

Goal 12: Ensure sustainable consumption and production patterns

Target 12.5: By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

Indicator 12.5.1: National recycling rate, tons of material recycled

## Institutional information

### Organization(s):

United Nations Environment Programme (UNEP) and United Nations Statistics Division (UNSD)

## Concepts and definitions

### Definition:

For the purposes of this indicator, the National Recycling Rate will be defined as the quantity of material recycled in the country plus quantities exported for recycling out of total waste generated in the country, minus material imported intended for recycling. Note that recycling includes codigestion/anaerobic digestion and composting/aerobic process, but not controlled combustion (incineration) or land application.

Level 1 (global monitoring) Indicators	
<i>National recycling rate</i>	(Material recycled + material exported for recycling – material imported for recycling) / total waste generated (excluding mining, construction and agricultural waste)
<i>Waste intensity</i>	Waste generated divided by Domestic Material Consumption (DMC), as an indicator of waste reduction
<i>e-waste Generation (with United Nations University)</i>	Due to the political importance of reducing e-waste and the current data availability this is included as a Level 1 indicator.
Level 2 (national monitoring) Indicators	
<i>Total Waste Generated (excluding construction, demolition and agriculture) by type, including e-waste</i>	This is the denominator for recycling and useful for understanding the target 12.5 on waste reduction.
<i>National recycling rate total and by type, including e-waste</i>	Based on national data sources

A full methodology for this indicator is available in the document entitled, “Measuring Waste in the Context of the SDGs (UNEP, forthcoming)”.

### Rationale:

Minimizing waste generation and maximizing the recycling of waste is central to the concept of circular economy. However, currently the total amount of produced materials that are recycled are estimated to be low (based on academic literature). If countries are to better understand how waste are generated, collected and recycled then this will put countries and other stakeholders in a better position to identify how to tackle the issues face for key waste streams (such as metals, e-waste or plastics).

**Concepts:**

Material recycled Expressed in tons, reported at the last entity in the recycling chain, preferably when tons of material is bought as secondary resource to be used in production facilities during the course of the reporting year; Secondary mineral materials used in the construction sector are excluded; composting is considered recycling for the purposes of this indicator.

Municipal Solid Waste (MSW) 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., 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. Further information on municipal solid waste is defined in the SDG indicator methodology for 11.6.1.

Recycling is defined under the UNSD/UNEP Questionnaire on Environment Statistics and further for the purpose of these indicators as “Any reprocessing of waste material [...] 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.”

For the purpose of consistency with the Basel Convention reporting and correspondence with EUROSTAT reporting system, Recovery operations R2 to R12 listed in Basel Convention Annex IV, are to be considered as ‘Recycling’ under the UNSD reporting for hazardous waste.

Total waste generated is the total amount of waste (both hazardous and non-hazardous) generated in the country during the year.

Total waste generated (excluding construction, mining and agriculture) is the total amount of waste (both hazardous and non-hazardous) generated in the country during the year. For the purpose of this indicator, total waste generated will include municipal solid waste, non-hazardous industrial waste, hazardous waste and exclude non-metallic minerals (industrial and construction minerals), construction waste and agricultural waste. Expressed in tons, reported as the sum of waste generated during the course of the reporting year in sectors following the UNSD/UNEP Questionnaire on Environment Statistics, Table R1 Generation of Waste by Source, excluding Construction waste (F 41- 43 ISIC code), Agricultural waste (A 01-03 ISIC code) and Mining and quarrying waste (ISIC 05-09).

**Comments and limitations:**

Most countries control large end-of-chain recycling facilities and export of recyclable materials, so data from these entities is feasible to collect. There may be recycling carried out in the informal sector that never enters the formal channels, in this case countries can estimate the size of the informal recycling sector to properly account for all the recycling in the country.

National recycling rate is part of measuring progress towards sustainable consumption and production, but it does not capture prevention, reduction, reuse and repair. Calculating additional intensity indicators against the DMC and the material flow (MF) gives proxies and helps connect this indicator to resource efficiency in consumption and production.

Additional research is needed to understand typical losses (due to transformation of materials, loss of humidity, % of rejects) along the recycling chain for various recyclable materials. The losses would need

to be known as %-ages from the point of entry in the recycling value chain (I.e. Collection of source segregated material, or input to sorting facility) to the point of exit (I.e. when the material leaves the last recyclable processing unit to enter a facility as secondary raw material). This would allow to connect indicator 11.6.1. which will measure among other things the municipal recycling rate, to the national recycling rate. Municipal recycling rate is likely going to be measured at the beginning of the chain, while indicator 12.5.1 will likely be measured at the point of exit from the chain. Such studies may be done using the process flow and material mass balance approach. Another approach could be to follow transactions in the waste management process and introducing so called “system of boundaries” defining points of reporting of waste quantities.

## Methodology

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### Computation Method:

A full methodology for this indicator is available in the document entitled, “Measuring Waste in the Context of the SDGs (UNEP, forthcoming)”.

