MFA for circular economy – European Union experience
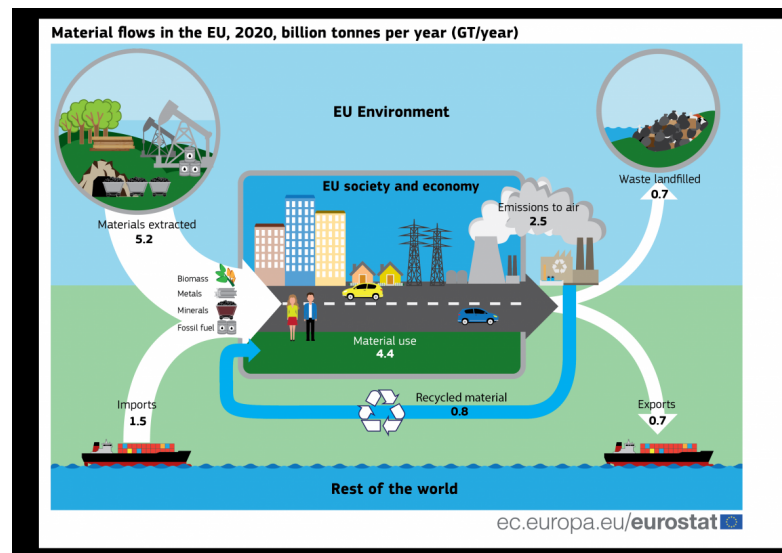
Arturo de la Fuente

Eurostat, unit 'environmental statistics and accounts, sustainable development'

OECD/UNECE Seminar on Implementation of SEEA,
28-31 March 2022

MFA for circular economy

Material flows are at the core of the circular economy paradigm

Material flow accounts are the bedrock of metrics of material flows

MFA examples in this presentation

1. Key indicators: domestic material consumption, resource productivity

2. Derived indicator: circular material use rate

3. Material footprints

4. Sankey diagrams

5. Links circular economy with climate change

1. Key MFA indicators

- Domestic material consumption (DMC)
    - DMC = Domestic extractions + imports – exports
    - Key indicator of extractions natural resources

