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Sustainable Cycles Programme

Session 2: Perspectives from the Netherlands

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Programme



MFA production and use in Netherlands

- Why MFA?
- MFA Production
- MFA Use

Why MFA?

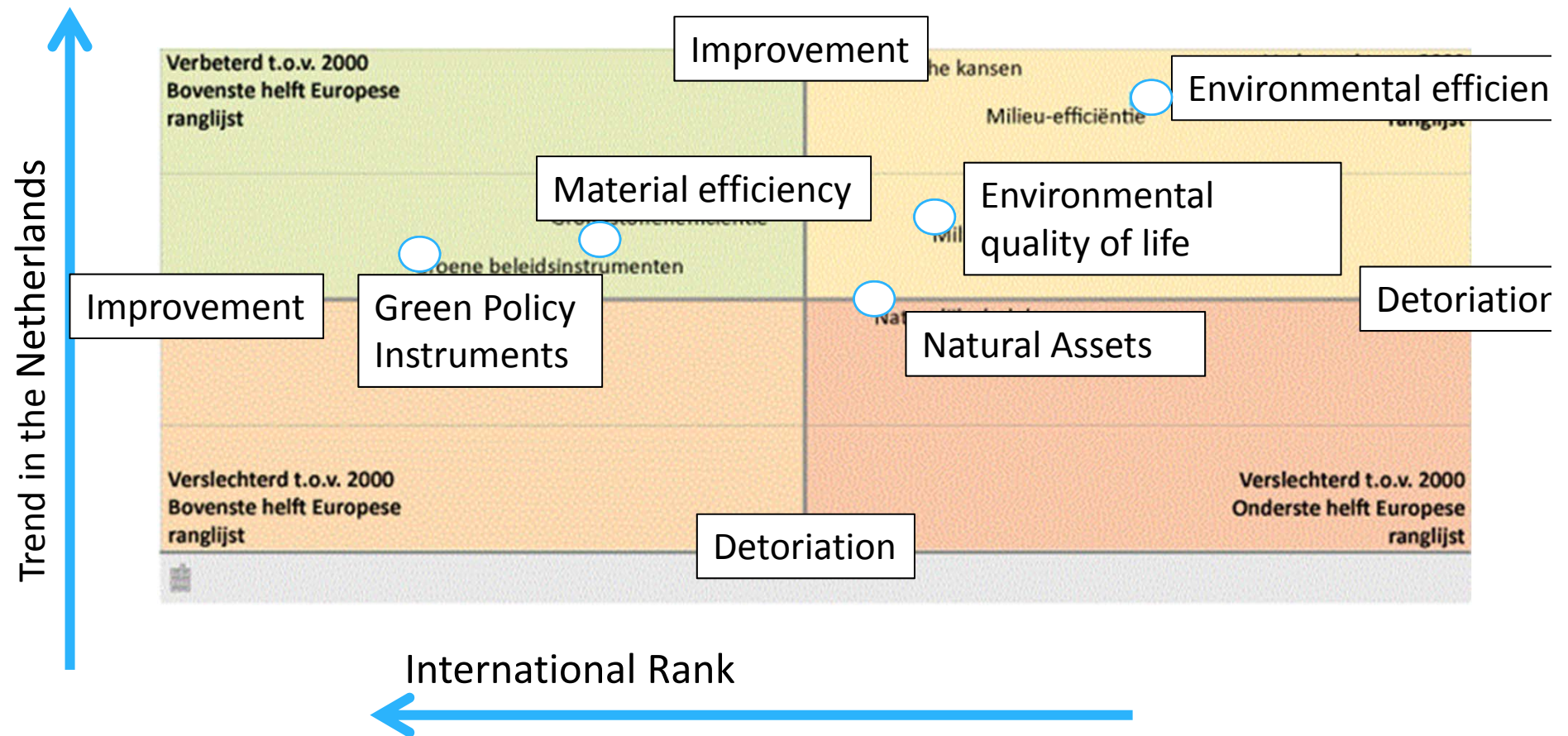
- Assess critical raw materials
- Link of materials to economy
 - Availability of materials is not always certainty
 - Vulnerability of economy
 - Trace substance flows (gold, or other materials)
 - Resource efficiency
- MFA derived indicators used in national overarching monitoring frameworks:
 - Green Growth Framework
 - Circular economy framework

