



## Exercise 4d.1: Assigning macro-level resource use indicators

Estimated time requirement: 20 minutes

### Introduction

Indicators are important instruments for monitoring and evaluating the progress made towards resource efficiency and circular economy. While indicators can be used at various levels (micro, meso, macro), many countries have started to define metrics for measuring resource use at the national level. Resource use indicators are essential to conducting Material Flow Analysis (MFAs), which typically distinguishes between 6 different kinds of metrics: total material requirement (TMR), total material input (TMI), direct material input (DMI), domestic material consumption (DMC), total domestic output (TDO) and total material output (TMO). For definitions, please have a look at table 1. When measuring a country's GDP in relation to its DMC, we can derive an indication about the degree of resource productivity and economic decoupling. To account for the indicators various data sources can be used. Most material flows are statistically observed, while other, indirect flows associated to exports or imports must be estimated. After completing this exercise, you will be familiar with the terminology of resource use indicators and with possible data sources to determine material flows.

### Structure of exercise

| Part | Task  | Time   |
|------|---|--------|
| 1    | Please form groups of 2-3 people and examine the template on the next page. Based on the definition presented in table 1, please allocate the 6 macro-level indicators (TMO, TMI, DMC, TDO, DMI, TMR) to the slots 1-5 in figure 1 on worksheet 1.                            | 10 min |
| 2    | Material inputs and output can be accounted for by using various data sets. Examples are listed on worksheet 2. Allocate the examples of data sets to each category: i) material inputs and ii) material outputs. Add two additional data sets to each category respectively. | 10 min |

### Background information

| Indicator                           | Definition  |
|-------------------------------------|---|
| Total material requirement (TMR)    | = Indirect flows of imports + imports + used domestic extraction + unused domestic extraction |
| Total material input (TMI)          | = Total material requirement - indirect flows of imports                                      |
| Direct material input (DMI)         | = Total material input - unused domestic extraction   |
| Domestic material consumption (DMC) | = Direct material input - exports   |
| Total domestic output (TDO)         | = Domestic material consumption + unused domestic extraction                                  |
| Total material output (TMO)         | = Total domestic output + exports   |



A country's **resource productivity index** can provide insights into the degree of **economic decoupling**:

- **Consumption-based** resource productivity index =  $GDP/DMC$
- **Production-based** resource productivity index =  $GDP/DMI$

Figure 1: Definitions of resource use indicators applied in MFAs



Worksheet 1

Total Material Output (TMO)      Total Material input (TMI)      Domestic Material Consumption (DMC)      Total Domestic Output (TDO)      Direct Material Input (DMI)      Total Material Requirement (TMR)

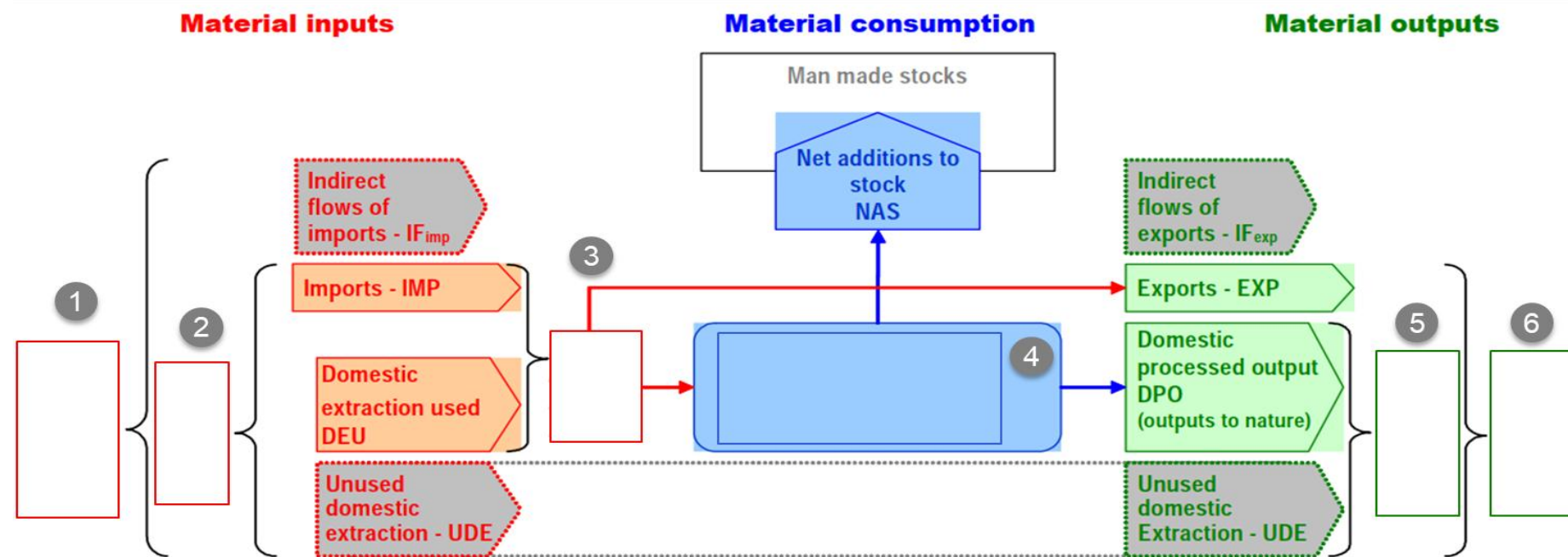


Figure 2: Exercise template for allocation of resource use indicators (adapted from: <https://www.oecd.org/environment/indicators-modelling-outlooks/MFA-Guide.pdf>)



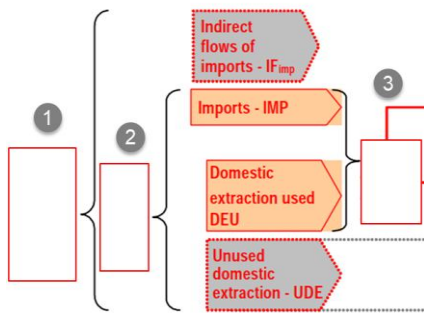
### Worksheet 2

### Data Sources

|  |   |   |
|--|---|---|
| Agricultural statistics<br>(cereals, vegetables etc. produced) | Environmental accounts for air<br>emissions | Energy statistics and balances<br>(extraction of fuels) |
| Energy statistics<br>(emission inventories)                    | Forestry statistics<br>(timber harvested)   | Agricultural statistics for fertilizer<br>use           |

### Data Sources for Material Input:

#### Material inputs




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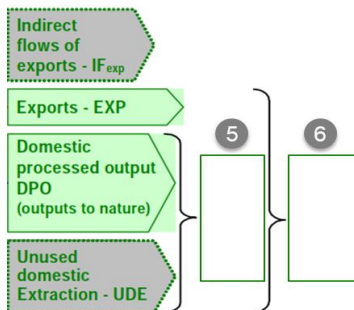
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### Data Sources for Material Output:

#### Material outputs




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