

ENV 501 / GR A3 30

Material Flow Analysis and resource management

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Last week

- Course introduction
- Industrial ecology as the research field of MFA
- Overview of methodological approaches

Course outline

8:15 - 9:00 and 9:15 - 10:00

13:15 - 14:00

14:15 - 15:00

Block I:
EW-MFA
global /
national

W1 - Sep 12

Introduction to the course and general concepts

All

Exercise

Project

W2 - Sep 19

EW – MFA and EW – MFA in different countries

FMC

Exercise

Project

W3 - Sep 26

EW – MFA in the Swiss context, Urban Metabolism

External Guest –
Florian Kohler

Exercise

Project

W4 - Oct 03

EW – MFA in the Swiss context: Cantons and Circular Economy

FMC

Exercise

Project

W5 - Oct 10

The Service-Stock-Flows Nexus

CRB

Exercise

Project

W6 - Oct 17

Dynamic MFA

External Guest –
Stefan Pauliuk

Exercise

Project

Oct 24

Autumn break

Block II:
MFA
regional /
urban

W7 - Oct 31

Spatial MFA

FMC

Exercise

Project

W8 - Nov 07

Input-Output Analysis and Material Flow Cost Accounting

External Guest –
Vincent Moreau

Exercise

Project

W9 - Nov 14

MFA and Uncertainty

External guest –
Stefan Pauliuk

Exercise

Project

W10 - Nov 21

Case studies: Waste management in Indonesia / Critical Raw Materials in the Swiss context

GF & FMC

Exercise

Project

W11 - Nov 28

Social Metabolism

CRB

Exercise

Project

W12 - Dec 05

Agent-based model

CRB, FMC, MAH,
SLC

Past exam

Project

W13 - Dec 12

Group Project Presentation

CRB, FMC, MAH

Project

Project

W14 - Dec 19

Group Project Presentation

CRB, FMC, MAH

Project

Project

Block III:
Social
sciences
and
public
policy



Content of lecture

- MFA and EW-MFA: definitions
- Main material categories in EW-MFA
- EW-MFA indicators
- Data Sources
- How to perform an EW-MFA
- Cross-country comparisons

Material Flow Analysis (MFA) – Definition (recap)

- Material Flow Analysis (MFA) is the systematic study of **physical flows of natural resources and materials** into, through and out of a given system (usually the economy).
- It is based on accounts in **physical units**, and uses the **principle of mass balancing** to analyze the **relationships between material flows** (including energy), **human activities** (including economic and trade developments) and **environmental changes**.
- The system is defined in **space** and **time**.
- **Connects** the sources, pathways and sinks of a **material**.

MFA in practice – Applications (recap)

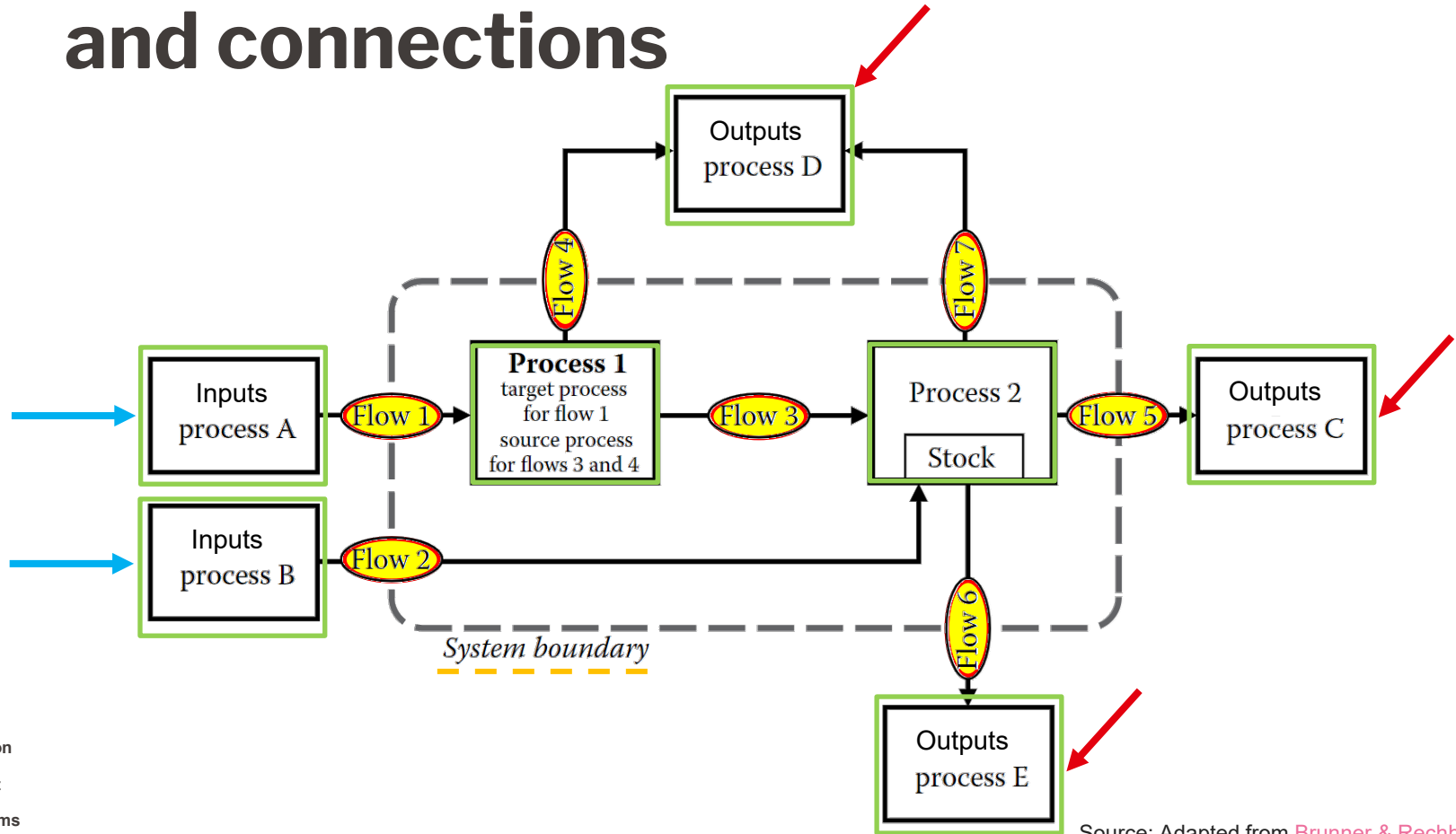
“You can’t manage what you can’t measure.”

- Urban planning
- Energy planning
- Economic and environmental performance
- Development of industrial symbiosis and eco-industrial parks
- Closing material loops and circular economy
- Pollution control
- Material and energy supply security

MFA in practice – Applications (recap)

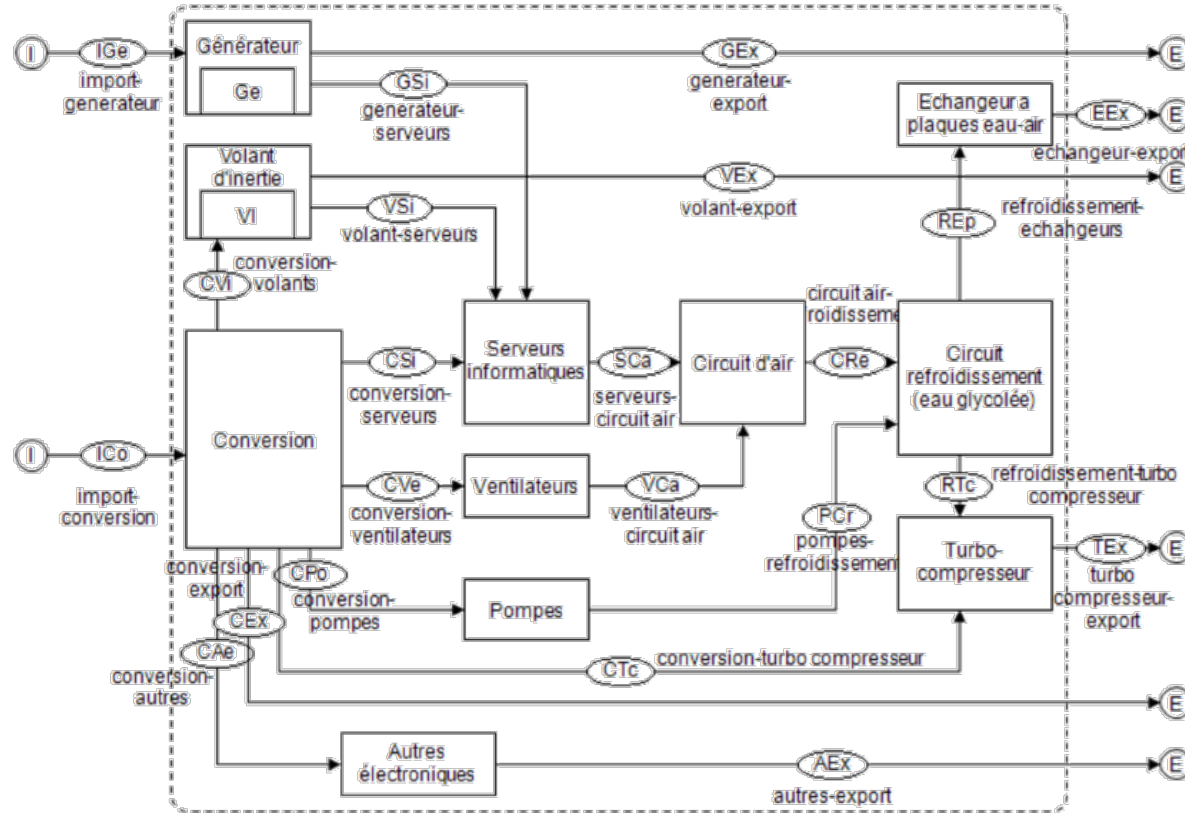
- **Early detection** of harmful/useful material accumulation or depletion in anthropogenic/natural subsystems.
- **Prediction of future** quantities in anthropogenic/natural subsystems.
- **Identification** of the need for action in the areas of environmental, resource, waste and policy management.
- **Evaluation** of the effectiveness of current/planned measures.
- **Design** of ecologically-optimized products, processes and systems (e.g. green design, eco-design, circularity).

MFA – Processes and connections



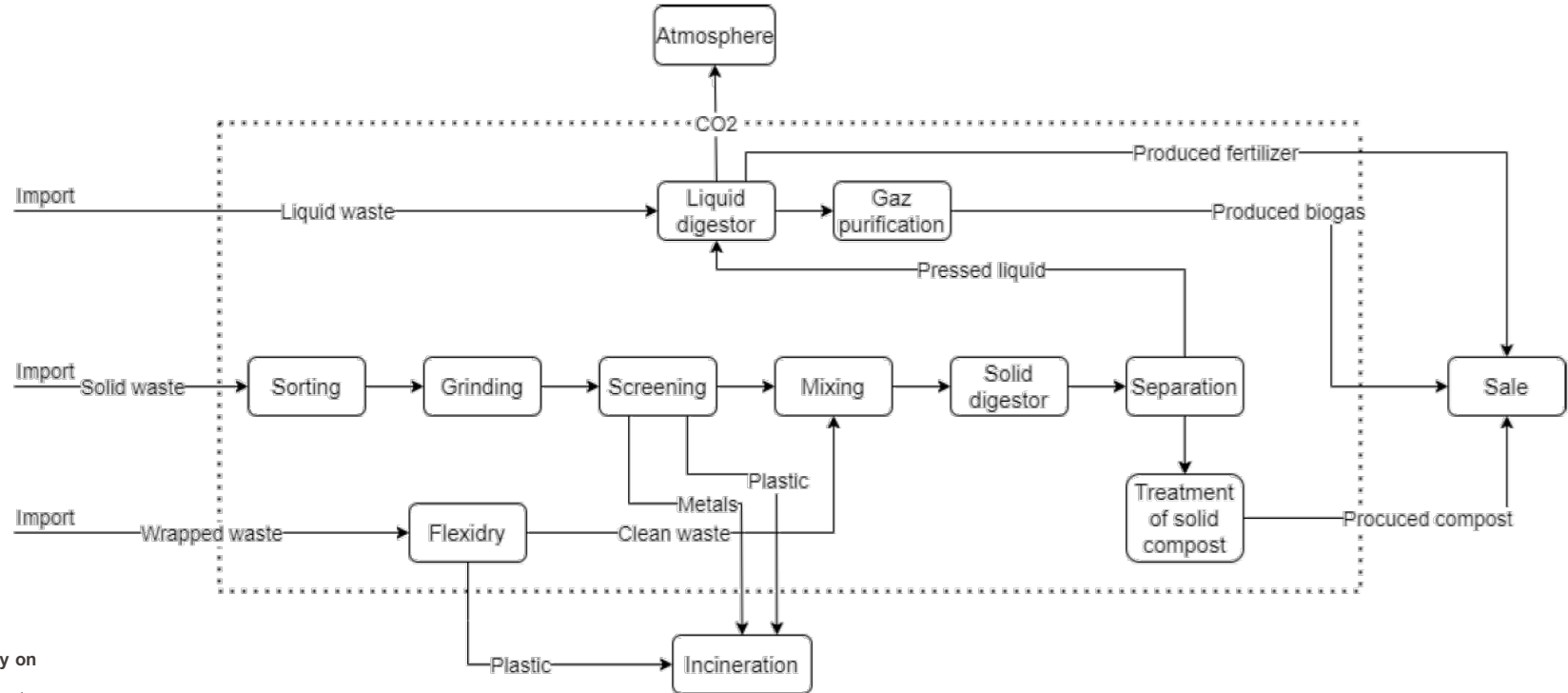
MFA –Processes and connections

Data center in Switzerland

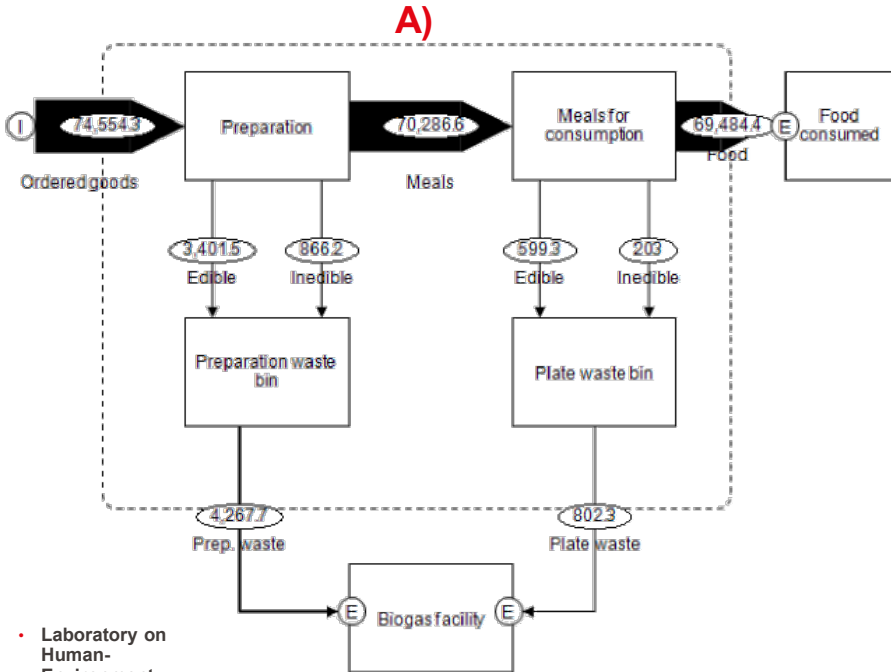


MFA – Processes and connections

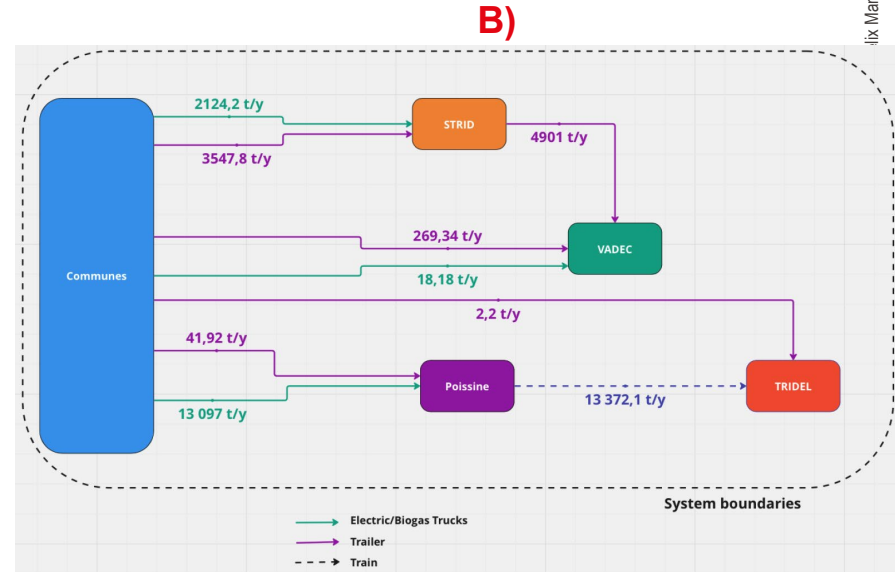
Waste processing plant in canton Vaud



MFA – Processes and connections



A) Flows of food at EPFL
B) Waste facilities in Switzerland



An aerial photograph of a desert landscape. A light-colored, winding road or path cuts through the sandy terrain. In the foreground, there are dark, rocky outcrops and some sparse, low-lying green shrubs. The background shows a vast, open desert valley under a bright sky.