Use of MFA in Green Growth in the Netherlands

- Efficiencies
 - DMC/GDP
- Disaggregated in three material groups
 - Minerals
 - Biomass
 - Non-minerals
- Trend and international position is assessed

MFA is used in Green Growth

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MFA is used for Circular economy

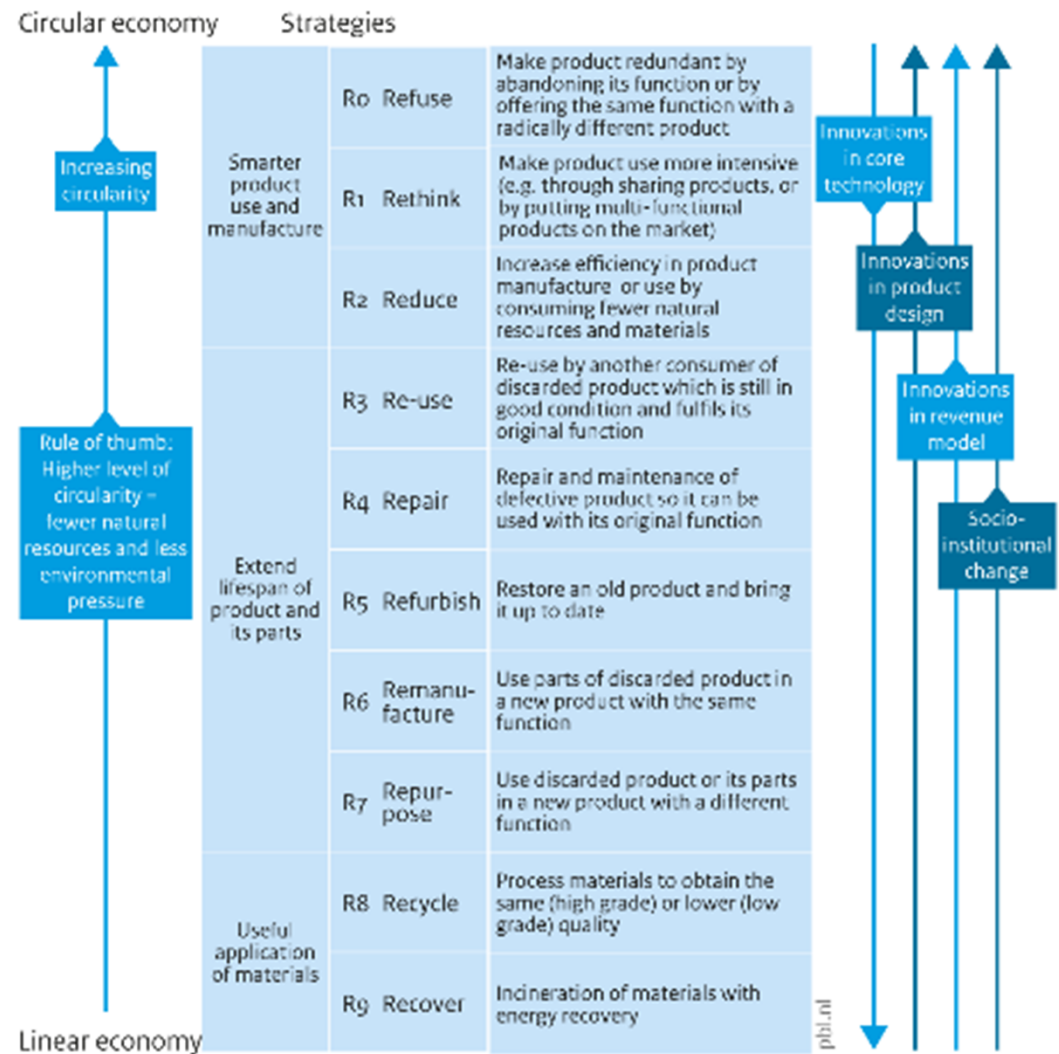
- Green growth → no targets
- Circular economy → Targets
- Netherlands has adopted a circular economy package
- By 2030: reduce the use of primary use of materials by 50%
 - To be specified if production or consumption perspective
- By 2050: be circular