For the purposes of this indicator, the National Recycling Rate will be defined as the quantity of material recycled in the country plus quantities exported for recycling out of total waste generated in the country, minus material imported intended for recycling. Note that recycling includes codigestion/anaerobic digestion and composting/aerobic process, but not controlled combustion (incineration) or land application.

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

For the Level 1 (global monitoring) data: Note that gap fillers for waste generation are more commonly used than for recycling rates, since end of the chain recycling data is typically more readily available. For the recycling rate information on waste generation will be used with regional gap fillers which are based on existing data on the recycling rate. Note that Gap fillers are available in publications such as What a Waste by the World Bank (2018)<sup>1</sup> or the 2006 IPCC Guidelines<sup>2</sup> for waste generation. The Global Waste Management Outlook (2015) is also a source of worldwide waste data and more recent regional publications are available for geographic areas but also for specific landscapes (e.g. mountains) that may have an impact on waste generation and composition.

For the Level 2 (national monitoring) data: The denominator for waste generation will be as follows. Note that the denominator is also relevant for the target and will be published.

### *Total waste generated*

$$\begin{aligned} &= \text{Waste from manufacturing (ISIC 10 – 33)} \\ &+ \text{Waste from electricity, gas, steam and air conditioning supply (ISIC 35)} \\ &+ \text{Waste from other economic activities (excluding ISIC 38)} \\ &+ \text{Municipal waste (excluding construction and mining)} \end{aligned}$$

<sup>1</sup> What a waste 2.0, A Global Snapshot of Solid Waste Management to 2050, The World Bank, <http://datatopics.worldbank.org/what-a-waste/>

<sup>2</sup> IPCC Guidelines, [https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5\\_Volume5/V5\\_2\\_Ch2\\_Waste\\_Data.pdf](https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_2_Ch2_Waste_Data.pdf)

The recycling rate is defined as above for level 1.

For the disaggregation by waste stream the formula will be the same, but particular waste types will be evaluated. (Existing data on e-waste and the importance of e-waste means that it will be requested as additional sub-indicators on the Total e-waste generated and the e-waste Recycling rate

**Disaggregation:**

- By where recycling occurs (in-country and materials exported destined for recycling)
- By material type (plastics, metals, etc.) and for key groups of materials (e.g. e-waste and packaging waste)

**Treatment of missing values:**

UNSD, who conducts the data collection, validation and dissemination process via the UNSD/UNEP Questionnaire on Environment Statistics, does not make any estimation or imputation for missing values so the number of data points provided towards Level 2 (national monitoring) indicators are actual country data.

However, UNEP is considering the possibility of global modelling towards Level 1 (global monitoring) indicators.

**Regional aggregates:**

The data will be aggregated at the sub-regional, regional and global levels. For the aggregation methods, please see: [http://uneplive.unep.org/media/docs/graphs/aggregation\\_methods.pdf](http://uneplive.unep.org/media/docs/graphs/aggregation_methods.pdf).

**Sources of discrepancies:**

As mentioned, waste statistics involve a large number of national and sub-national stakeholders which may create discrepancies. To address these possible discrepancies, inter-institutional stakeholder collaboration is always encouraged.

## Data Sources

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**Description:**

Data provided by national governments, including NSOs and Ministries of Environment

**Collection process:**

The custodian agencies propose to collect national data through the UNSD/UNEP Questionnaire on Environment Statistics (waste section). UNSD carries out extensive data validation procedures that include built-in automated procedures, manual checks and cross-references to national sources of data. Communication is carried out with countries for clarification and validation of data. Only data that are considered accurate or those confirmed by countries during the validation process are included in UNSD's environment statistics database and disseminated on UNSD's website.

Additionally, data from the Basel Convention reporting may also be sent to countries for their consideration for SDG reporting.

Data for OECD and European Union countries are collected through the biennial OECD/Eurostat Joint Questionnaire on the State of the Environment that is consistent with the UNSD/UNEP Questionnaire, so data are comparable. (<https://unstats.un.org/sdgs/tierIII-indicators/files/Tier3-12-05-01.pdf>.)

## Data Availability

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**Description:**

All countries that reply to the questionnaire.

**Time series:**

The UNSD/UNEP Questionnaire on Environment Statistics is sent every 2 years requesting annual data and the time series will be maintained.

## Calendar

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**Data collection:**

The UNSD/UNEP Questionnaire on Environment Statistics is sent every 2 years.

**Data release:**

First SDG reporting cycle: 2020

## Data providers

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National Statistical Systems

## Data compilers

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UNSD and UNEP (and UNU for e-waste)

## References

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**URL:**

United Nations Statistics Division (UNSD) and United Nations Environment Programme Questionnaire on Environment Statistics (waste section). Available at:

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

**References:**

Measuring Waste in the Context of the SDGs (UNEP, forthcoming)

## Related indicators

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Indicators 11.6.1, 12.4.2, 12.3.1(a)