Introduction to Economy-wide MFA (EW-MFA)

Definition, components, indicators

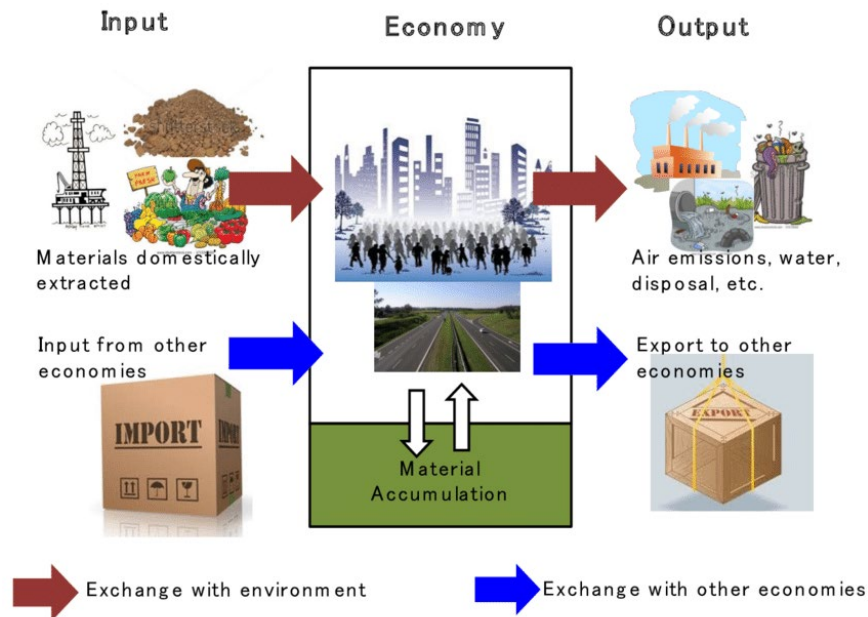
MFA – Different approaches

							EW-MFA
Main objective	Substances	Materials	Products, Goods and Services		Businesses		Countries, Regions
	e.g., chemical elements or compounds (Cd, Cl, Pb, Zn, Hg, N, P, C, CO ₂ , CFC)	e.g., raw materials and semi-finished goods, energy carriers, metals (ferrous and nonferrous), sand and gravel, timber, plastics	e.g., batteries, transportation, packaging		e.g., offices, plants, small and medium sized enterprises, multi-national enterprises		e.g., aggregated mass of materials and related mixed or selected materials
Type of analysis	Substance Flow Analysis	Material Flow Analysis	Life Cycle Assessment		Business level Material Flow Analysis		Economy-wide Material Flow Analysis
Type of analytical tools	Substance Flow Accounts	Material Flow Accounts, Industrial, Urban or Regional Metabolism	Life-Cycle Inventory, Impact Assessment (ISO 14040)	Lif-Cycle Costing	Material Flow Cost Accounting (ISO 14051)	Business Material Flow Accounting	Physical Input-Output Tables, NAMEA approaches
							Economy-wide Material Flow Accounts

Source: [Moreau and Massard, 2017](#)

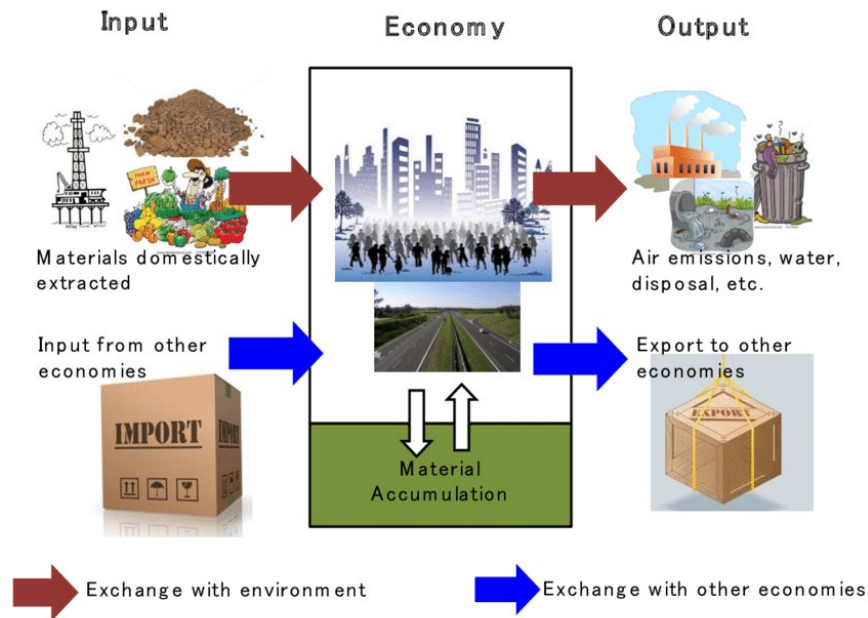
Economy-wide MFA (EW-MFA)

- ... accounts for all material flows (**inputs and outputs**) in national economies (socio-economic metabolism)
- ... describes the **interactions** of the domestic **economy** with the natural **environment** and the **rest of the world economy**



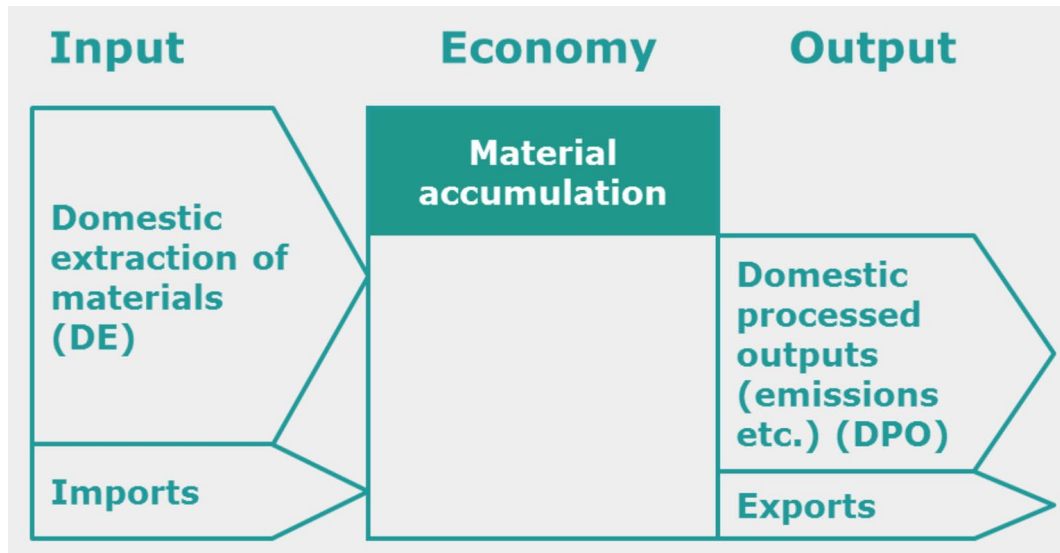
Economy-wide MFA (EW-MFA)

- ... represents **national accounts in physical** instead of monetary terms
- ... compatible with other national accounts (e.g. financial), enabling integrated analyses of environmental and economic aspects.
- ... part of official statistics, assessing the state of a nation's natural resources



Economy-wide MFA (EW-MFA)

Material inputs Economy and Society Material outputs

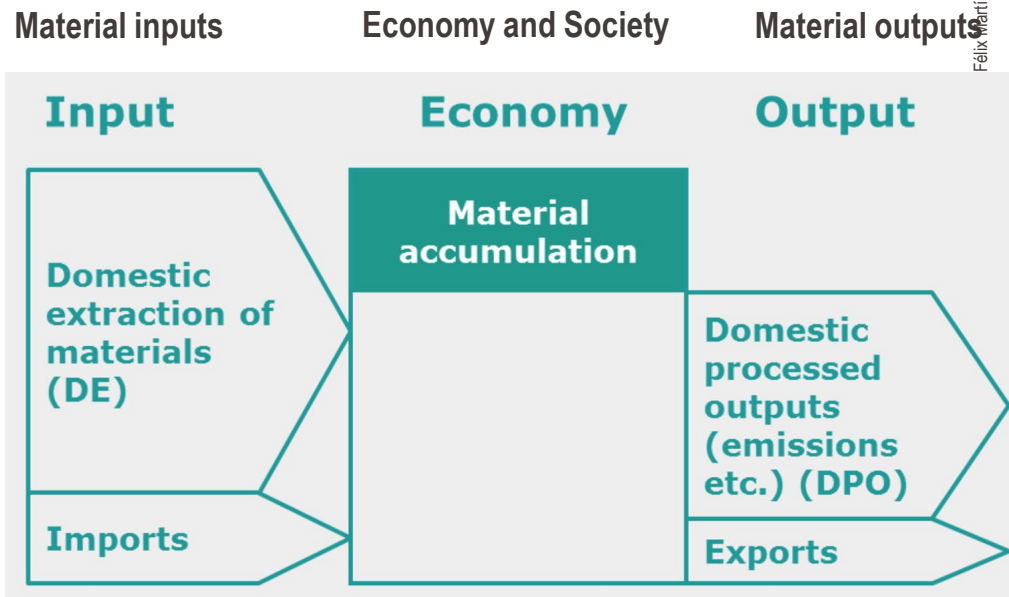


Material flows within the economy are not clearly represented in EW-MFA
Water and electricity flows are not represented as well

Economy-wide MFA (EW-MFA)

Materials classified in major categories:

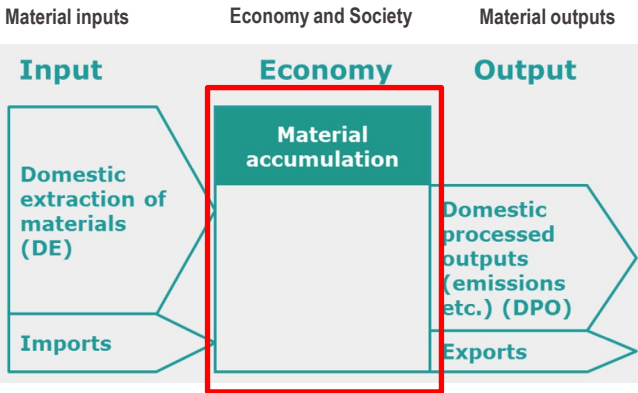
- **Fossil energy carriers**
 - Coal, peat, other solid energy resources
 - Oil and gaseous energy products
 - Products mainly from fossil energy
- **Biomass**
 - Crops, Fodder, fish
 - Timber
 - Products mainly from biomass
- **Metal ores**
 - Iron ores
 - Products mainly from metals
- **Non-metallic minerals**
 - Non-metallic minerals, raw and processed
 - Products mainly from non-metallic minerals



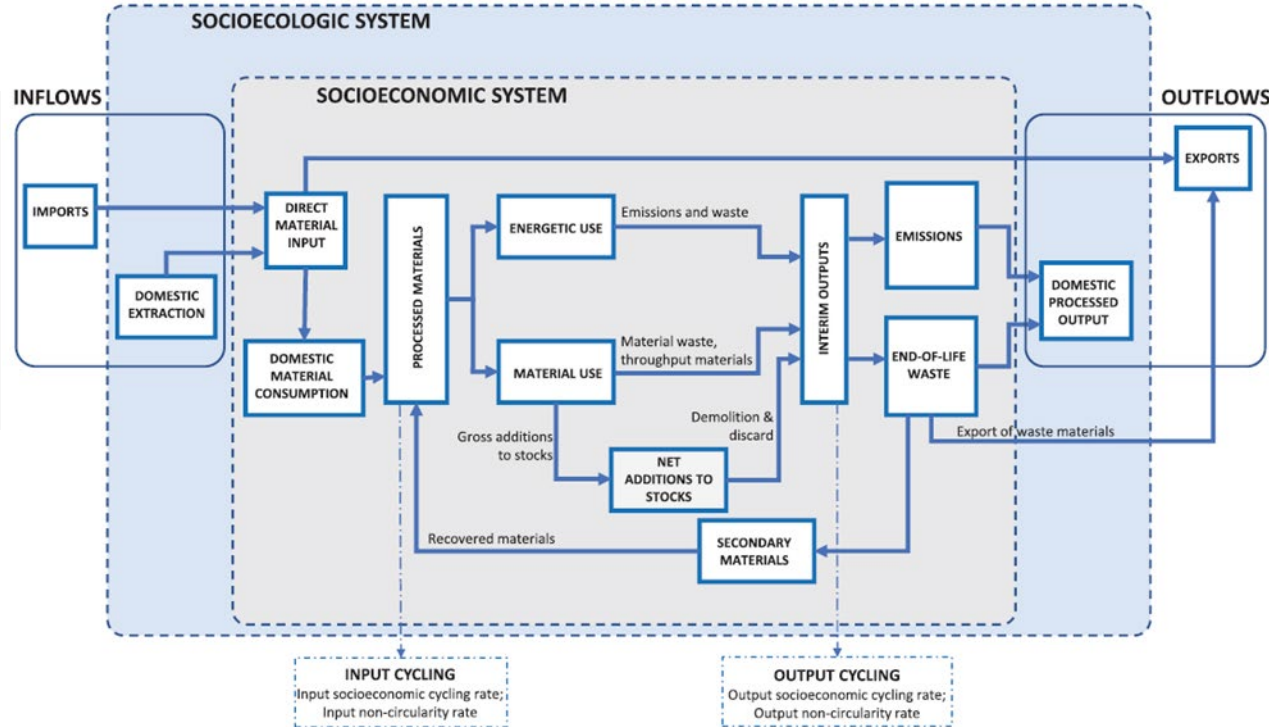
Economy-wide MFA (EW-MFA)