- Resource productivity: GDP/DMC
    - *Decoupling* growth from extractions of natural resources
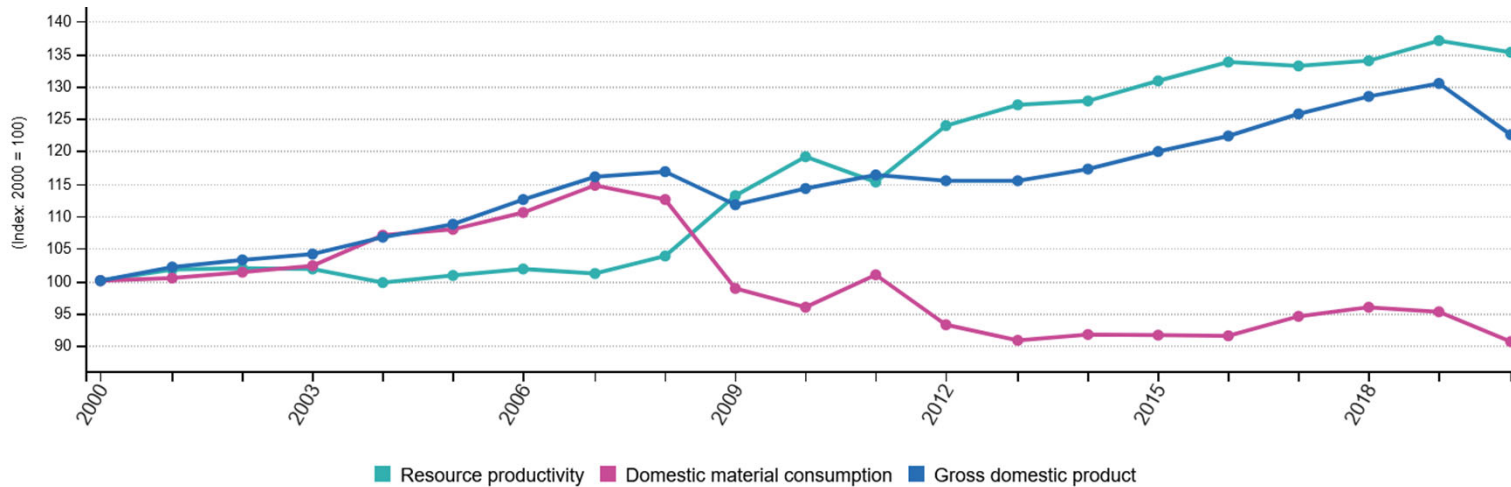
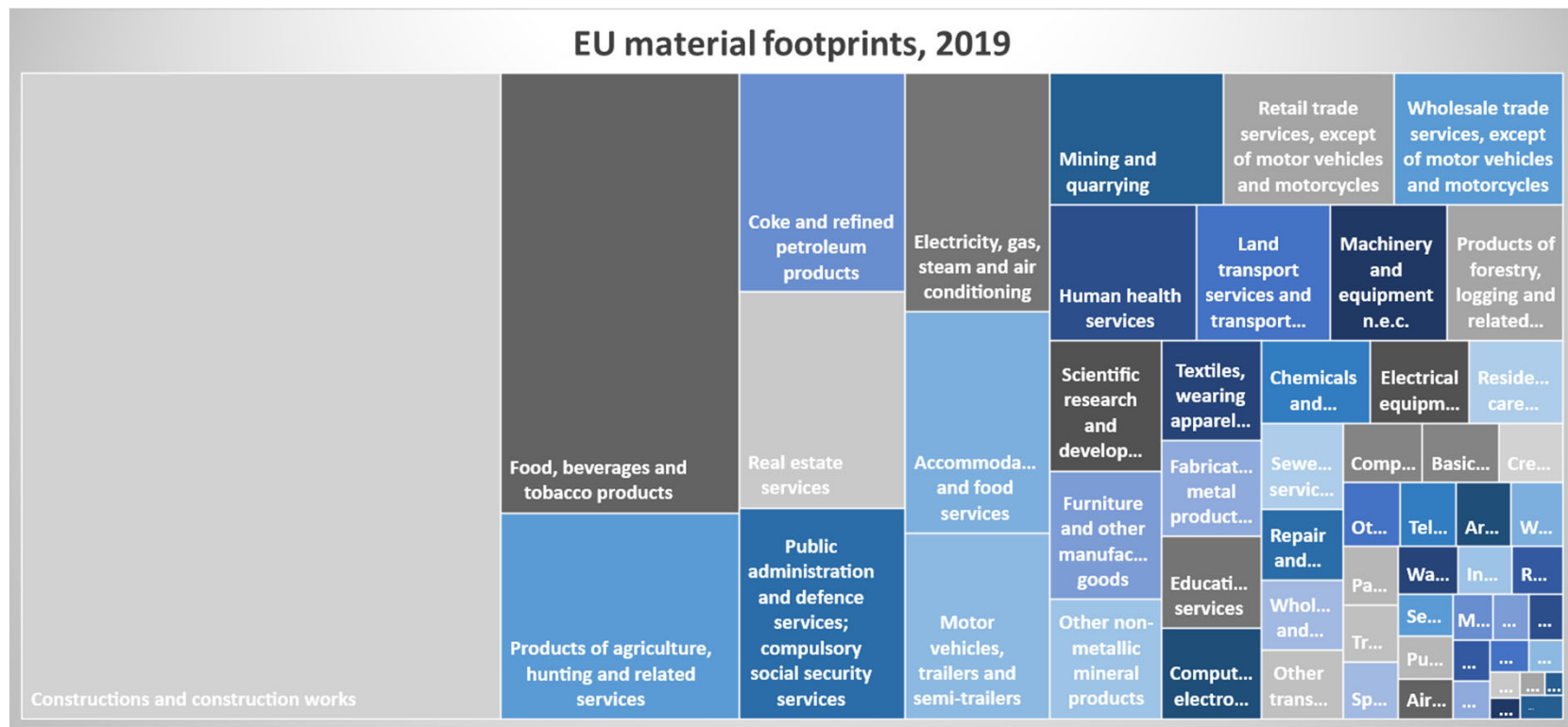# 2. Derived indicator: circular material use rate

