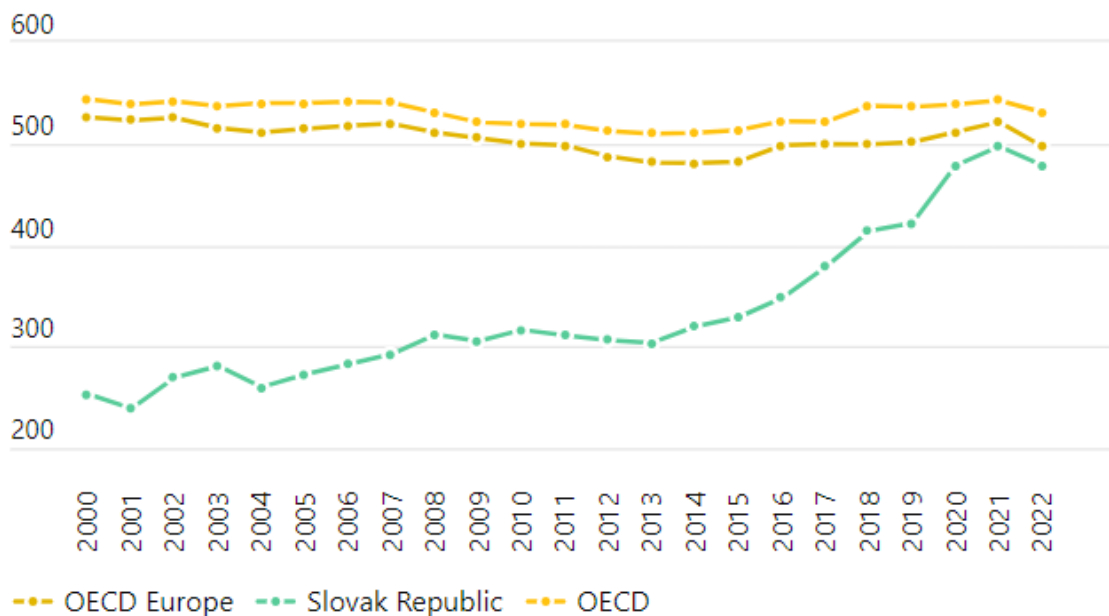
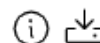


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MUNICIPAL WASTE – OECD ENVIRONMENT AT A GLANCE COUNTRY PROFILES

Municipal waste

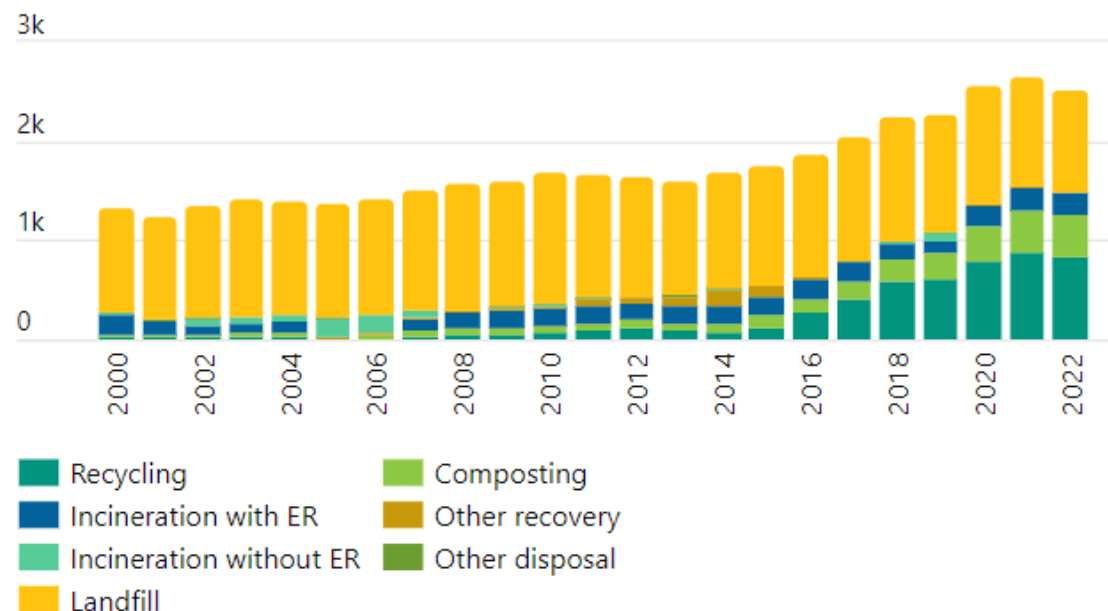
Municipal waste generation intensity
Kilogramme per person