- **Fossil energy carriers**
 - Strategic relevance for industrial processes
 - Scarcity, Price fluctuations, dependency, emissions, climate change
- **Biomass**
 - Energetic use (food-feed-fuel) or Material use (e.g., construction)
 - Soil fertility, environmental degradation
- **Metal ores**
 - Strategic relevance for industrial processes
 - Scarcity (Critical Raw Materials), price fluctuation, pollution
- **Non-metallic minerals**
 - Strategic relevance for construction and industry
 - Scarcity, closely linked with energy flows

Economy-wide MFA (EW-MFA)



Note: Calculations also possible in **Raw Material Equivalents** = domestic extraction of natural material inputs that were necessary to produce the respective traded goods



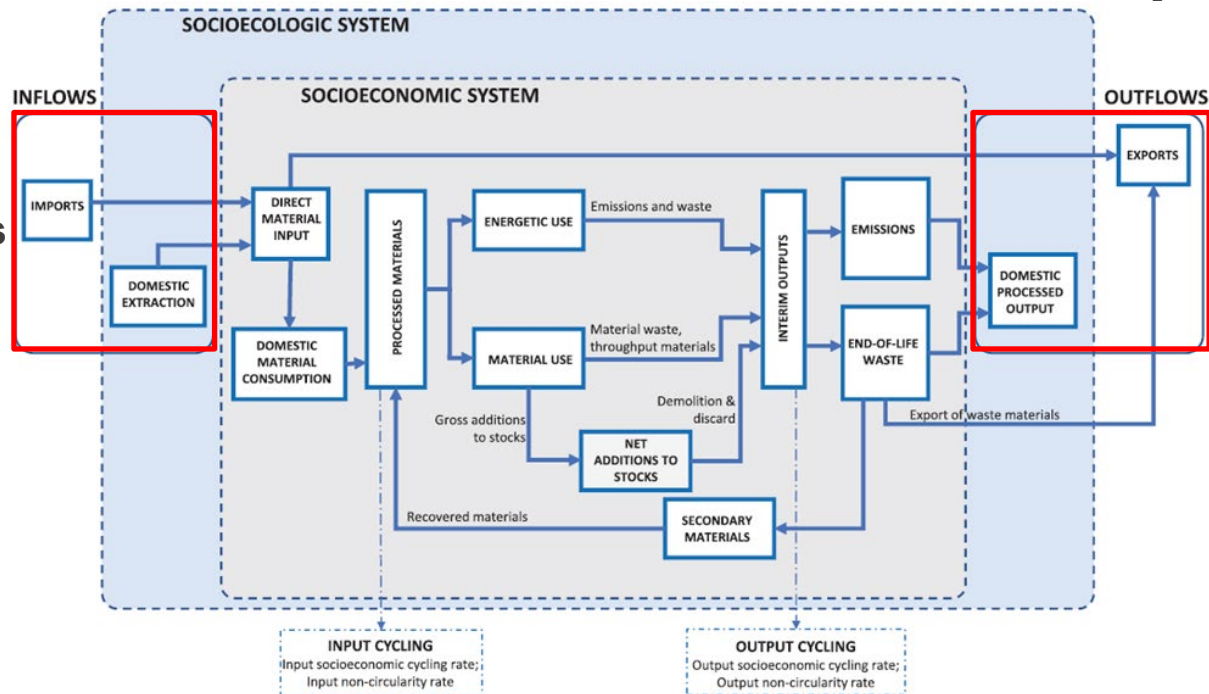
Basic flow types

- Domestic extraction (DE)
- Domestic processed output (DPO)
- Imports (IMP)
- Exports (EXP)

Flows types are basis for indicators

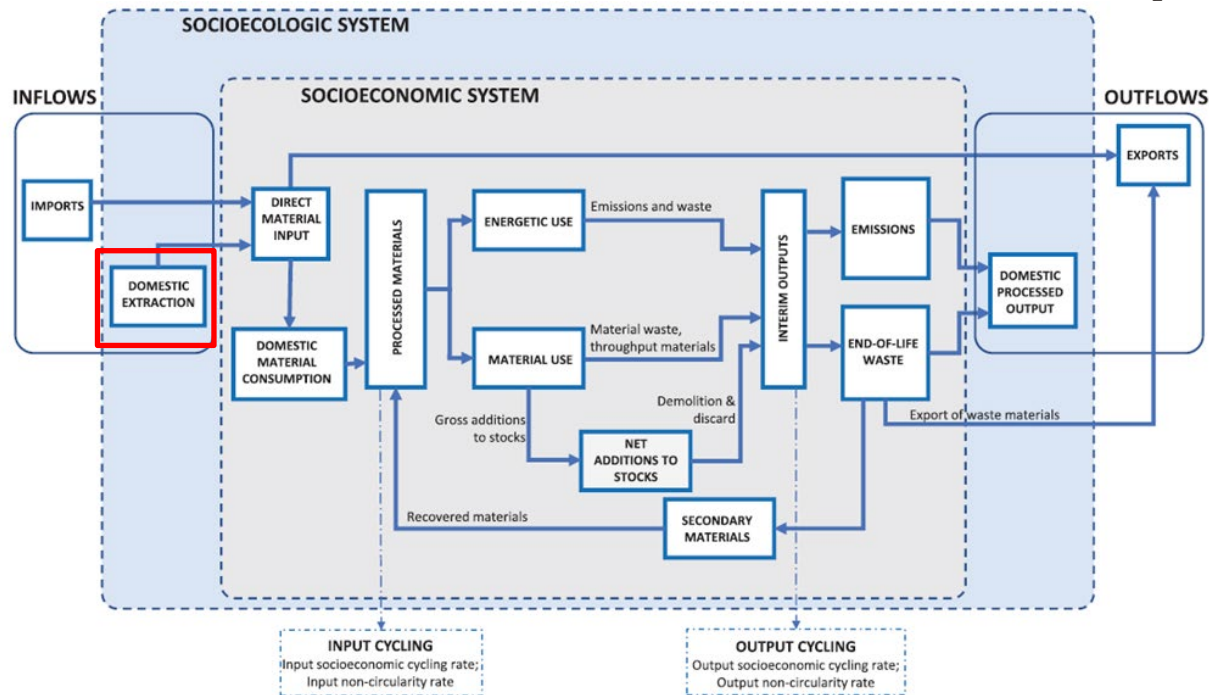
- Direct material input (DMI) = $DE + IMP$
- Domestic material consumption (DMC) = $DE + IMP - EXP$
- Physical trade balance (PTB) = $IMP - EXP$
- Net additions to stock = $DMI - DPO - EXP$

Laboratory on
Human-
Environment
Relations in
Urban Systems

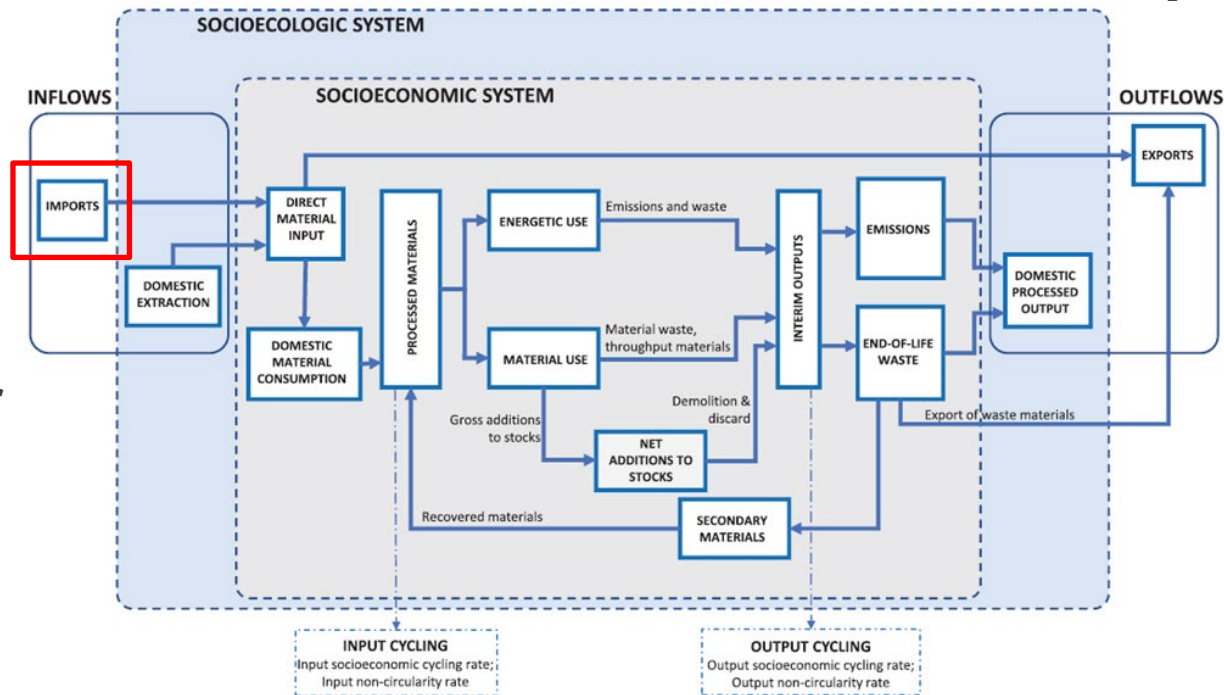


Domestic extraction (DE)

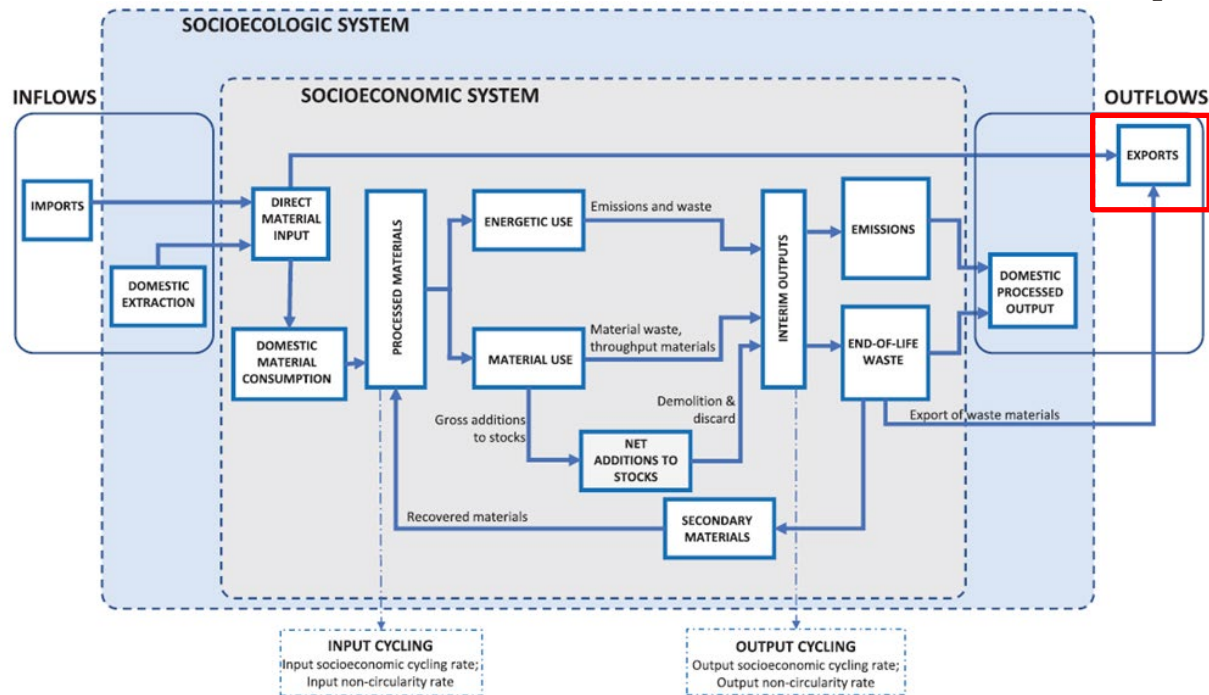
- All raw materials that are extracted from the domestic environment and further used in production processes (excluding air and water).



- Imported and traded goods at all stages of processing, from raw materials to highly processed products.
- Products are allocated to specific material categories, e.g. imported car produced from **steel** as the main component is allocated to **metal ores**.



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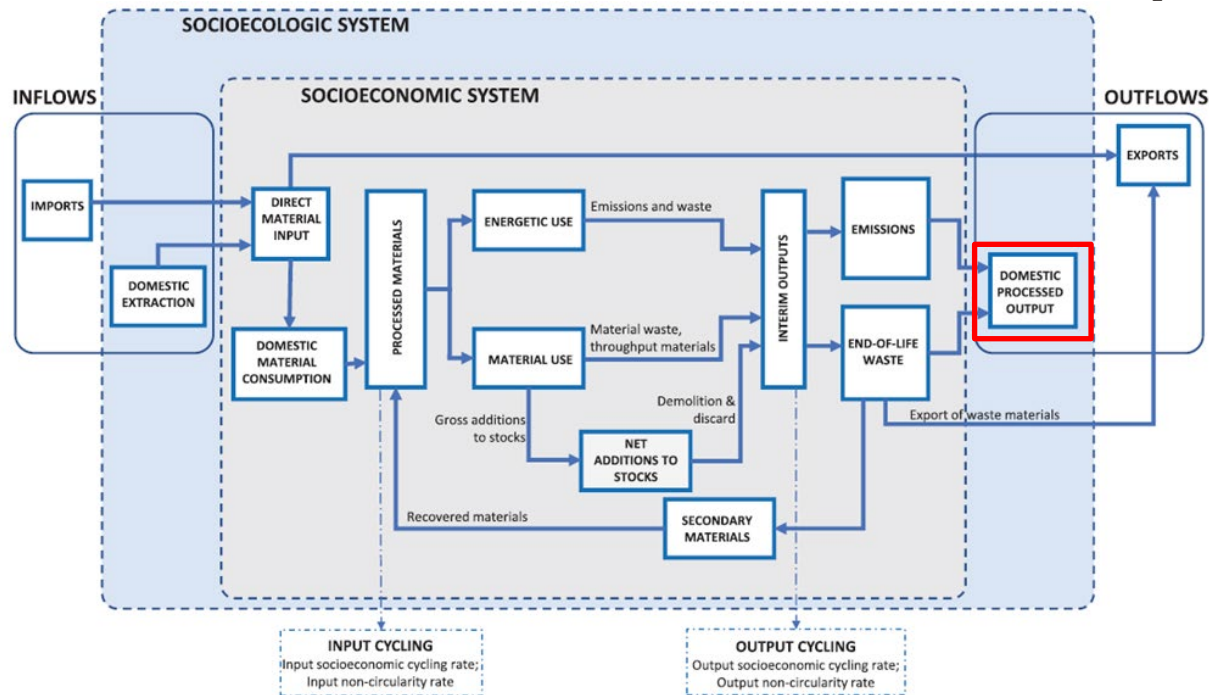


Context of use: DE, IMP, EXP

- The **domestic extraction** data can be useful information for a **national resource** conservation policy.
- **Import** and **export** data can be used to **assess the physical trade balance** of a nation.
- Together with the information on extraction, the **self-sufficiency** of a nation can be assessed.
- Countries can be characterized with regard to the nature of their economy: **resource producing** or **resource consuming** nations