The EU is

13 %

Circular

Share of secondary raw materials in total intake of material resources

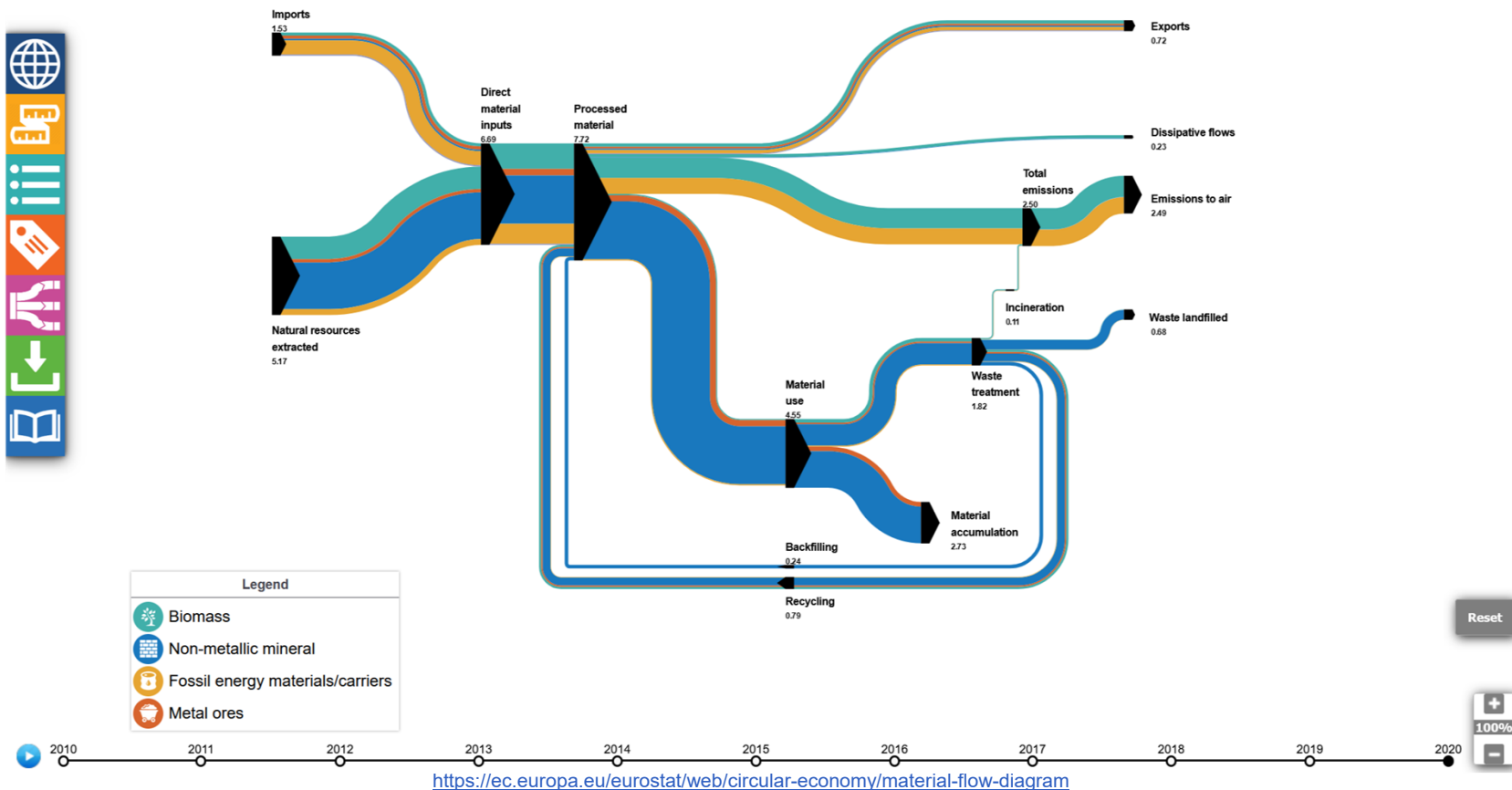$$CMU\ rate = \frac{U}{DMC + U}$$

U: recycled waste in treatment operations

European Commission

3. Material footprints (raw material consumption)

MFA + model-based imports & exports in raw material equivalents

EU material footprints, 2019

4. Sankey diagrams of material flows

Imports
1.53

Direct
material
inputs
6.69

Processed
material
7.72

Exports
0.72

Dissipative flows
0.23

Total
emissions
2.50

Emissions to air
2.49

Natural resources
extracted
5.17

Incineration
0.11

Waste landfilled
0.68

Material
use
4.55

Waste
treatment
1.82

Material
accumulation
2.73

Backfilling
0.24

Recycling
0.79

Legend
- Biomass
- Non-metallic mineral
- Fossil energy materials/carriers
- Metal ores