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



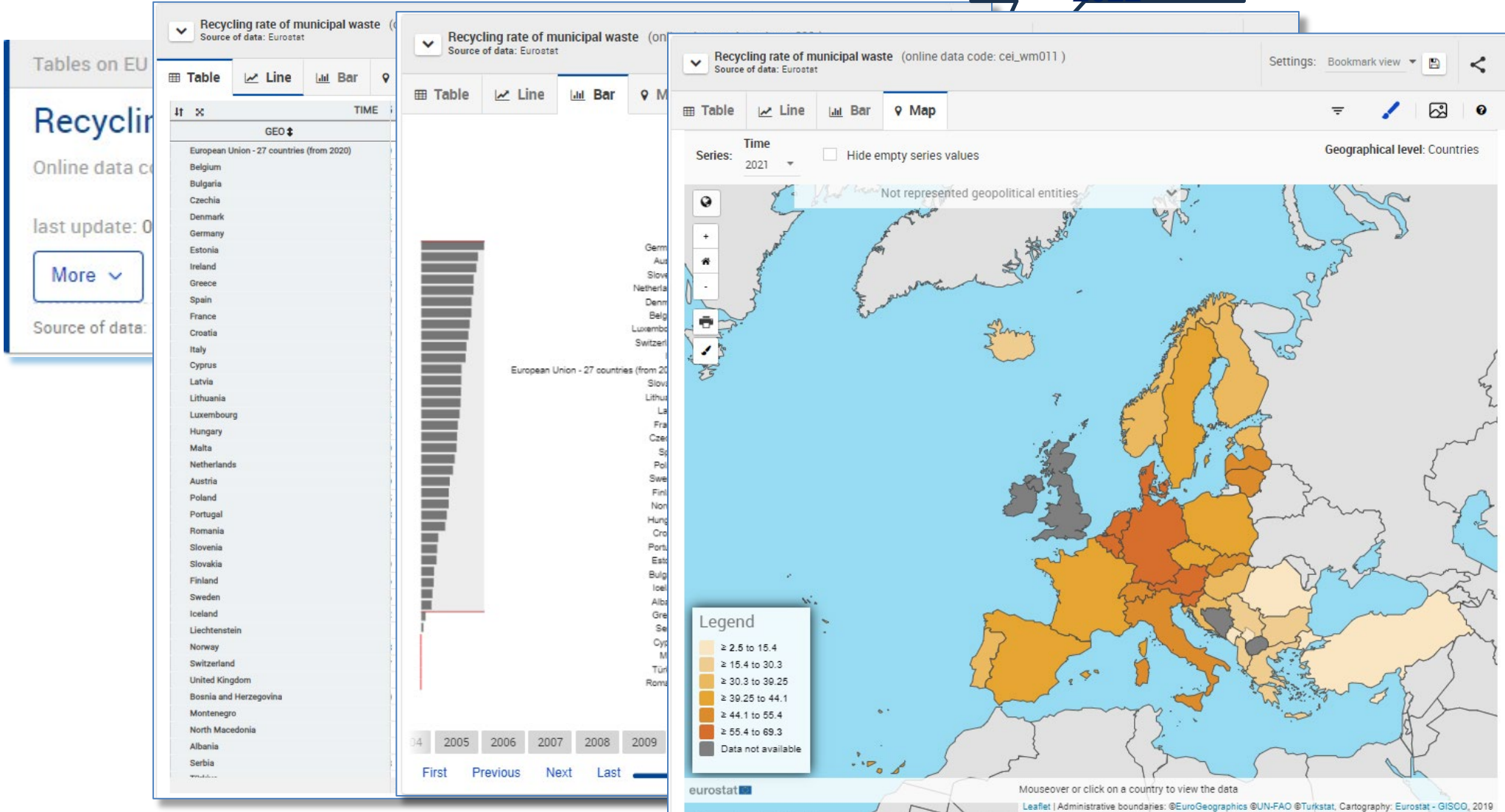
Note: ER = energy recovery, [Country notes](#).