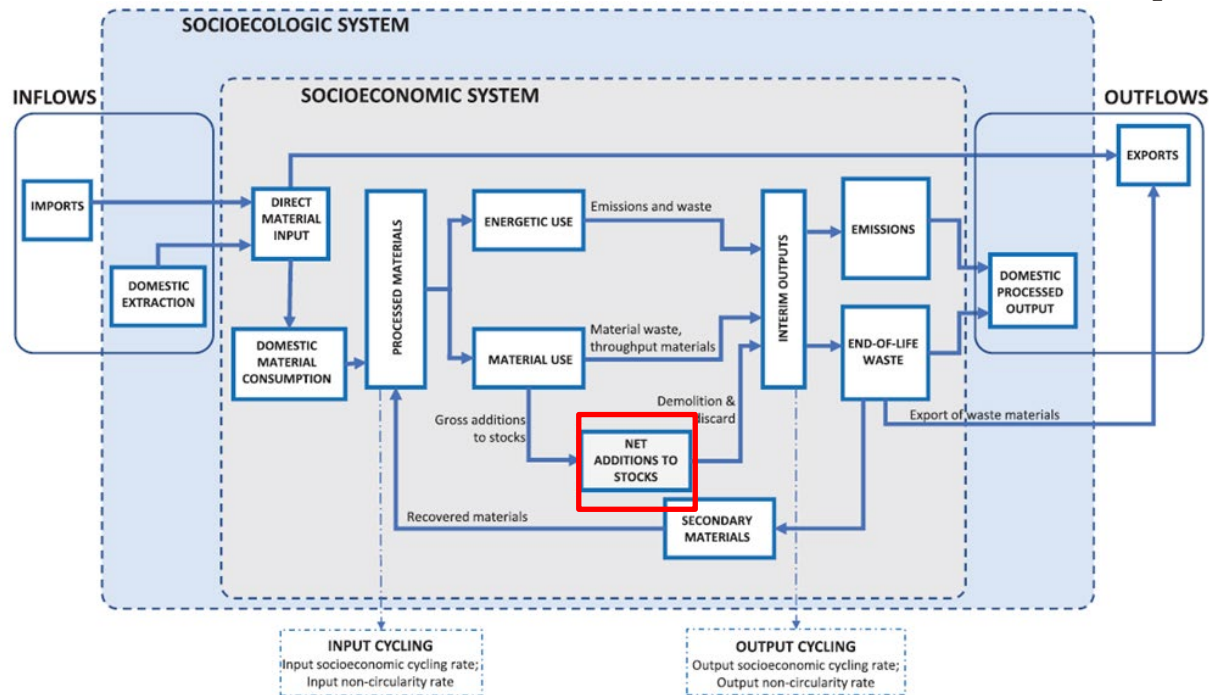
Domestic Processed Output (DPO)

- **Total mass of waste materials** generated along the value added chain, including resource extraction, processing, manufacturing use, and waste management
- Includes emissions to air, water, and landfill



Net Additions to Stocks (NAS)

- Measure of **physical growth** in an economy
- **New materials** are added to stocks (buildings, infrastructures, durable goods)
- **Old materials** are removed from stock as buildings are demolished, and durable goods disposed of (removals)



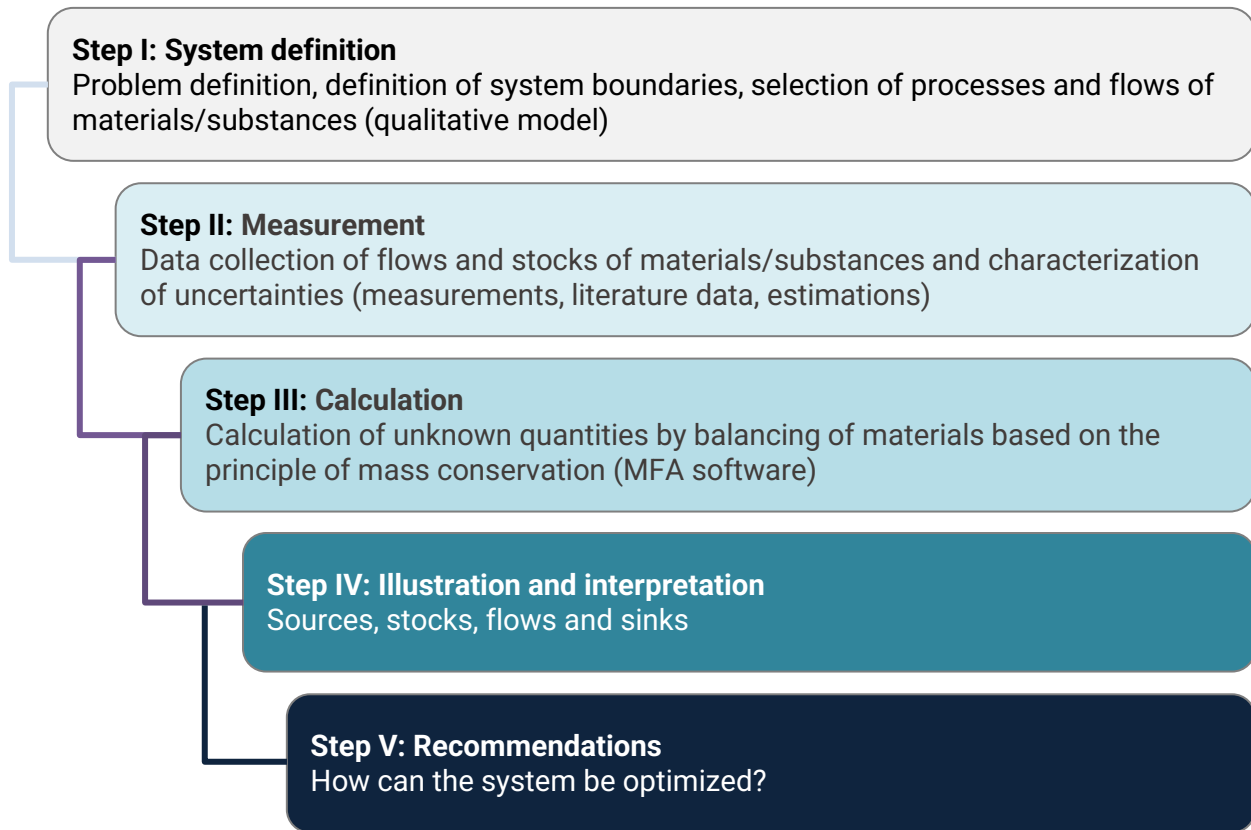
General observations

- Reminder: **Raw Material Equivalent** = domestic extraction of natural material inputs that were necessary to produce the respective traded goods
- In terms of mass weight, a **product** tends to have a relatively **lower weight** than the domestic extraction required for its production
- **Domestic extraction** basically measures **natural** inputs
- **Imports** and **exports** are **product** flows, and are therefore largely goods that have undergone at least some processing and often extensive processing.

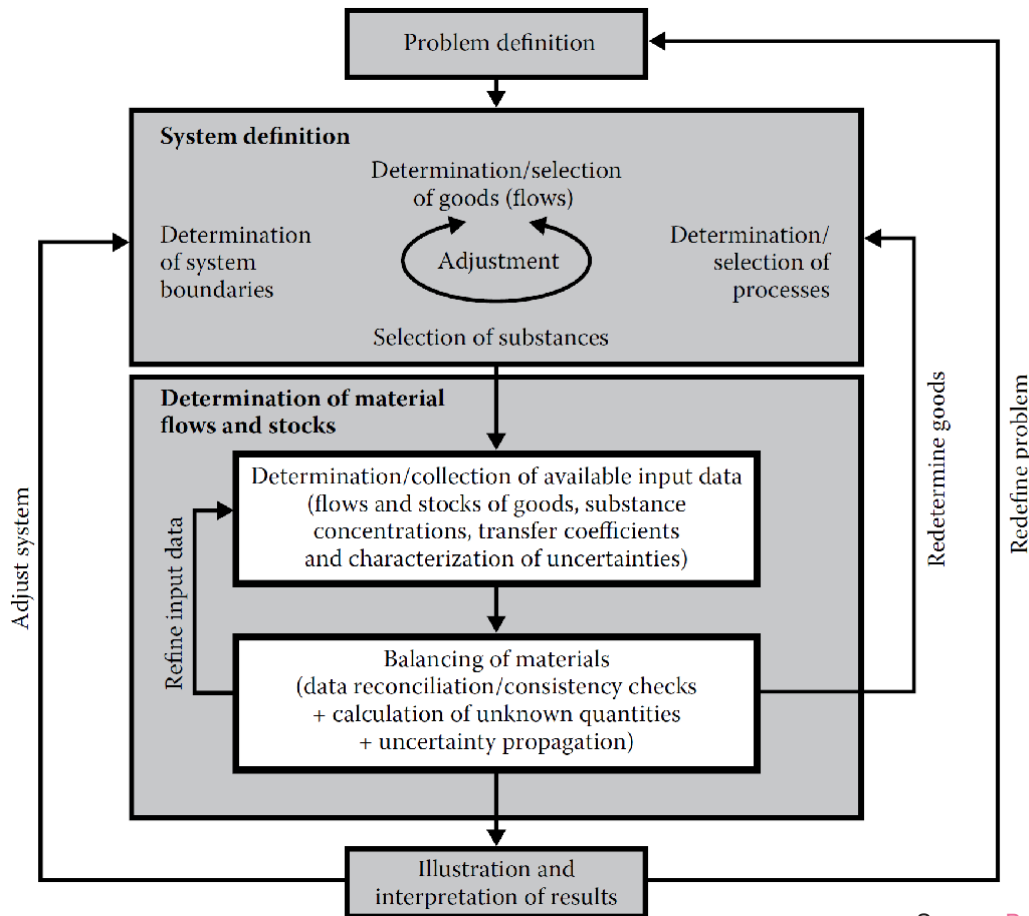
How to carry out an EW-MFA

Steps, data sources, cross-country comparisons

How to carry out an EW-MFA?



- System definition
- Data acquisition
- Calculation
- Representation and interpretation
- Recommendations



How to carry out an EW-MFA?

Formulate a precise question.

What problem should be tackled with the material flow analysis?

Define the system in space and time.

Determining the spatial and temporal boundary for material flow modelling.

Characterize the material balance system.

Which processes and material flows are relevant to the question formulated and have to be taken into account in the model?

Select material flow indicators.

Which material flow indicators are relevant for answering the question?

How to carry out an EW-MFA?

- Structure, instructions, parameters
- **Table A-D:** DE, IMP, EXP
- **Table F:** DPO
- **Table G:** Balancing items
- **Table H:** Indicators **calculated automatically** from tables
- **Compilation tools**
 - Grazed biomass, crop residues
 - Sand & gravel, clay, limestone
 - Balancing items



Enable automatic checks when closing workbook

Check the whole questionnaire

Economy-wide material flow accounts (EW-MFA)

2024 EW-MFA questionnaire

INTRODUCTION

version 21 November 2023

This is Eurostat's electronic questionnaire for the 2024 data collection on **economy-wide material flow accounts (EW-MFA)**. It includes a number of sheets – an overview is provided in sheet '**structure**'. Reporting Tables A, B, and D are based on Regulation (EU) No. 691/2011.

Please specify your country by selecting from the drop-down list

Deadline for returning back the 2024 EW-MFA questionnaire is: **30 April 2024**

The sheet '**instructions**' provides you with detailed information on filling in the questionnaire. Please address any questions to the following e-mail address:

ESTAT-MFA@ec.europa.eu

This electronic questionnaire shall be submitted to Eurostat using the **EDAMIS** reporting system (Electronic Data files Administration and Management Information System). Please ensure that the following EDAMIS parameters are entered:

Domain: **ENVDATA**

Data set: **ENVDATA_MFA_A**

Year: **2022** (which is the most recent legally mandatory reference year). Eurostat greatly appreciates receiving EW-MFA data starting from 2000 ranging up to 2022.

The eDAMIS system has been installed in all National Statistical Institutes and your local eDAMIS coordinator will give you a user-id and password.

Should you have any questions regarding data transmission, please contact your local eDAMIS coordinator or the Eurostat eDAMIS helpdesk at:

estat-support-edamis@ec.europa.eu

or call +352 4301 33213.

Please provide the **primary contact person for EW-MFA in your country** (*institution, unit, name, email, telephone*):

How to carry out an EW-MFA?



☐ Enable automatic checks when closing workbook

Economy-wide material flow accounts (EW-MFA)
2024 EW-MFA questionnaire

Check the whole questionnaire

Reset

Table of contents

Sheet	Title	Content	Status
1 intro	EW-MFA questionnaire - Introduction	General information about the EW-MFA questionnaire	<i>to be filled out (please select country and provide primary contact person)</i>
2 structure	Table of content of the EW-MFA questionnaire	Overview of this electronic EXCELworkbook	for information
3 instructions	Instructions for completing the EW-MFA questionnaire and overview of the checking rules	Instructions on how to use and fill in the questionnaire	for information
4 footnote instructions	Instructions for reporting of the footnotes	Provides instructions for SDMX compliant reporting of footnotes	for information
5 footnotes_list	List of footnotes	Please insert footnote texts for each footnote symbol you use in tables A to I	for information
6 Table_A	Domestic extraction (DE)	Table A records material flows from the environment into the economy in a detailed breakdown by type of material	<i>to be filled out</i>
7 Table_B	Imports - total imports (intra- and extra-EU imports)	The physical trade tables (Tables B and D) record the imports and exports of products in thousand tonnes and grouped by materials. Table B accounts for total imports	<i>to be filled out</i>
8 Table_D	Exports - total exports (intra- and extra-EU exports)	The physical trade tables (Tables B and D) record the imports and exports of products in thousand tonnes and grouped by materials. Table D accounts for total exports	<i>to be filled out</i>
9 Table_F	Domestic processed output (DPO)	Table F records material flows from the economy to the domestic environment (e.g. emissions to air, water and soil)	<i>to be filled out</i>

How to carry out an EW-MFA?

Country:		Go to Footnotes	Show Footnote	Check Data
Unit:	1000 Metric tonnes	Clean Checks		

TABLE A: DOMESTIC EXTRACTION

TABLE A: DOMESTIC EXTRACTION

MF.1 Biomass

MF.1.1 Crops (excluding fodder crops)

- MF.1.1.1 Cereals
- MF.1.1.2 Roots, tubers
- MF.1.1.3 Sugar crops
- MF.1.1.4 Pulses
- MF.1.1.5 Nuts
- MF.1.1.6 Oil-bearing crops
- MF.1.1.7 Vegetables
- MF.1.1.8 Fruits
- MF.1.1.9 Fibres
- MF.1.1.A Other crops (excluding fodder crops) n.e.c.