Various Strategies to achieve a Circular Economy

All link indirectly to Material Use

Source: Jose Potting, Marko Hekkert, Ernst Worrell and Aldert Hanemaaijer, *Circular Economy: Measuring innovation in product chains*, PBL, 7-01-2017

Circularity strategies within the production chain, in order of priority



Source: RLI 2015; edited by PBL

Examples of indicators physical flow accounts to monitor circular economy

- Relation material use
 - Economy (efficiency: DMC/GDP)
 - Dependencies of imports
 - Environmental accounts
- Impact
 - Material Footprint
- Analyses
 - Input/output
 - Environmental hotspot
- Circular economy
 - Biobased economy
- Trace specific substances (gold, for instance)

How to make an MFA ???

- MFA is part of SEEA
- Although MFA is not exclusively made in SEEA
- Many other sources, and uses

Methodology of the Netherlands

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- Methodology according to Eurostat (Eurostat, 2009)
- Deviates in estimation of the imports and exports.
 - Physical data from the international trade statistics is not used directly.
 - Derives price information per commodity from the international trade statistics. The price information in combination with monetary data from the national accounts provides the required physical data.
- Rationale
 - The quality standard of the Dutch physical international trade data was not high enough.
 - This approach insures MFA that are fully consistent with the monetary data in the national accounts.
- <https://www.cbs.nl/NR/rdonlyres/D867533E-9F99-4E35-98DB-504F4DACE57D/0/2009MFANetherlands.pdf>