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

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= 48.6 % in 2022

MUNICIPAL WASTE RECYCLING RATE - EUROSTAT



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

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. 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:

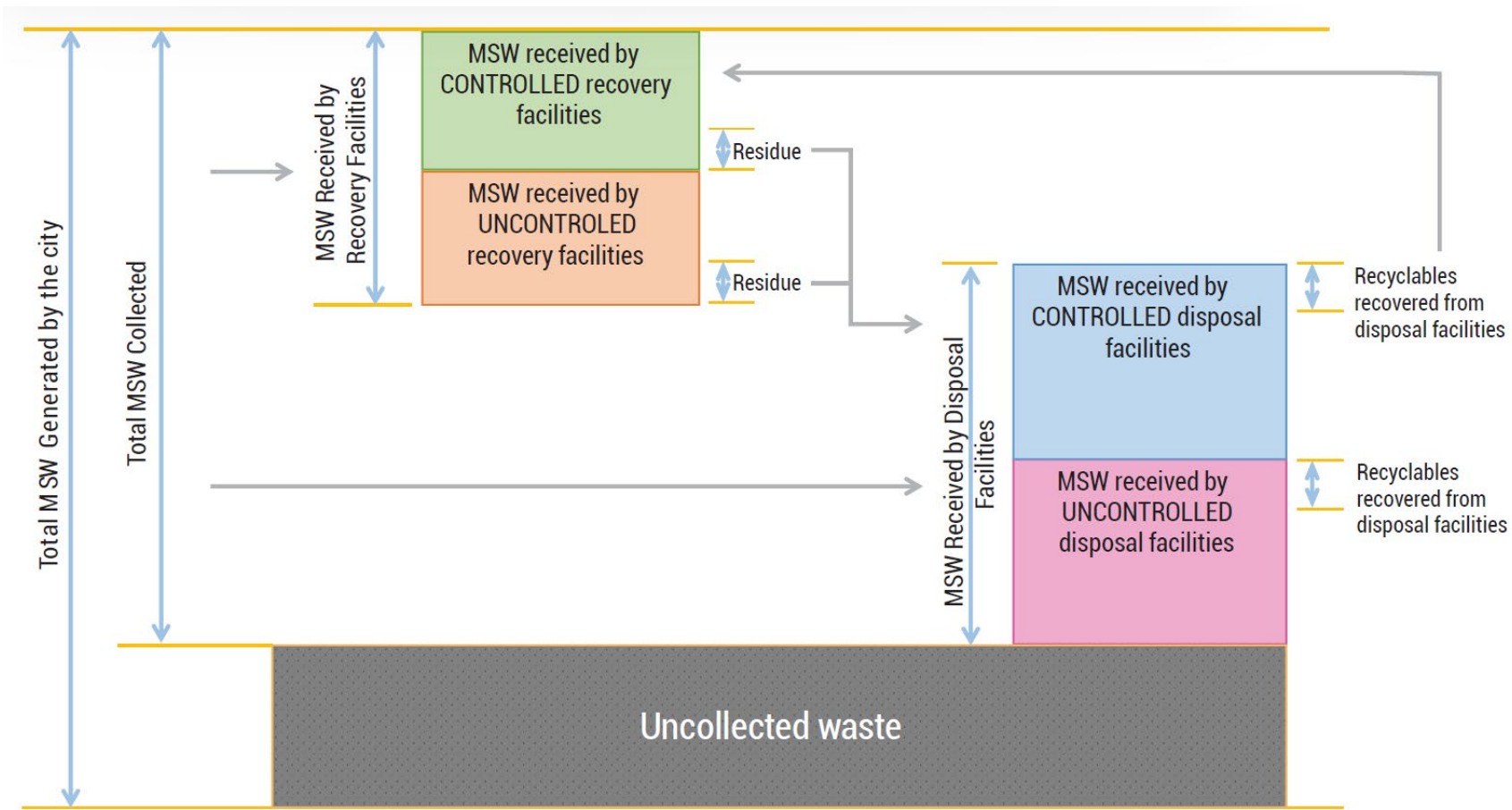
- $SDG\ 11.6.1 = \frac{\text{Total MSW collected and managed in controlled facilities (t/day)}}{\text{Total MSW generated (t/day)}} \times 100 (\%)$
- Units: metric tonnes; percent
- Could be calculated by using amounts collected instead of generated as a denominator
- Relates to national-level indicators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