2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

https://ec.europa.eu/eurostat/web/circular-economy/material-flow-diagram

Reset

European
Commission

5. Links circular economy with climate change

Eurostat testing decomposition analysis with SEEA data:

$$\Delta greenhouse\ gas\ emissions$$
$$= \Delta GDP + \Delta population + \textcolor{green}{\Delta circular\ material\ flows}$$
$$+ \textcolor{green}{\Delta resource\ efficiency\ (materials)} + \Delta carbon\ in\ energy\ mix$$
$$+ \Delta other\ factors$$

Circular economy is a major reducer of greenhouse gas emissions in the European Union over 2008-2020

European Commission

5. Links circular economy with climate change (cont.)

National accounts + MFA + energy accounts + air emissions =…
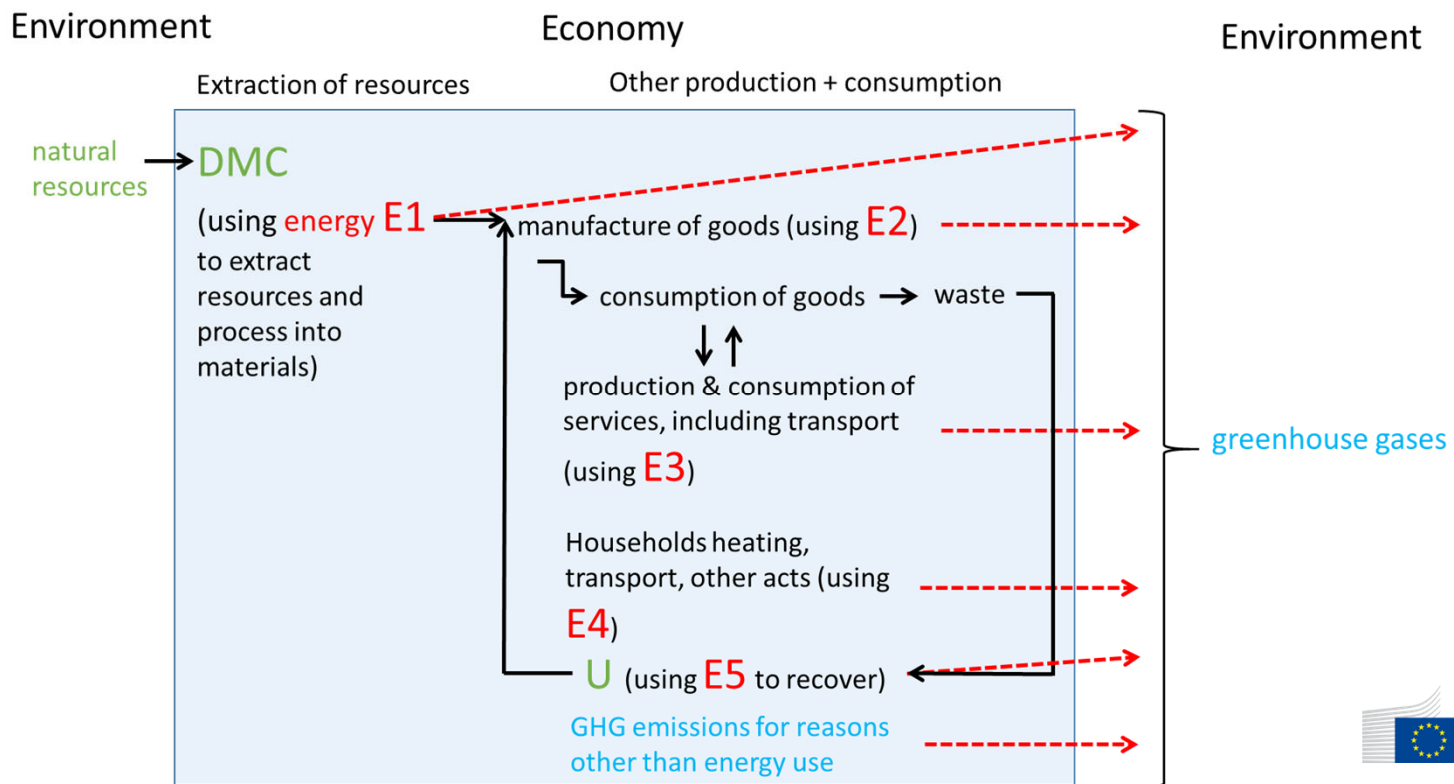
Conclusion: MFA examples in this presentation

