Compilation of EW-MFA

SDG and Environment Statistics Unit, 2025
Early Warning and Assessment Division, UNEP

Table A- Domestic Extraction (DE)

Domestic extraction includes four groups of extracted materials:

A.1 Biomass
A.2 Metal ores
A.3 Non-metallic minerals
A.4 Fossil fuels.

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Table A. Domestic Extraction

Biomass: all biomass of vegetable origin extracted by humans and their livestock, capture of wild fish, and the biomass of hunted animals. Biomass of livestock and livestock products (e.g. milk, meat, eggs, hides) is not accounted for as domestic extraction but considered as flows within the economic system.

Metal ores: only that portion of the excavated rock which is to be processed in some way, to obtain the desired metals, should be counted. This means that any soil or rock which is simply excavated and moved, to gain access to the metal ore itself, should not be counted as ore..

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Table A. Domestic Extraction

Non-metallic minerals: If accounted by mass, the vast majority of the materials of this category are sand, gravel, and clay used for construction, while the remainders are used either as decorative stones or for chemicals and fertilizers. Certain materials can be used for either industrial or construction purposes, since there is no clear and distinct differentiation between the two.

Fossil fuels: Fossil fuels are materials formed from biomass in the geological past and comprise solid, liquid and gaseous materials: coal and peat, crude oil and natural gas, oil shale and tar sands.

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Table B- Imports of materials and Table C. Exports of materials

The categories have been chosen to correspond as closely as possible with the categories used for domestic extraction, but there are a few additional categories.

This is to allow the capture of additional goods which have been processed to some degree, and even some manufactured goods where they are dominated by specific material categories. For example, where DE only accounts for wood as it is extracted from the environment, the trade account will seek to include processed wood and wood products.

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Table B- Imports of materials and Table C. Exports of materials

The tonnages of materials required to produce a product, but which are not a physical part of the final traded product, are not accounted for in physical trade.

Materials which enter and leave a country merely en route to their destination are known as transit flows and should not be counted in either import or export accounts.

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Table D. Material outflows

Outputs to the environment are summarized as domestic processed output (DPO) and include five major categories:

D.1. Emissions to air;
D.2. Waste landfilled (uncontrolled);
D.3. Emissions to water;
D.4. Dissipative use of products;
D.5. Dissipative losses.

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Table D. Material outflows

D.1. Emissions to air are gaseous or particulate materials released to the atmosphere from production or consumption processes in the economy.

D.2. Waste landfilled (uncontrolled): Only waste disposed of outside of controlled sites should be accounted for, i.e. uncontrolled land deposits or “wild” dumping. However, while the distinction between controlled and uncontrolled landfills is accepted on conceptual grounds, there are reasons to take account of controlled landfills as a memorandum item.

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Table D. Material outflows

D.3. Emissions to water include substances and materials released to natural waters by human activities after or without passing wastewater treatment. This category more or less includes outflows from municipal or industrial sewage treatment plants. The only exception is category D.3.5. “dumping of materials at sea”. Material flows comprised as “dumping at sea” can be differentiated into land-based and sea-based litter.

D.4. Dissipative use of products is related to some materials that are deliberately dissipated into the environment because dispersal is an inherent quality of product use or quality and cannot be avoided: fertilizer, sewage sludge, compost, pesticides, seeds, etc. Organic fertilizer (manure) spread on agricultural land should be reported in dry weight. Hence, data with water content should be converted to dry matter. The same holds true for sewage sludge and compost.

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Table D. Material outflows

D.5. Dissipative losses are unintentional outputs of materials to the environment resulting from abrasion, corrosion, and erosion at mobile and stationary sources, and from leakages or accidents during the transport of goods. Many of these flows have never been quantified. It is recommended that only those data that can be provided with justifiable effort be completed. The air emission submissions to the UNECE Convention on Long Range Transboundary Air Pollutants (CLRTAP) are the most significant data source for this item. The database includes information on emissions in road transport from automobile tyre and brake wear (NFR code: 1A3bvi) and from automobile road abrasion (NFR code: 1A3bvii).

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Table E. Balancing items

A main advantage of organizing environmental statistics employing a material flow accounting approach including inputs and outputs is the ability for coherence checks of individual data sets by establishing a material balance of inputs and outputs.

The balancing equation can take the following form:
DE + Imports + Balancing items (input side) = Exports + DPO + Net Additions to Stock (NAS) + Balancing items (output side),

where NAS includes Intermediate consumption + Final consumption + Accumulation (or Stock).

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Table E. Balancing items

Balancing items are defined as the additional inputs and outputs necessary to establish a material balance.

On the input side, these can be:
- Oxygen for combustion processes,
- Oxygen for respiration of human and livestock; bacterial respiration from solid waste and wastewater,
- Nitrogen for Haber-Bosch process,
- Water requirements for the domestic production of exported beverages.

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Table E. Balancing items

On the output side, balancing items are comprised of:

- Water vapor from combustion,
- Gases from respiration of humans and livestock, and from bacterial respiration from solid waste and wastewater,
- Excorporated water from biomass products.

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Table F. Headlines indicators

Domestic Extraction (DE) measures the flows of materials that originate from the environment and that physically enter the economic system for further processing or direct consumption. They are converted into or incorporated in products, and are usually of economic value, i.e. they are "used" by the economy.

DE = DE (A.1 Biomass) + DE (A.2 Metal ores) + DE (A.3 Non-metallic minerals) + DE (A.4 Fossil fuels)

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Table F. Headlines indicators

Direct Material Input (DMI) measures the direct input of materials used in the economy, i.e. all materials which are of economic value and are used in production and consumption activities. DMI equals domestic extraction used plus imports.

DMI = DE + Imports

Domestic Material Consumption (DMC) measures the total amount of material directly used in an economy (i.e. excluding indirect flows).

DMC = DMI - Exports

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Table F. Headlines indicators

Physical Trade Balance (PTB) reflects the physical trade surplus or deficit of an economy. It is defined as imports minus exports.

PTB = Imports - Exports

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Table F. Headlines indicators

Domestic Processed Output (DPO) measures the total weight of materials extracted from the domestic environment or imported, which after use in the economy flow back to the environment. These flows occur at the processing, manufacturing, use, and final disposal stages of the production-consumption chain. Included are emissions to air, waste landfilled (uncontrolled), emissions to water, dissipative use of products and dissipative losses.

DPO = Emissions to air + Waste landfilled (uncontrolled) + Emissions to water + Dissipative use of products + Dissipative losses

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Table F. Headlines indicators

Net additions to stock (NAS) measures the difference between inputs and outputs.

NAS = DE + Imports + Balancing items (input side) - Exports - DPO - Balancing items (output side)

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DATA SOURCES ANALYSIS

1. Review the required data for EW-MFA
2. Identify the institutions
3. Identify the available data
4. Choose of data

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DATA SOURCES ANALYSIS

REQUIRED DATA	INSTITUTION	AVAILABLE DATA
BIOMASS		
METAL ORES		
NON-METALLIC MINERALS		
FOSSIL FUELS		
IMPORTS		
EXPORTS		
AIR EMISSIONS		
WASTE LANDFILLED (UNCONTROLLED)		
EMISSIONS TO WATER		
USE DISSIPATIVE OF PRODUCTS		
DISSIPATIVE LOSSES		

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Thank you

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