MF.1.2 Crop residues (used), fodder crops and grazed biomass

- MF.1.2.1 Crop residues (used)
 - MF.1.2.1.1 Straw
 - MF.1.2.1.2 Other crop residues (sugar and fodder beet leaves, etc.)
- MF.1.2.2 Fodder crops and grazed biomass
 - MF.1.2.2.1 Fodder crops (including biomass harvest from grassland)
 - MF.1.2.2.2 Grazed biomass

MF.1.3 Wood

- MF.1.3.1 Timber (industrial roundwood)
- MF.1.3.2 Wood fuel and other extraction
- MF.1.3 MEMO: Net increment of timber stock (memo item)

MF.1.4 Wild fish catch, aquatic plants and animals, hunting and gathering

- MF.1.4.1 Wild fish catch
- MF.1.4.2 All other aquatic animals and plants
- MF.1.4.3 Hunting and gathering

MF.2 Metal ores (gross ores)

MF.2.1 Iron

MF.2.2 Non-ferrous metal

- MF.2.2.1 Copper
 - MF.2.2.1 MEMO: Copper - metal content
- MF.2.2.2 Nickel
 - MF.2.2.2 MEMO: Nickel - metal content
- MF.2.2.3 Lead
 - MF.2.2.3 MEMO: Lead - metal content
- MF.2.2.4 Zinc
 - MF.2.2.4 MEMO: Zinc - metal content
- MF.2.2.5 Tin

MF.1 Biomass

MF.1.1 Crops (excluding fodder crops)

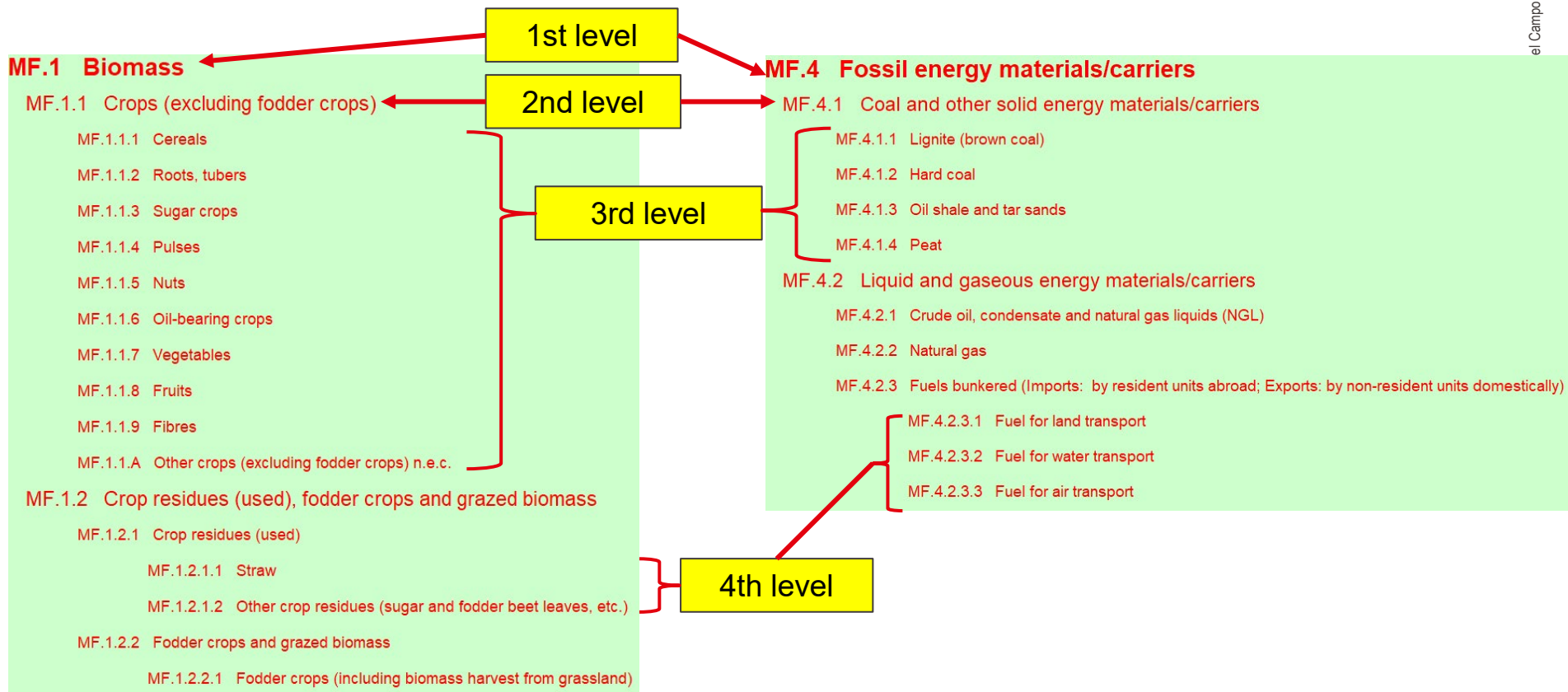
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- MF.1.2.2 Fodder crops and grazed biomass
 - MF.1.2.2.1 Fodder crops (including biomass harvest from grassland)

How to carry out an EW-MFA?

- Specific hierarchical classification.



How to carry out an EW-MFA?

Compilation tools

- **Grazed biomass**
 - Demand side estimate: Livestock numbers, fodder crops used
 - Supply side estimate: Grazed area
- **Crop residues:** Calculated from cereal harvest
- **Sand & gravel:** Concrete production, cement consumption, length of roads
- **Clay:** Production of bricks and roof bricks
- **Limestone:** Cement production
- **Balancing items**
 - Energy use data
 - Population numbers
 - Beverages

Note: **Balancing items** - Oxygen for **combustion** processes and **respiration**, and nitrogen; or water vapour from combustion, and gases from respiration

Where to find data?

- Open data portals (UN Comtrade database; FAOSTAT, etc.)
- Country statistics, Specialized reports



Showing 1 to 3 of 3 Results

Period	Trade Flow	Reporter	Partner	2nd Partner	Customs Desc	Transport Mode	Commodity Code	Trade Value (US\$)	Net Weight(kg)
2020	M	Cambodia	Switzerland	World	TOTAL CPC	TOTAL MOT	270111	\$2,472	110
2020	M	India	Switzerland	World	TOTAL CPC	TOTAL MOT	270111	\$17,392,404	165253000
2020	M	South Africa	Switzerland	World	TOTAL CPC	TOTAL MOT	270111	\$11,537	110000

World mineral production 2017-21

Production of crude steel

tonnes (metric)

Country	2017	2018	2019	2020	2021
Austria	8 134 600	6 885 000	7 423 500	6 765 100	7 920 000
Azerbaijan	387 258	381 617	325 895	264 506	304 077
Belarus	2 432 580	2 572 862	2 717 705	2 559 577	2 390 000
Belgium	7 842 300	7 980 000	7 760 000	6 120 000	6 910 000
Bosnia & Herzegovina	734 518	677 443	800 600	740 194	774 832
Bulgaria	652 400	666 100	565 900	483 800	547 500
Croatia	—	135 800	69 126	45 273	185 143
Czech Republic	4 553 000	4 966 000	4 600 000	2 900 000	4 700 000
Finland	4 003 634	4 100 000	3 511 000	3 482 000	4 322 000
France	15 504 683	15 387 355	14 449 651	11 595 698	13 946 700

Food Balances (2010-)

DOWNLOAD DATA VISUALIZE DATA METADATA REPORT

COUNTRIES
REGIONS
SPECIAL
M49

Filter results e.g. afghanistan

- ☐ Afghanistan
- ☐ Albania
- ☐ Algeria
- ☐ Angola
- ☐ Antigua and Barbuda
- ☐ Argentina

Select All Clear All

ITEMS
ITEMS AGGREGATED
CPC

Filter results e.g. population

- ☐ Wheat and products
- ☐ Rice and products
- ☐ Barley and products
- ☐ Maize and products
- ☐ Rye and products

ELEMENTS

Filter results e.g. total population - both s

- ☐ Total Population - Both sexes
- ☐ Production Quantity
- ☐ Import Quantity
- ☐ Stock Variation
- ☐ Export Quantity
- ☐ Domestic supply quantity

Select All Clear All

YEARS

Filter results e.g. 2020

- ☐ 2020
- ☐ 2019
- ☐ 2018
- ☐ 2017
- ☐ 2016

Where to find data?

- **Fossil energy carriers**

- National energy statistics and balances
- International sources:
 - UN International Energy Agency (IEA)
 - United Nations Industrial Commodity Production
 - Statistics
 - US Geological Survey (USGS)
 - British Geological Survey (BGS)

- **Biomass**

- Agricultural crop statistics (tonnes, tonnes/ha)
- Forestry statistics (tonnes, m³)
- Fishery statistics (tonnes)
- Economic Accounts for Agriculture EAA (€)
- Agricultural land use statistics FSS (hectares)
- National feed-, food- and wood-balances
- International statistics
- FAOSTAT: Comprehensive information on global agricultural, forestry, fisheries statistics

Where to find data?

- **Metal ores**

- PRODCOM
- Individual mining companies (e.g. annual business reports)
- International data sources:
 - British Geological Survey (BGS),
 - US Geological Survey (USGS)

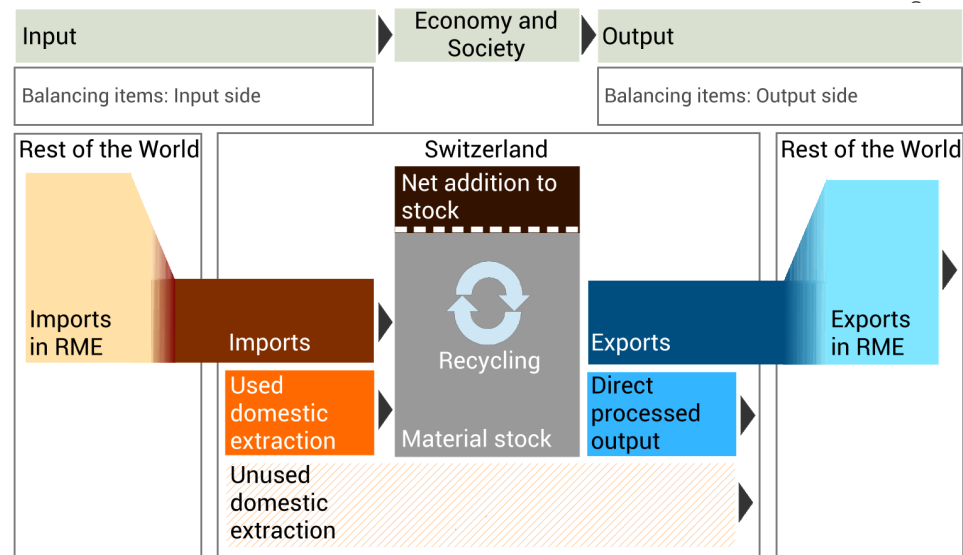
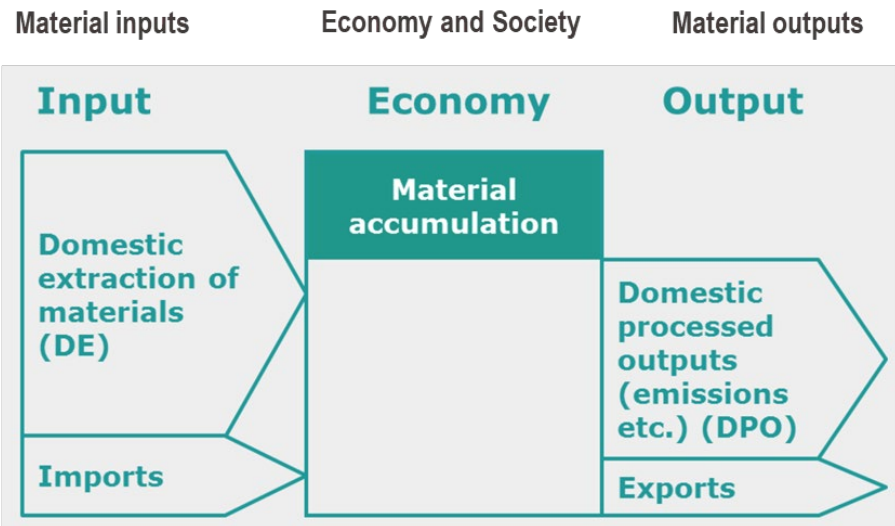
- **Non-metallic minerals**

- PRODCOM
- Individual mining companies (e.g. annual business reports)
- International data sources:
 - British Geological Survey (BGS),
 - US Geological Survey (USGS)

EW-MFA across the world

Cross-country comparisons





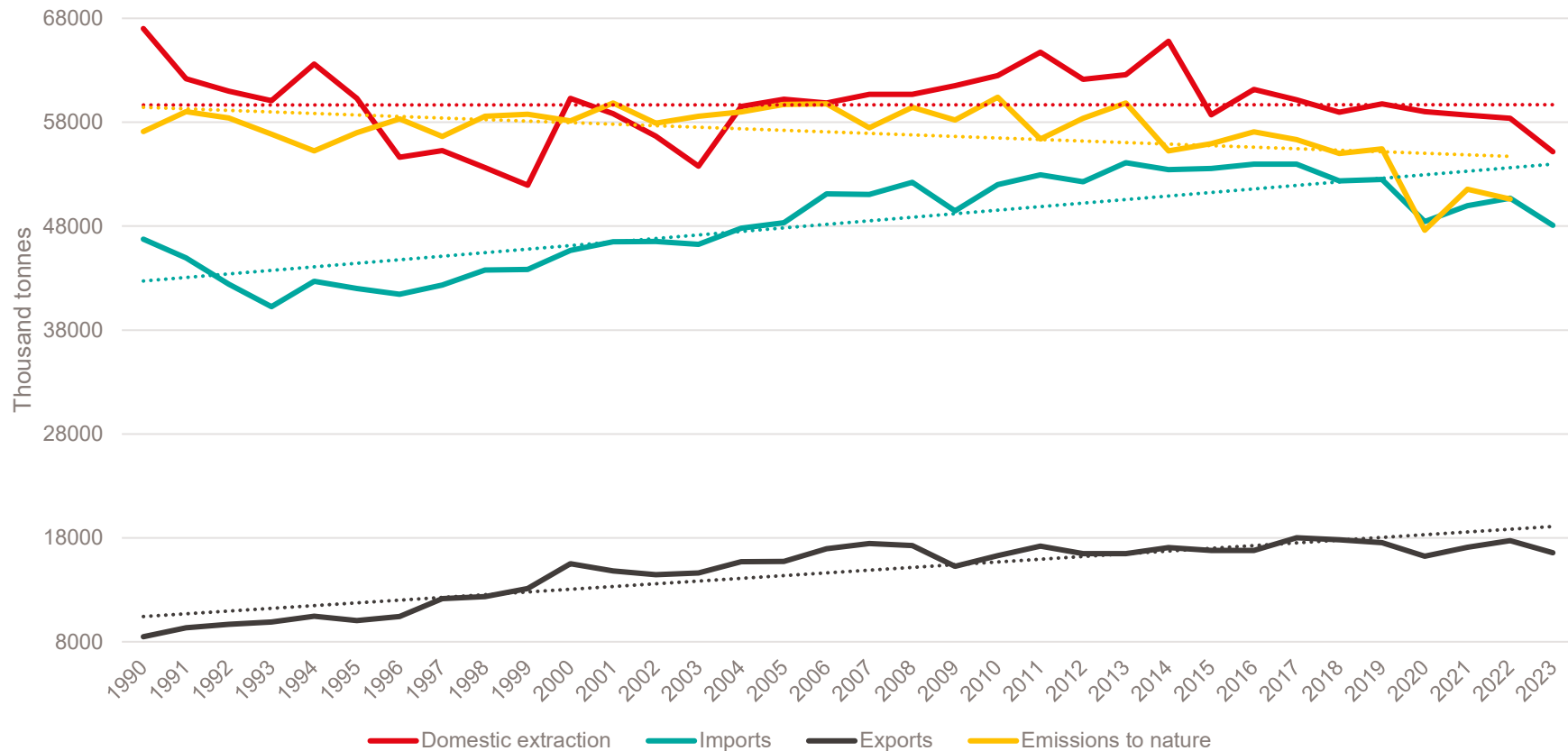
RME: Raw Material Equivalents

EPFL

Switzerland EW-MFA indicators

Material flow accounts - Indicators															
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Thousand tonnes	Domestic extraction	62485	64744	62130	62579	65789	58714	61166	60170	58967	59780	59012	58682	58373	55167
	Imports	51997	52930	52274	54111	53441	53562	53959	53952	52355	52503	48431	49968	50684	48068
	Exports	16309	17202	16486	16495	17074	16783	16802	18005	17829	17544	16238	17089	17745	16581
	Direct material input	114482	117674	114403	116690	119230	112276	115125	114122	111321	112283	107443	108650	109057	103234
	Domestic material consumption	98173	100472	97917	100195	102156	95493	98323	96117	93492	94738	91205	91560	91312	86653
	Physical trade balance	35688	35728	35787	37616	36367	36779	37157	35946	34526	34958	32192	32878	32939	31486
	Emissions to nature	60394	56377	58392	59848	55235	55926	57070	56318	54999	55431	47621	51553	50613	*
	Net additions to stock	64261	68073	65039	66930	70128	64150	65657	64150	62145	63119	61857	60804	61466	*
Tonnes per capita	Domestic extraction	7,9	8,1	7,7	7,7	8,0	7,1	7,3	7,1	6,9	6,9	6,8	6,7	6,6	6,2
	Imports	6,6	6,7	6,5	6,6	6,5	6,4	6,4	6,4	6,1	6,1	5,6	5,7	5,7	5,4
	Exports	2,1	2,2	2,1	2,0	2,1	2,0	2,0	2,1	2,1	2,0	1,9	2,0	2,0	1,9
	Direct material input	14,5	14,8	14,2	14,3	14,5	13,5	13,7	13,5	13,0	13,0	12,4	12,4	12,4	11,5
	Domestic material consumption	12,5	12,6	12,2	12,3	12,4	11,5	11,7	11,3	10,9	11,0	10,5	10,5	10,4	9,7
	Physical trade balance	4,5	4,5	4,5	4,6	4,4	4,4	4,4	4,2	4,0	4,1	3,7	3,8	3,7	3,5
	Emissions to nature	7,7	7,1	7,3	7,4	6,7	6,7	6,8	6,6	6,4	6,4	5,5	5,9	5,7	*
	Net additions to stock	8,2	8,6	8,1	8,2	8,5	7,7	7,8	7,6	7,3	7,3	7,1	7,0	7,0	*