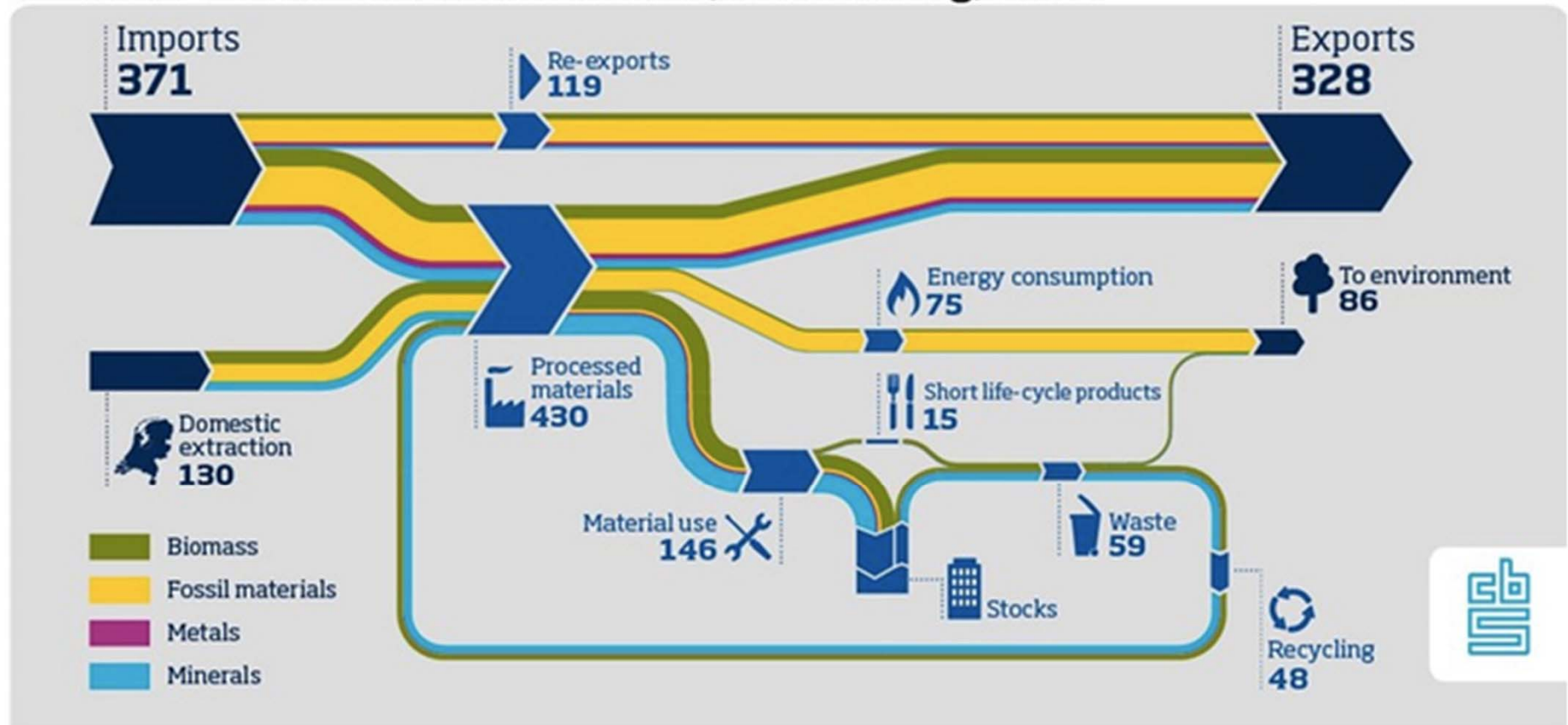
Overview of data sources

- International Trade Data
- National Statistics
 - Agricultural crop Statistics, Forestry Statistics, Fishery statistics, mining statistics
- Other Sources
 - Ministries, sector organisations, business reports
- International data sources
- FAO-stat, British Geological Survey, US Geological Survey, UN International Energy Agency, UN Industrial Commodity Statistics
- Waste Statistics
- Source: Statistics Netherlands

MFA use for Circular Economy

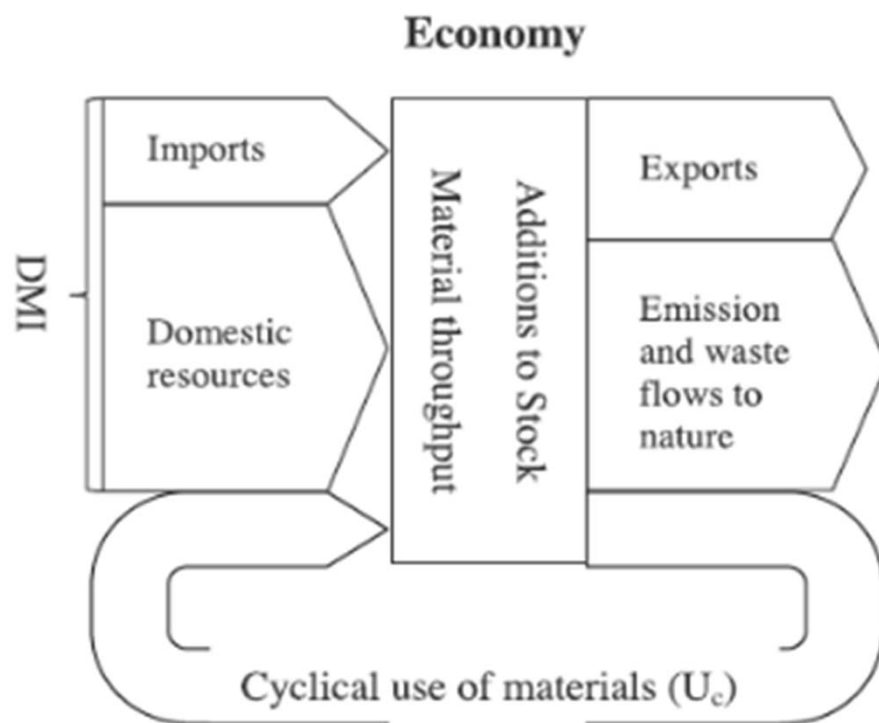
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Material flows in the Netherlands, in billion kg, 2014



Concepts of Circular Material Use

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$$CMU = U / (DMC + U)$$

$$DMC = DMI - Exports$$

- Kovanda, J. (2014). Incorporation of recycling flows into economy-wide material flow accounting and analysis: A case study for the Czech Republic. Resources, Conservation and Recycling, 92, 78-84

Interpretation of CMU

- The circular material use rate (CMU) measures, in percentage, the degree of circular (secondary) materials in the economy in relation to the overall material use.
- A higher amount of secondary materials substituting for primary raw materials avoids extraction of primary material.
- More detailed methodology can be found here
- https://circabc.europa.eu/sd/a/5becb94b-73b8-4c03-8646-4c49d5986578/ENV_ACC-EXP_WG_2016_07A%20Report%20Developing%20an%20Indicator%20for%20the%20Circular%20Economy_NL.pdf