- **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

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

- Unit: tonnes, percent
- Should cover waste from all economic activities (excluding ISIC 38 - recovery) and households
- To be broken down by type of material or waste: 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 covers waste from all economic sectors and from households, including waste from waste treatment (secondary waste), but excluding most mineral waste

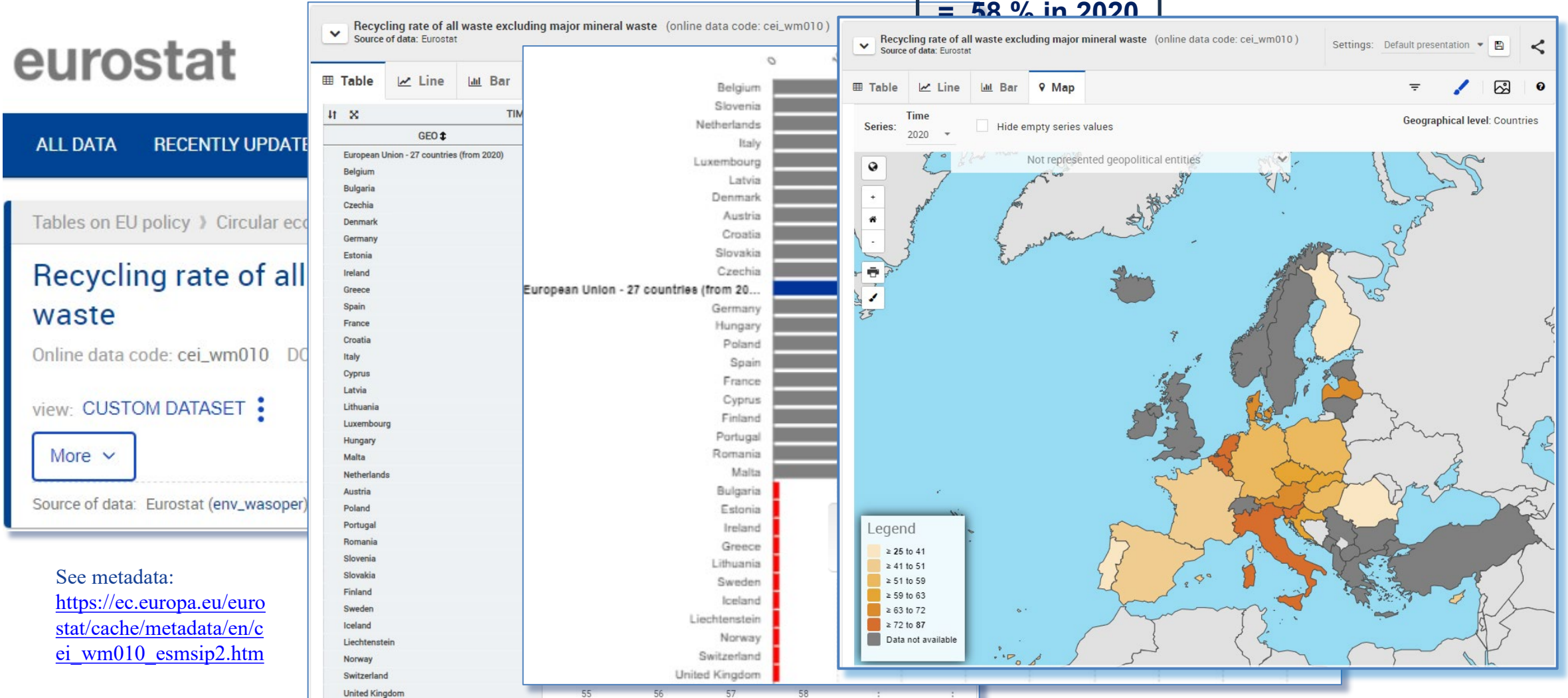
See metadata:

https://ec.europa.eu/eurostat/cache/metadata/en/c_ei_wm010_esmsip2.htm

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NATIONAL RECYCLING RATE, TONS OF MATERIAL RECYCLED (SDG 12.5.1) RECYCLING RATE OF ALL WASTE, EXCLUDING MAJOR MINERAL WASTE - EUROSTAT

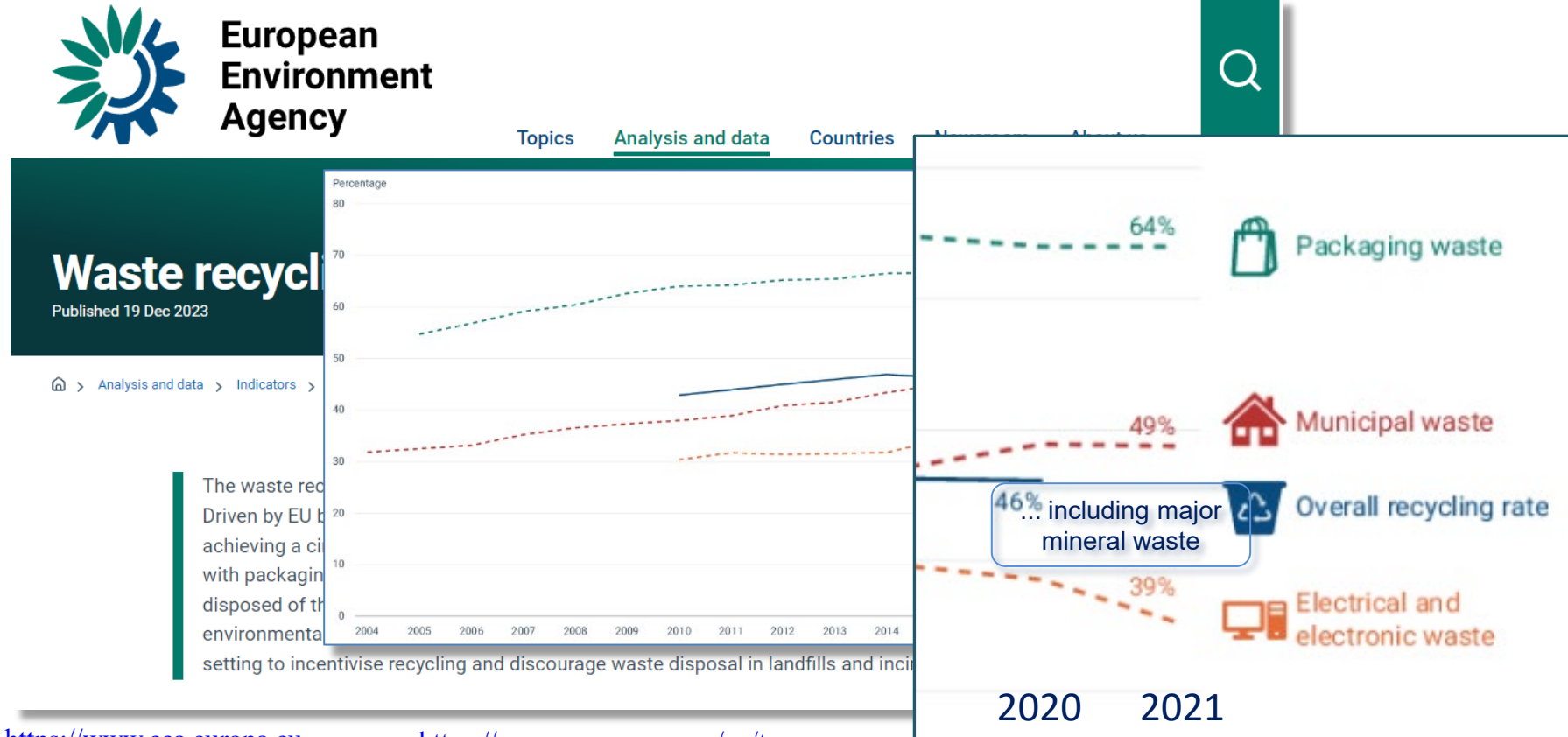
= 58 % in 2020



See metadata:
https://ec.europa.eu/eurostat/cache/metadata/en/ci_wm010_esmsip2.htm

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NATIONAL RECYCLING RATE (SDG 12.5.1) - WASTE RECYCLING ANALYSIS - EEA



<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
 - To distinguish between recycling and backfilling
 - Units: percent, percent change
- **Purpose and use**
 - Informs policies that promote a CE and sustainable construction and buildings
 - Monitors the fate of C&D waste
 - Helps identify untapped recovery potential
- **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
 - In the EU: publication of the indicator is currently discontinued due to quality and methodological concerns

DIVERSION OF WASTE FROM LANDFILLS

• Definition

Amounts of waste deposited in landfills and landfill rate, by type of waste category

- Calculation
 - Amounts (in mass units) of waste deposited in landfills, by type of waste category