Switzerland EW-MFA indicators



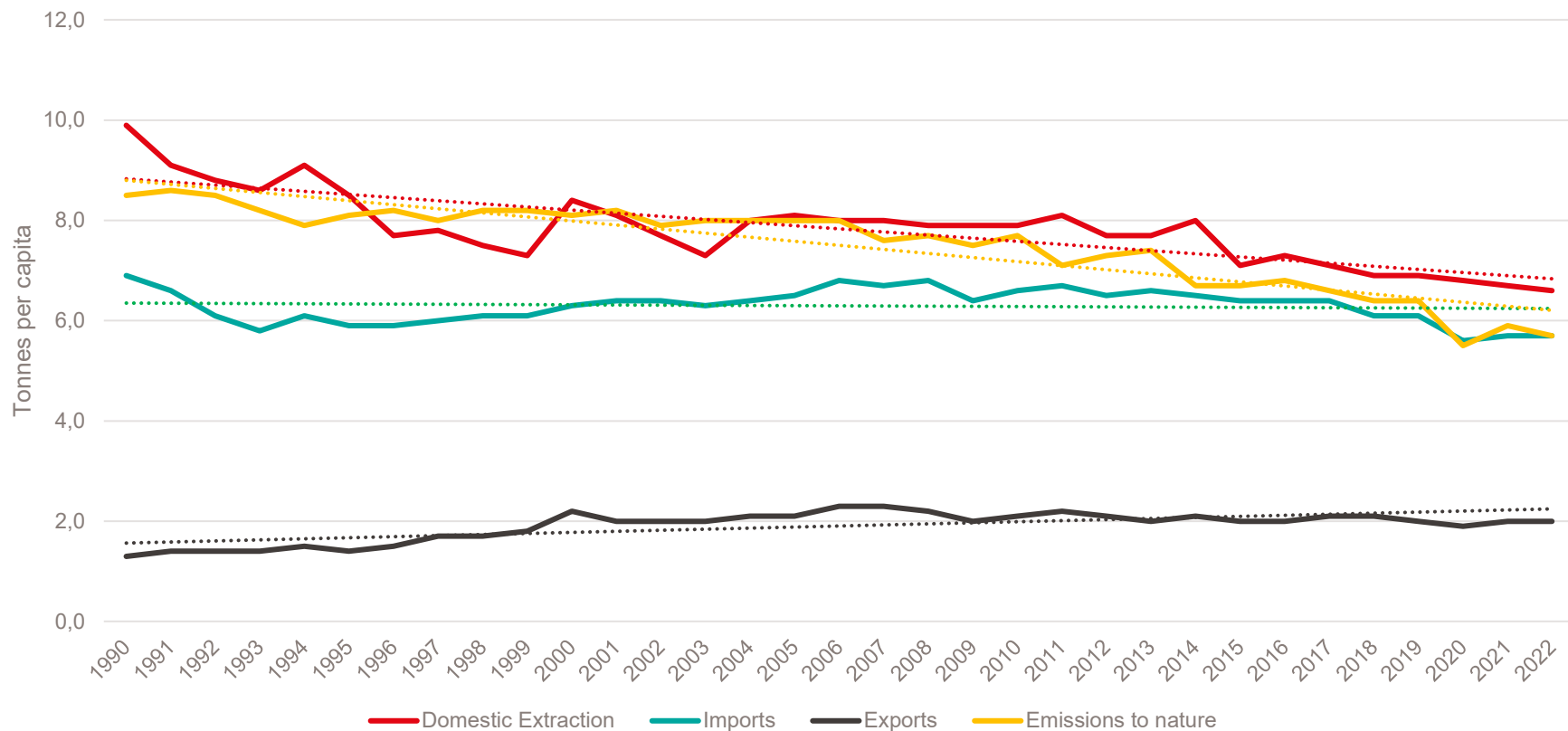
Switzerland EW-MFA indicators



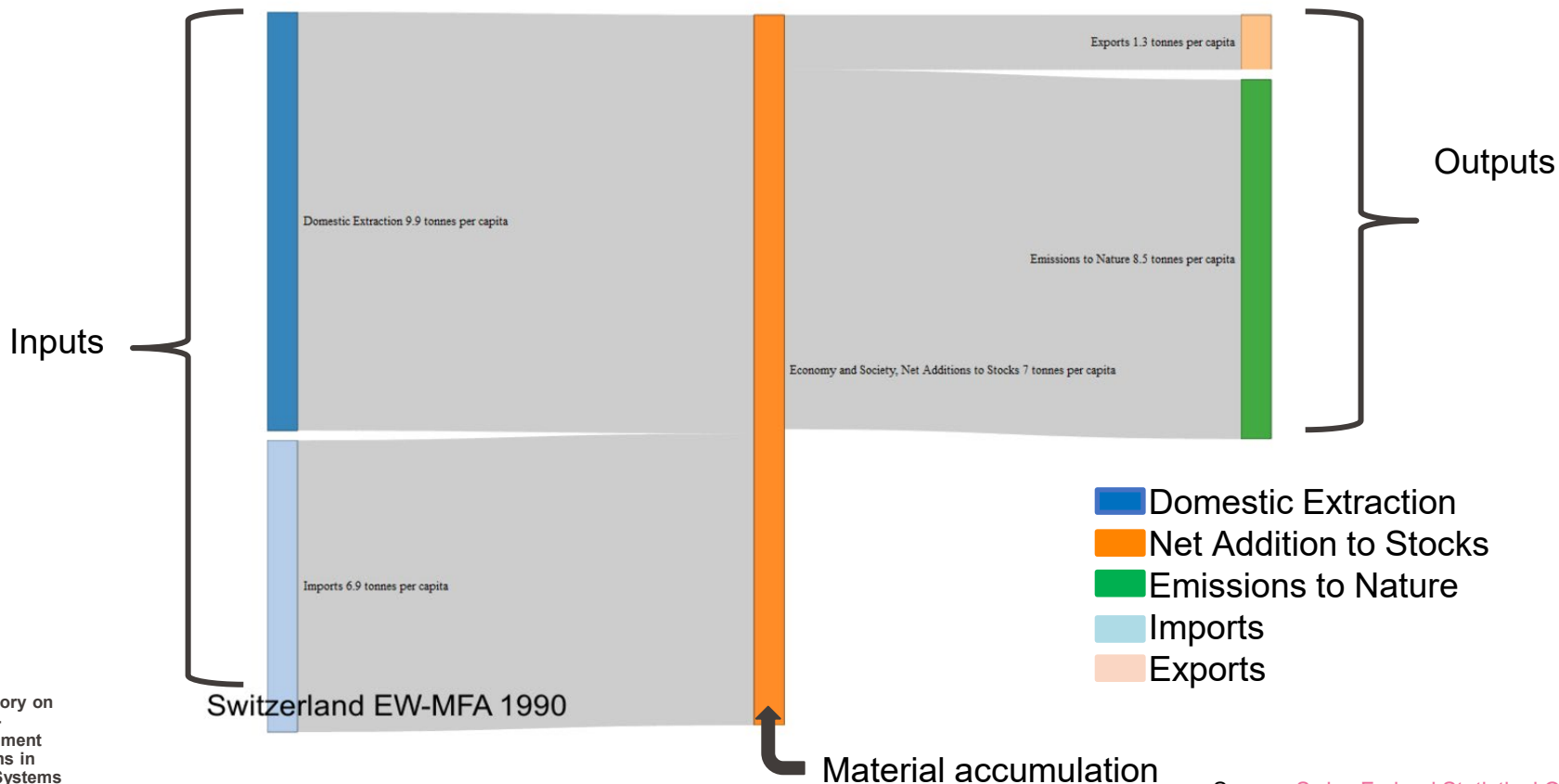
Switzerland EW-MFA 1990

Source: [Swiss Federal Statistical Office, 2024](#)

