

Indicator 8.4.1

Indicator, Target, and Goal

Indicator 8.4.1 Material Footprint, material footprint per capita, and material footprint per GDP (repeat of 12.2.1)

Target 8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead.

Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

Definition, concepts, and grounds

○ Definition

Material Footprint, material footprint per capita, and material footprint per GDP

○ Concepts

Material Footprint (MF) :

Material Footprint (MF) is the attribution of global material extraction to domestic final demand of a country.

○ Grounds and interpretations

Same as United Nations SDG indicator metadata.

Data source type and data collection method

Domestic extraction of materials :

- Ministry of the Environment: Statistics listed in the columns of fossil fuels, metallic minerals, non-metallic minerals, agricultural-forestry-and-fishery products, and agricultural non-edible parts of "Domestic resources" in the Table 2 of *The Figure of Material Flow in Japan and Explanation of the Items that Constitute the Material Flow*

Raw material equivalent of imports/raw material equivalents of exports:

- Ministry of the Environment: Statistics listed in the columns of fossil fuels, metallic minerals, non-metallic minerals, agricultural-forestry-and-fishery products, agricultural non-edible parts and import of "② input of materials such as raw materials" and "⑤ Export" in the Table 2 of *The Figure of Material Flow in Japan and Explanation of the Items that Constitute the Material Flow*
- Ministry of Internal Affairs and Communications: *Input-Output Tables for Japan(Input table)*
- Ministry of Economy, Trade and Industry: *Updated Input-Output Table*
- Eurostat: *Input data country RME tool (II-1 EU RME coefficients IMP; Coefficients for calculation of RME)*

Population :

- Ministry of Internal Affairs and Communications: *Population Estimates*

GDP :

- Cabinet Office: *Annual Report on National Accounts for 2021 (2008SNA, Benchmark year = 2015)*

Other methodological considerations

- Method of computation

Material footprint by type of raw material (tonnes) is calculated as:

$$MF = DE + RME_{IM} - RME_{EX}$$

Where:

MF : material footprint

DE : domestic extraction of materials

RME_{IM} : raw material equivalent of imports

RME_{EX} : raw material equivalents of exports

Material footprint per capita, by type of raw material (tonnes), is calculated as:

$$MF \text{ per capita} = \frac{MF}{\text{Annual average population}}$$

Material footprint per unit of GDP, by type of raw material (kilograms per constant 2015 United States dollar), is calculated as:

$$MF \text{ per GDP} = \frac{MF}{\text{GDP in constant 2015 United States Dollars}}$$

United Nations Environment Programme, 2023, shows three types of methods for calculation of material footprint indicators: ①Top-down approach: (input-output analysis) , ②Bottom-up approach: material intensity coefficients, and ③Hybrid approaches: complementing input-output analysis with coefficients. ③Hybrid approaches are used to estimate material footprint in Japan. See Kovanda and Weinzettel 2012 for the formula for the ③Hybrid approaches.

Raw material equivalents (RME) mean the method to estimate the amount of upstream material requirements to produce direct imports and exports.

Detailed data aggregation

None

References

Schoer, K., J. Weinzettel, J. Kovanda, J. Giegrich, and C. Lauwigi. 2012. *Raw Material Consumption of the European Union – Concept, Calculation Method, and Results*. *Environmental Science & Technology*, 46(16), 8903–8909.

United Nations Environment Programme, 2023, *The use of natural resources in the economy A Global Manual on Economy-Wide Material Flow Accounting*

<<https://seea.un.org/file/19612/download?token=4e4BrthJ>>

United Nations Department of Economic and Social Affairs 2022, SDG indicator metadata (Harmonized metadata template - format version 1.1)

<https://unstats.un.org/sdgs/metadata/files/Metadata-08-04-01.pdf>

Ministry of the Environment, Japan: *The Figure of Material Flow in Japan, Explanation of the Items that Constitute the Material Flow (in Japanese)*

<https://www.env.go.jp/content/900532601.pdf>

Data Provider:

Ministry of the Environment, Japan

Policy related Ministry:

Ministry of the Environment, Japan

International organization:

United Nations Environment Programme