1. Key indicators: domestic material consumption, resource productivity

2. Derived indicator: circular material use rate

3. Material footprints

4. Sankey diagrams

5. Links circular economy with climate change

European Commission

Where to find more?

- Eurostat online articles on [circular material use rate](), [resource productivity (decoupling)](), [material footprints](), [material flows in CE](), [SDG 12 responsible consumption and production]().

- Eurostat [online database](), especially on [material flows]()

  - indicators about domestic material consumption, resource efficiency, material footprints (RMC),…

- Eurostat's website dedicated to the circular economy [monitoring framework]()
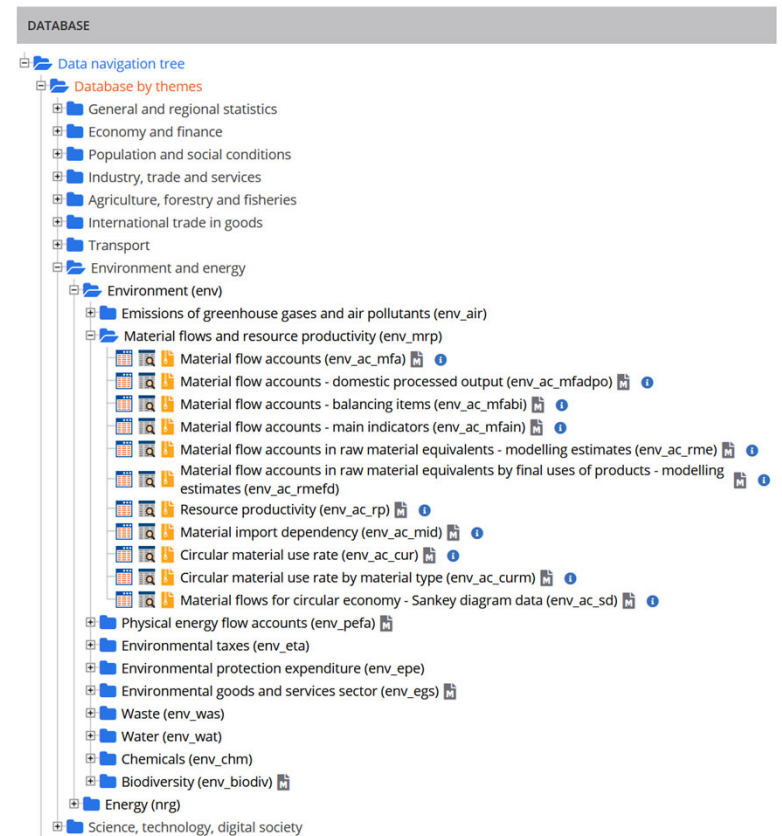
Thank you!

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European Commission