 - Proportion of waste (in %) deposited in landfills → ratio of waste deposited in landfills over total waste generated or collected
 - 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
 - All waste? Focus on municipal waste?

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DIVERSION OF WASTE FROM LANDFILL



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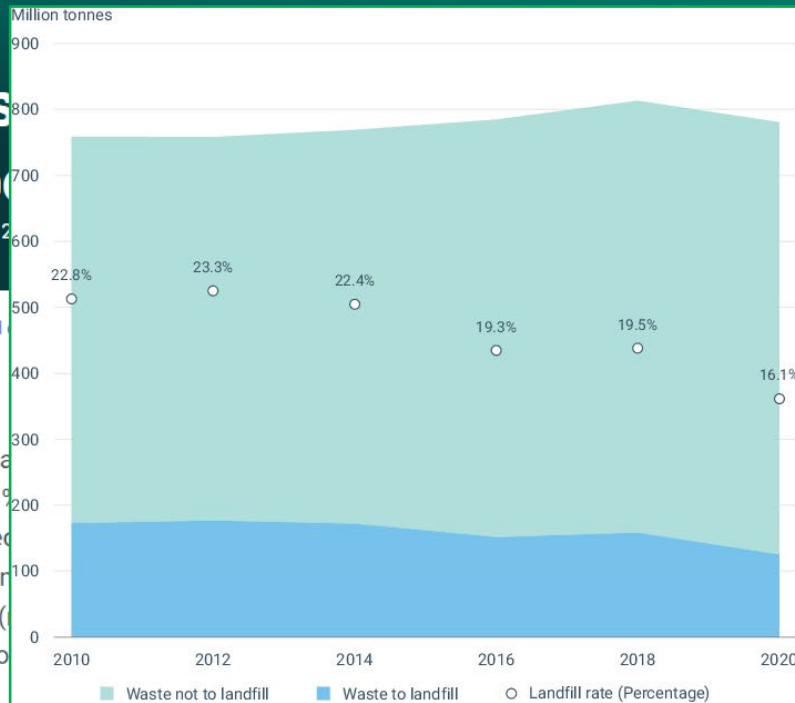
<https://www.eea.europa.eu/en/analysis/indicator/s/diversion-of-waste-from-landfill>

Diversification of waste management in Europe

Published 22 Jan 2021

Analysis and data

A key goal of the EU Waste Framework Directive is to reduce the amount of waste sent to landfill (from 23% in 2000 to 10% by 2020) and increase the amount of waste recycled (from 12% in 2000 to 22% by 2020). This is achieved through measures such as (1) increasing the amount of waste recycled, (2) increasing the amount of waste incinerated with energy recovery, and (3) increasing the amount of waste used in other recovery operations.



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Thank you !

**Working Group on Environmental
Monitoring and Assessment**

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