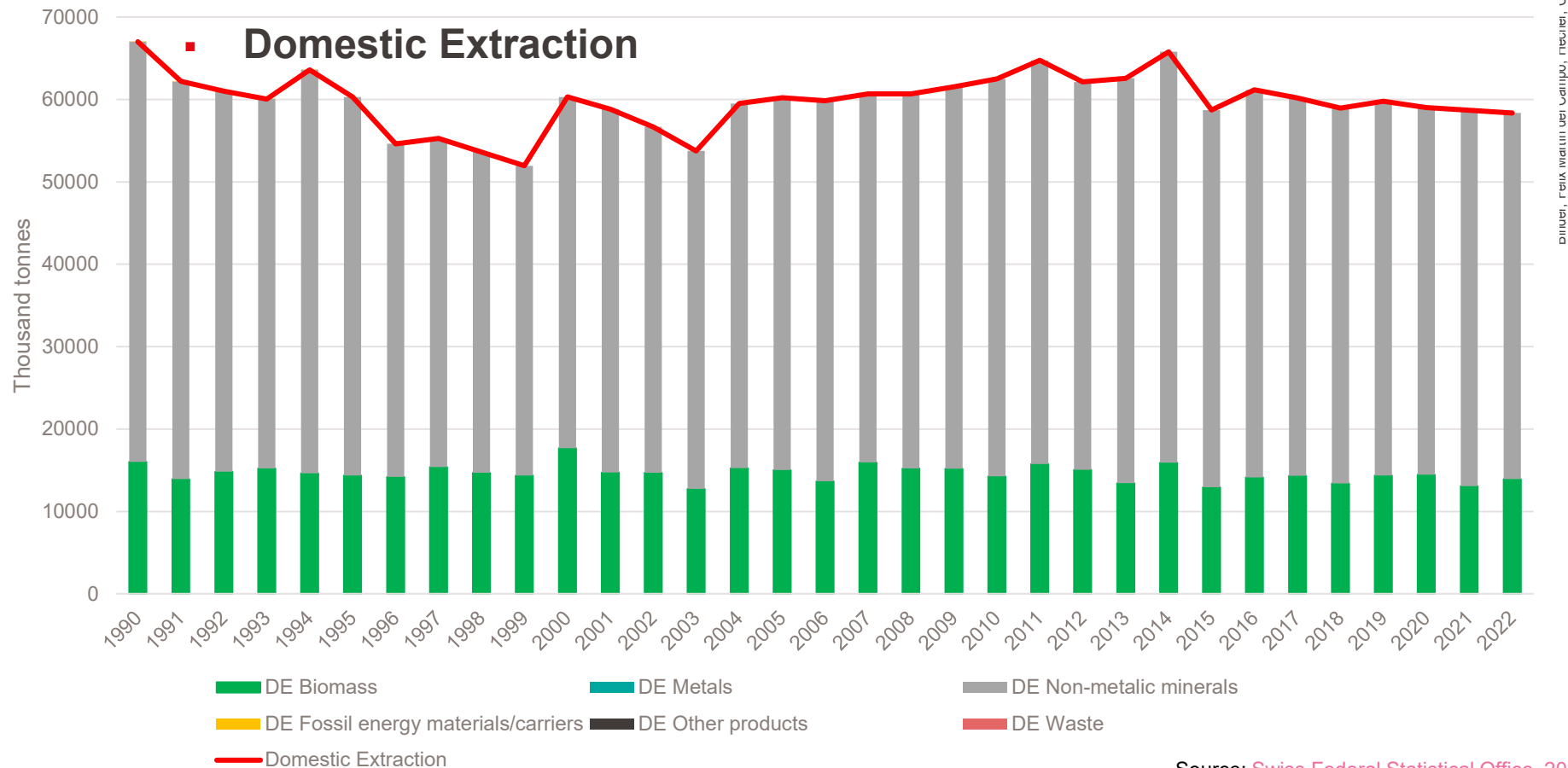
Switzerland EW-MFA indicators



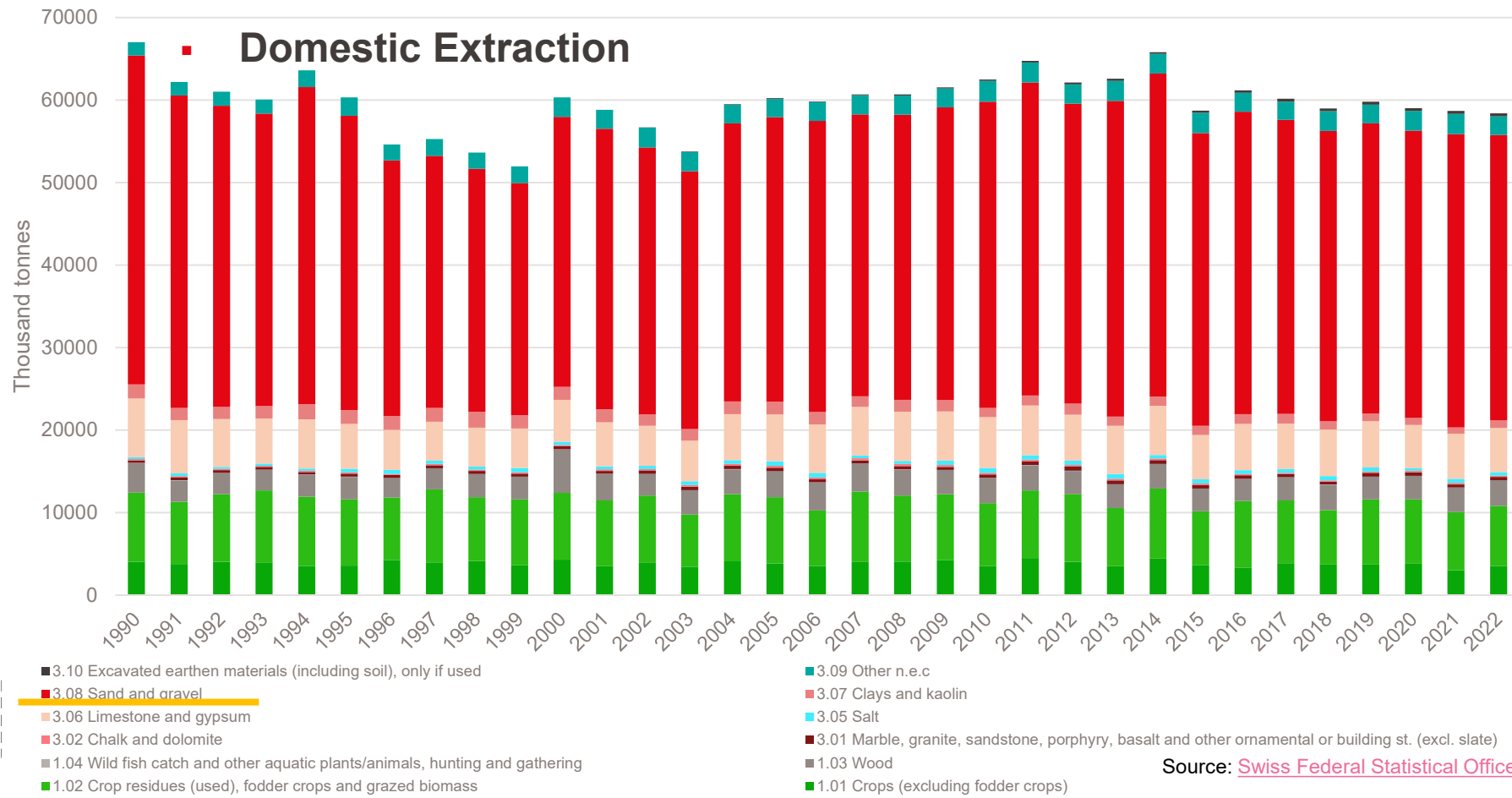
Switzerland EW-MFA indicators



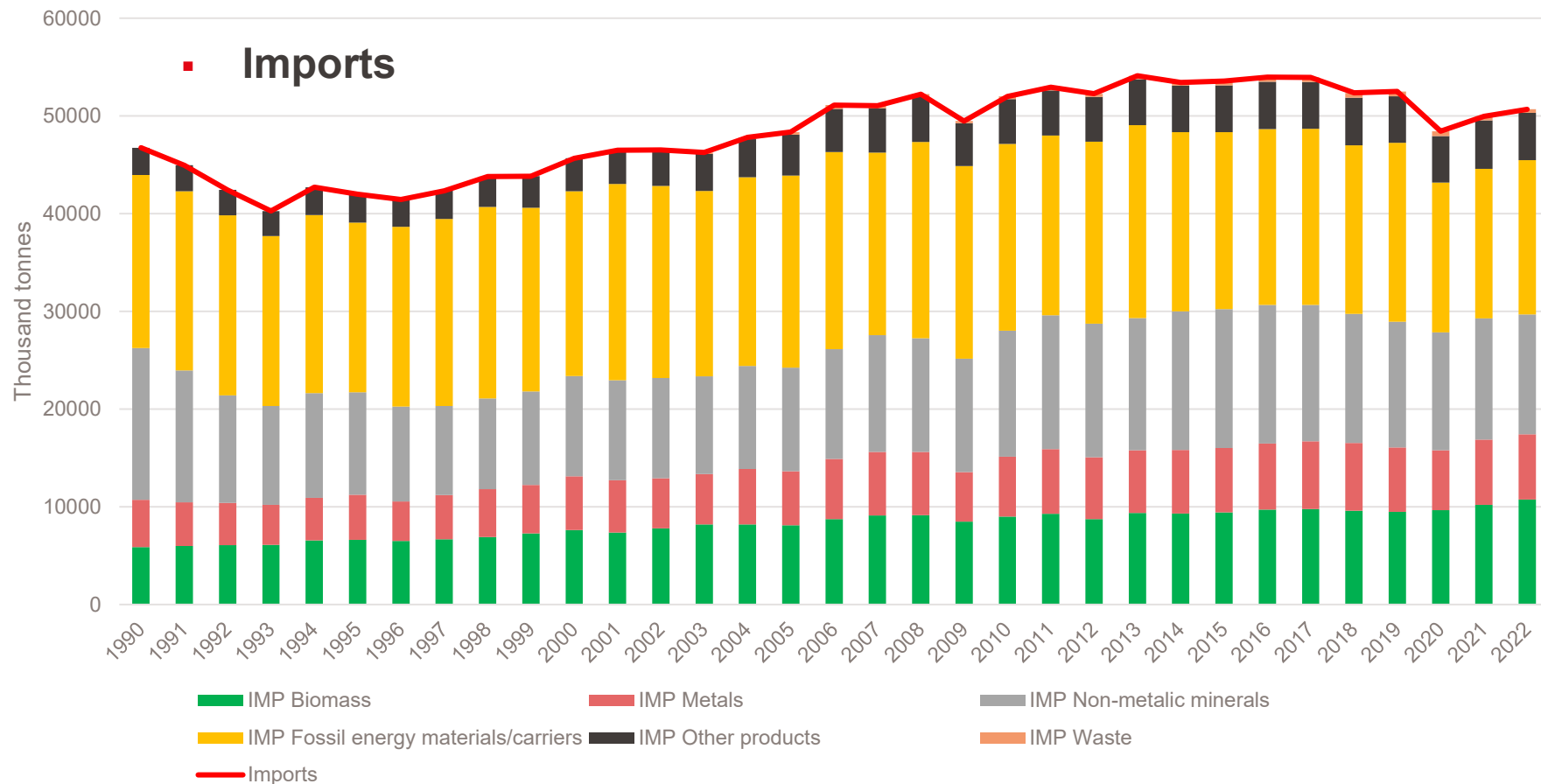
Switzerland EW-MFA indicators



Switzerland EW-MFA indicators

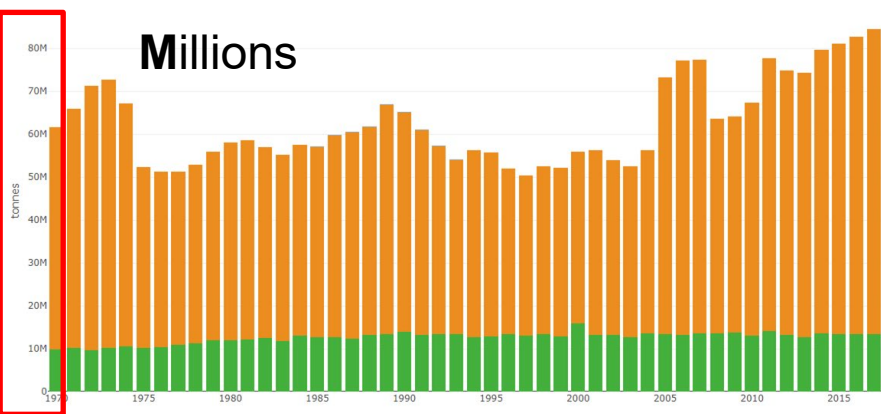


Switzerland EW-MFA indicators

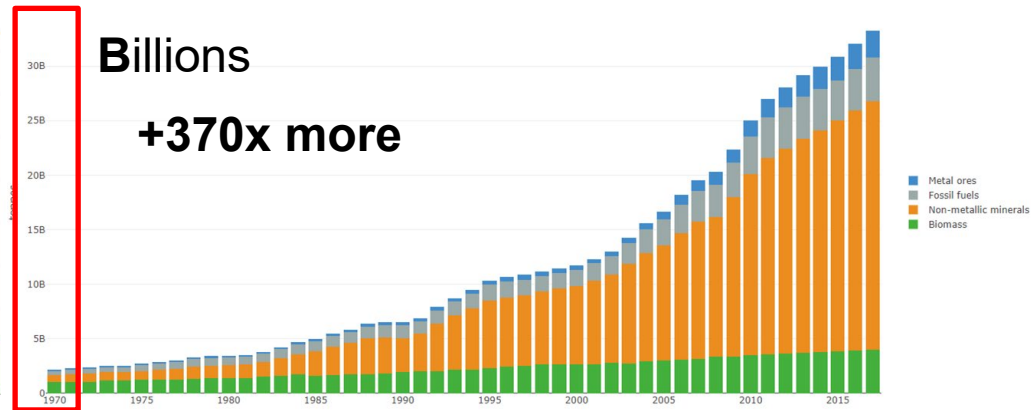


Domestic Material Extraction – Switzerland vs China 1970-2017

Domestic Extraction of Switzerland in 1970-2017, by material group



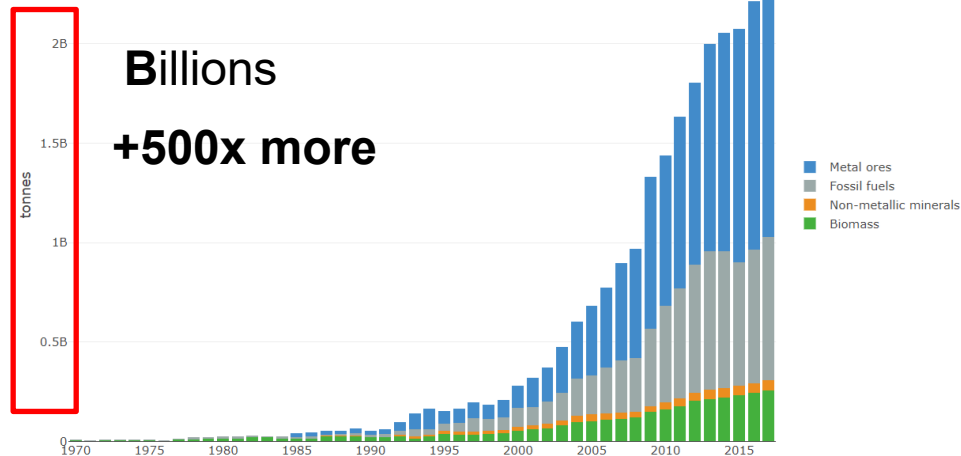
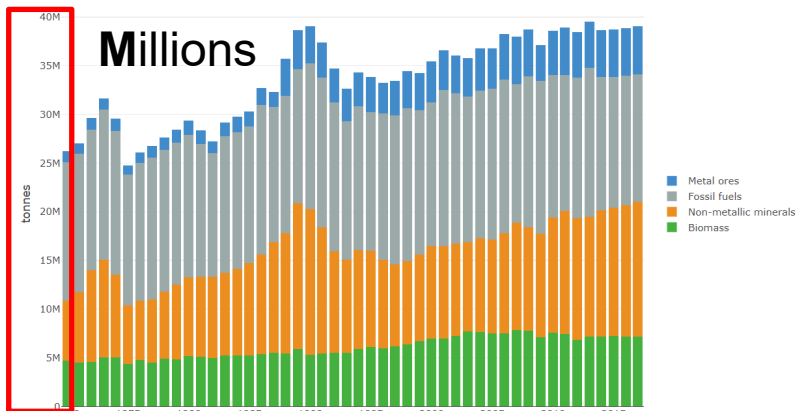
Domestic Extraction of China in 1970-2017, by material group



Imports – Switzerland vs China 1970-2017

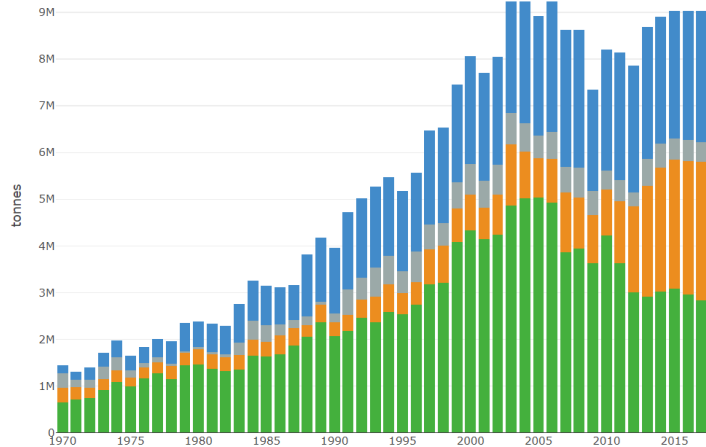
Imports of China in 1970-2017, by material group

Imports of Switzerland in 1970-2017, by material group

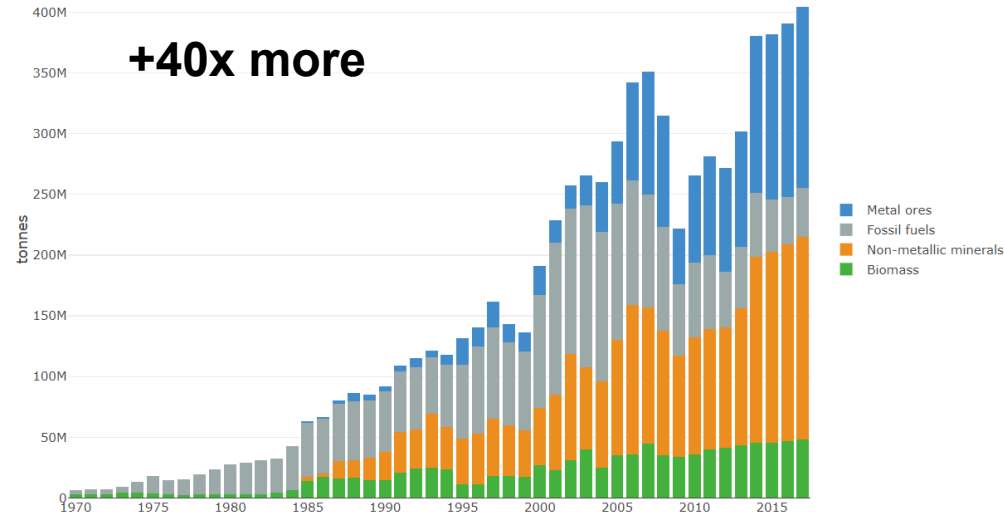


Exports – Switzerland vs China 1970-2017

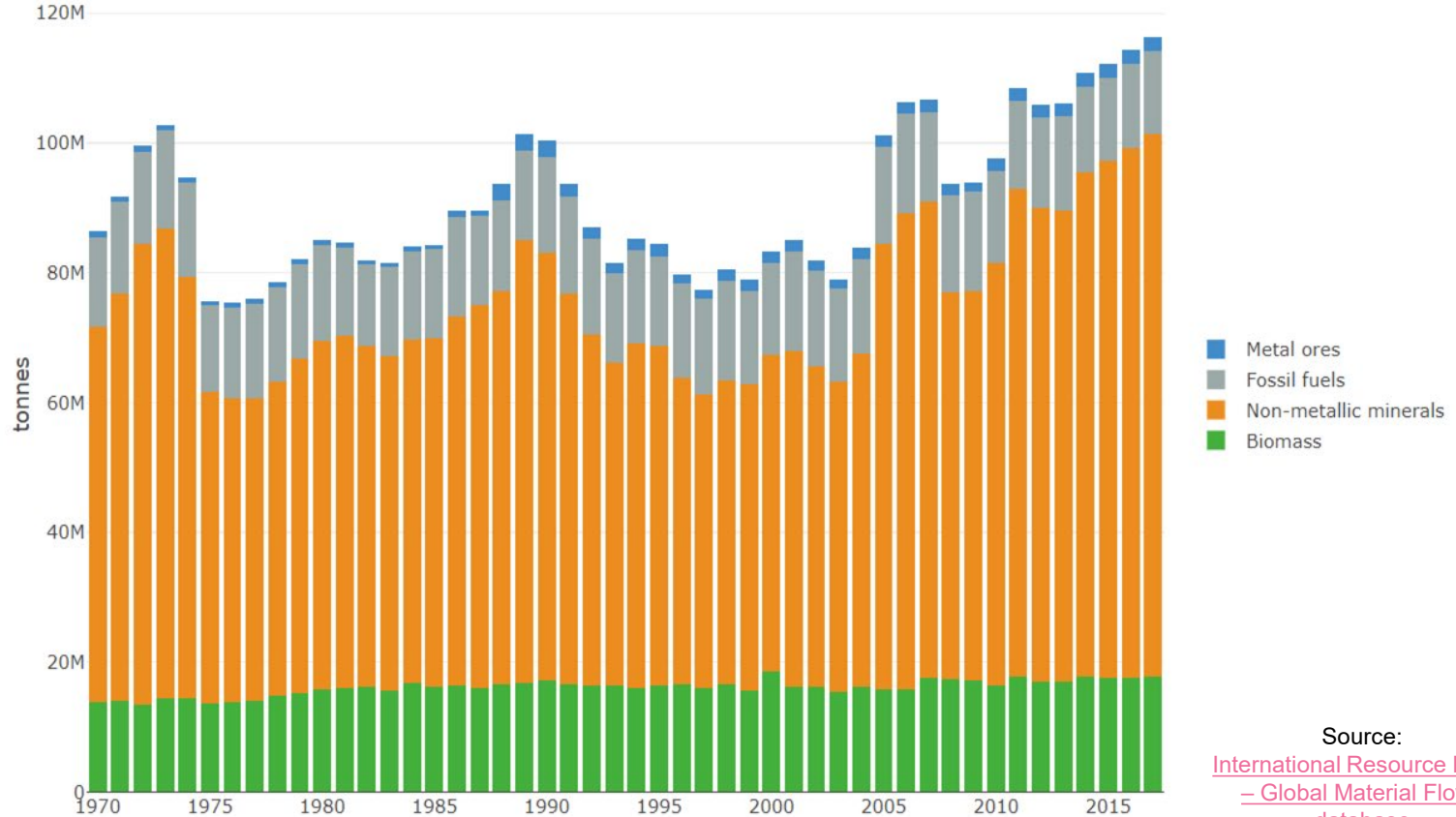
Exports of Switzerland in 1970-2017, by material group



Exports of China in 1970-2017, by material group



Domestic Material Consumption – Switzerland 1970-2017

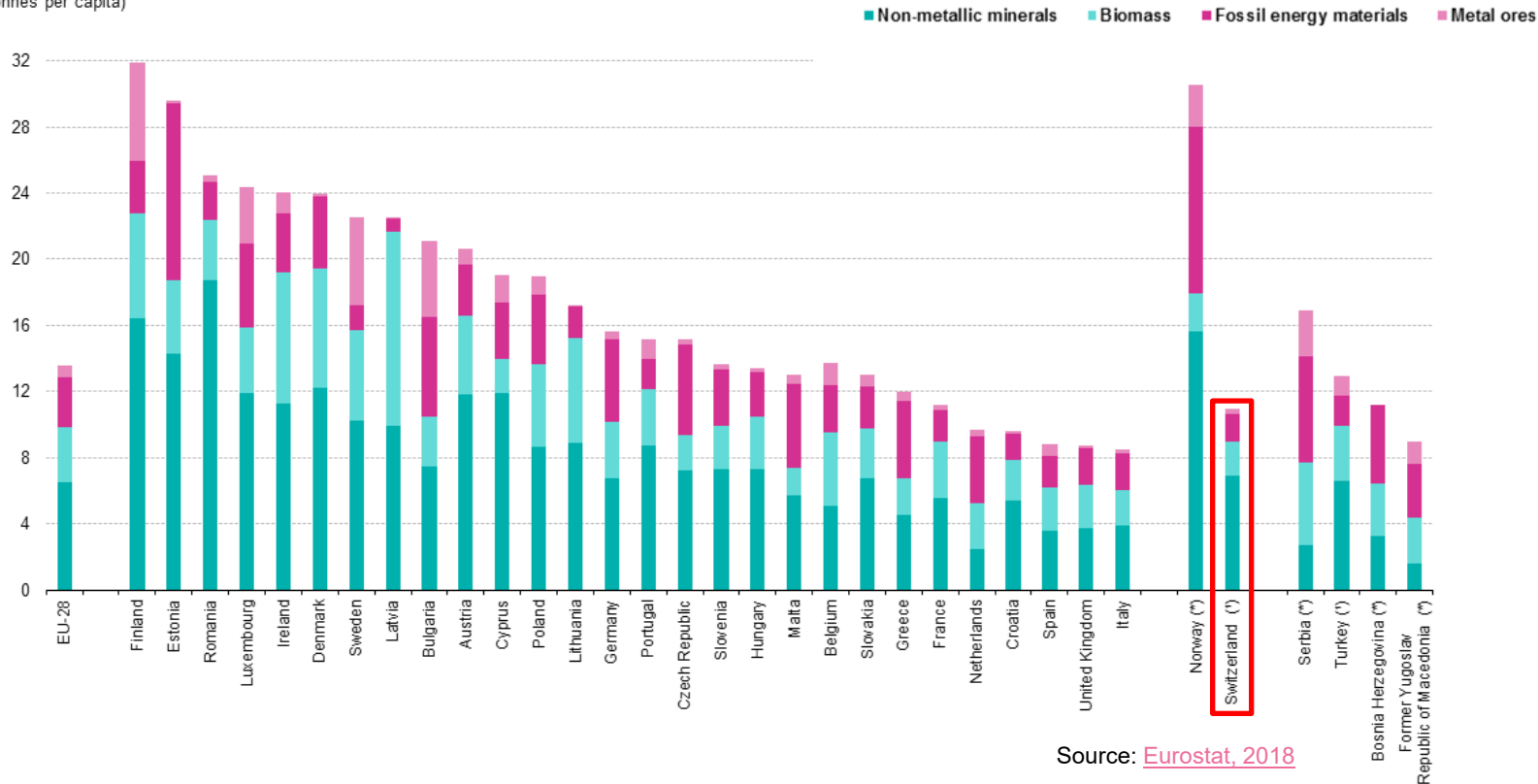


Source:

[International Resource Panel](#)
– [Global Material Flows](#)
[database](#)

Domestic Material Consumption – EU + other - 2017

Domestic material consumption by main material category, 2017
(tonnes per capita)

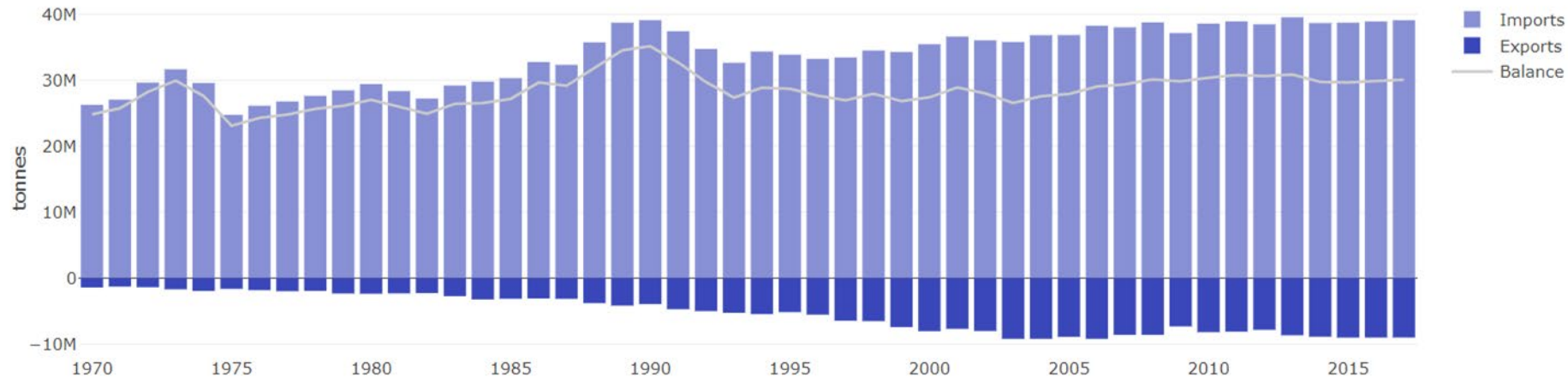


Source: [Eurostat, 2018](#)

Physical Trade Balance - Switzerland 1970-2017

Is a country a physical net-importer or net-exporter of raw materials?

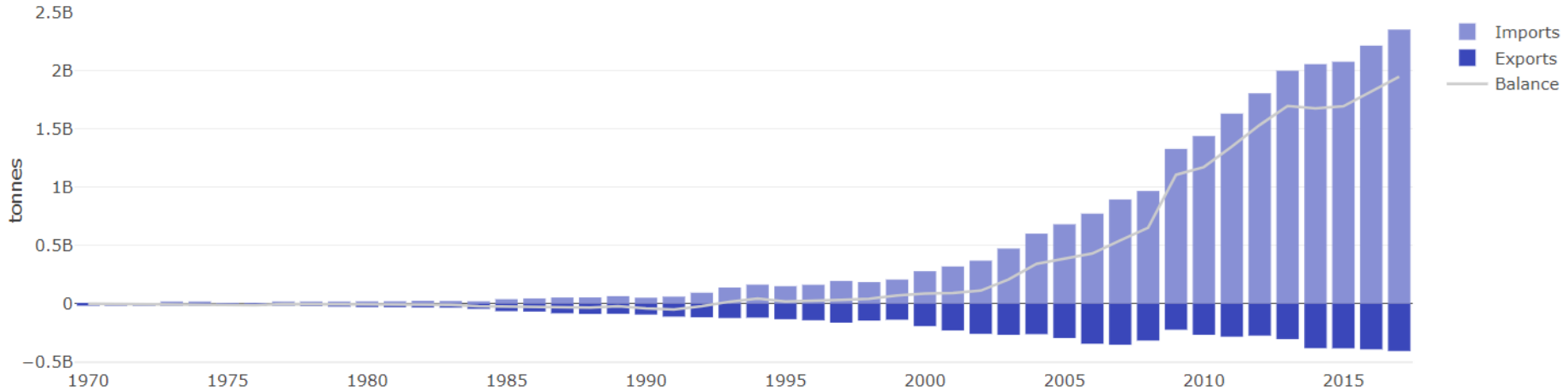
Trends of Physical Trade Balance (PTB) in Switzerland (1970 - 2017)



Physical Trade Balance – China 1970-2017

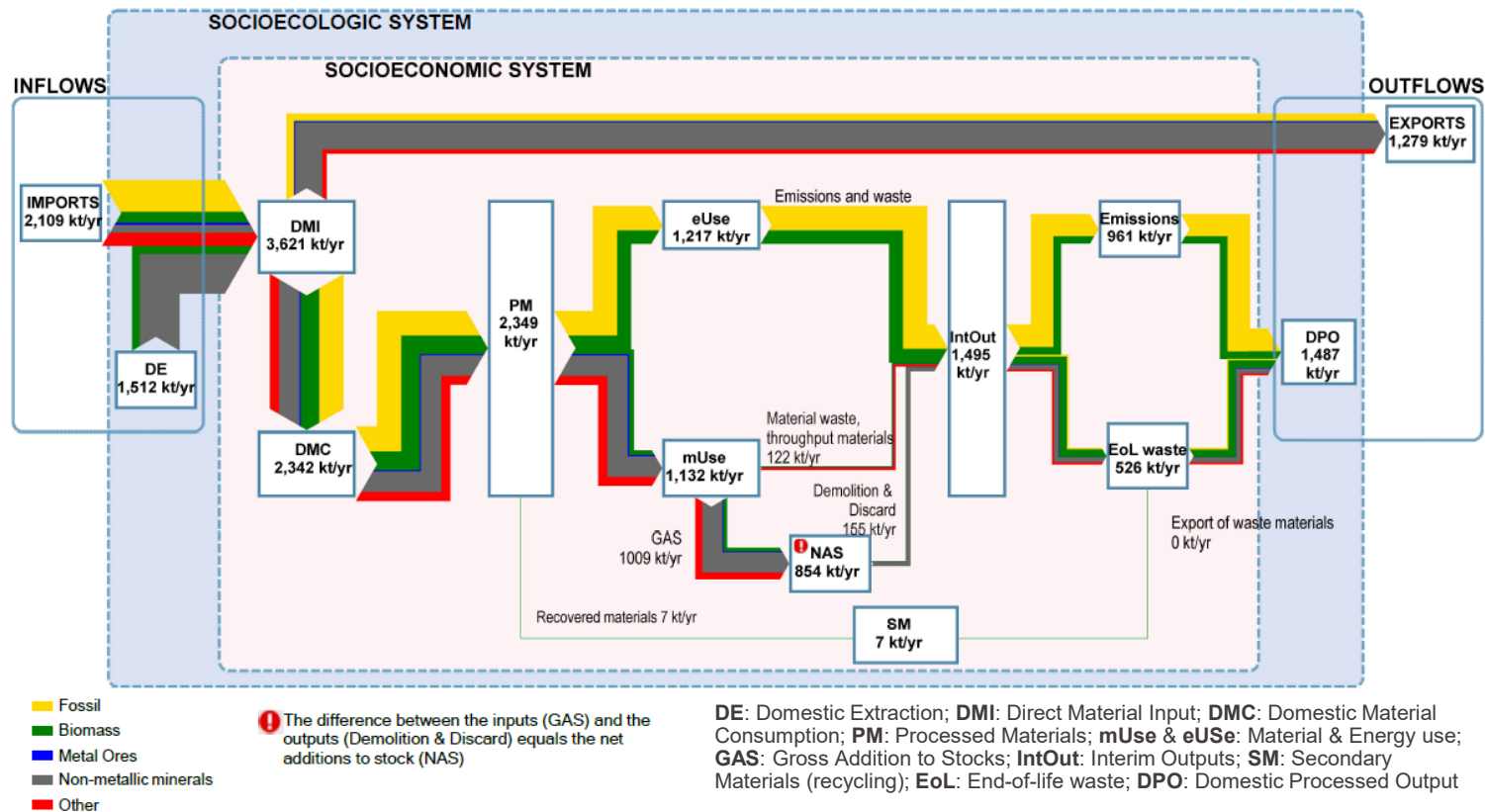
Is a country a physical net-importer or net-exporter of raw materials?

Trends of Physical Trade Balance (PTB) in China (1970 - 2017)



Integrative analysis and circularity indicators

EW-MFA for The Bahamas in 2018 by Main Material Categories



EW-MFA: Pro's and con's

Advantages

- Trend representation within countries
- Identification of proportions and hotspots
- Comparative analysis across countries/regions
- Development of physical indicators which can be set in relation to economic indicators
- Monitoring and assessment of overarching policy goals (e.g. SDGs)

Disadvantages

- Difficulties in explaining trends
- Difficulties in deriving causalities
- **None of the indicators show the full picture if considered individually**

An aerial photograph of a desert landscape. A light-colored, winding road or path cuts through the sandy terrain. In the foreground, there are large, dark, rocky outcrops and some sparse, low-lying green shrubs. The background shows a vast, flat desert floor extending towards a hazy horizon.

Thank you for your attention!

Next week: Guest lecturer, Florian Kohler

- Head of the Natural Resources and Territory group at the Federal Statistical Office (FSO).
- Statistics on material flow accounts, economic accounts for the primary sector, agriculture and food analysis, and territorial analysis.
- Over 10 years of experience in producing and developing economy-wide material flow accounts for Switzerland.
- Represents Switzerland in various Eurostat groups and task forces related to material flow accounts.