MFA with waste accounts

Nine percent recycled materials in the economy

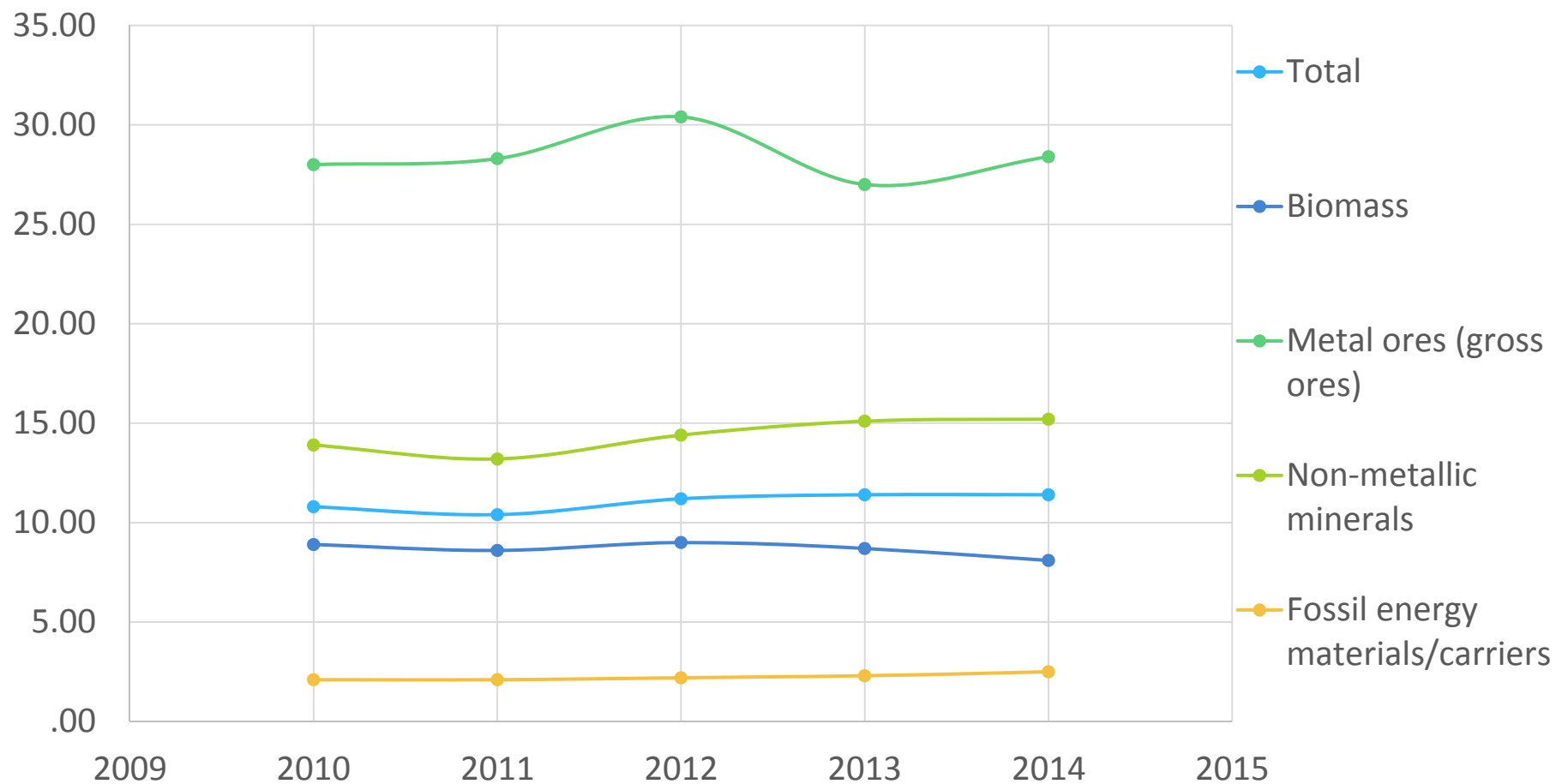
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Circular Use Rate in EU (in %)

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Prosum

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- H2020 funded project
- Inventory of Urban Mine of Secondary materials
- EU research (Horizon 2020) project
- 17 Consortium partners, e.g.
 - Statistics Netherlands
 - United Nations University
 - WEEE Forum
 - Academic Partners

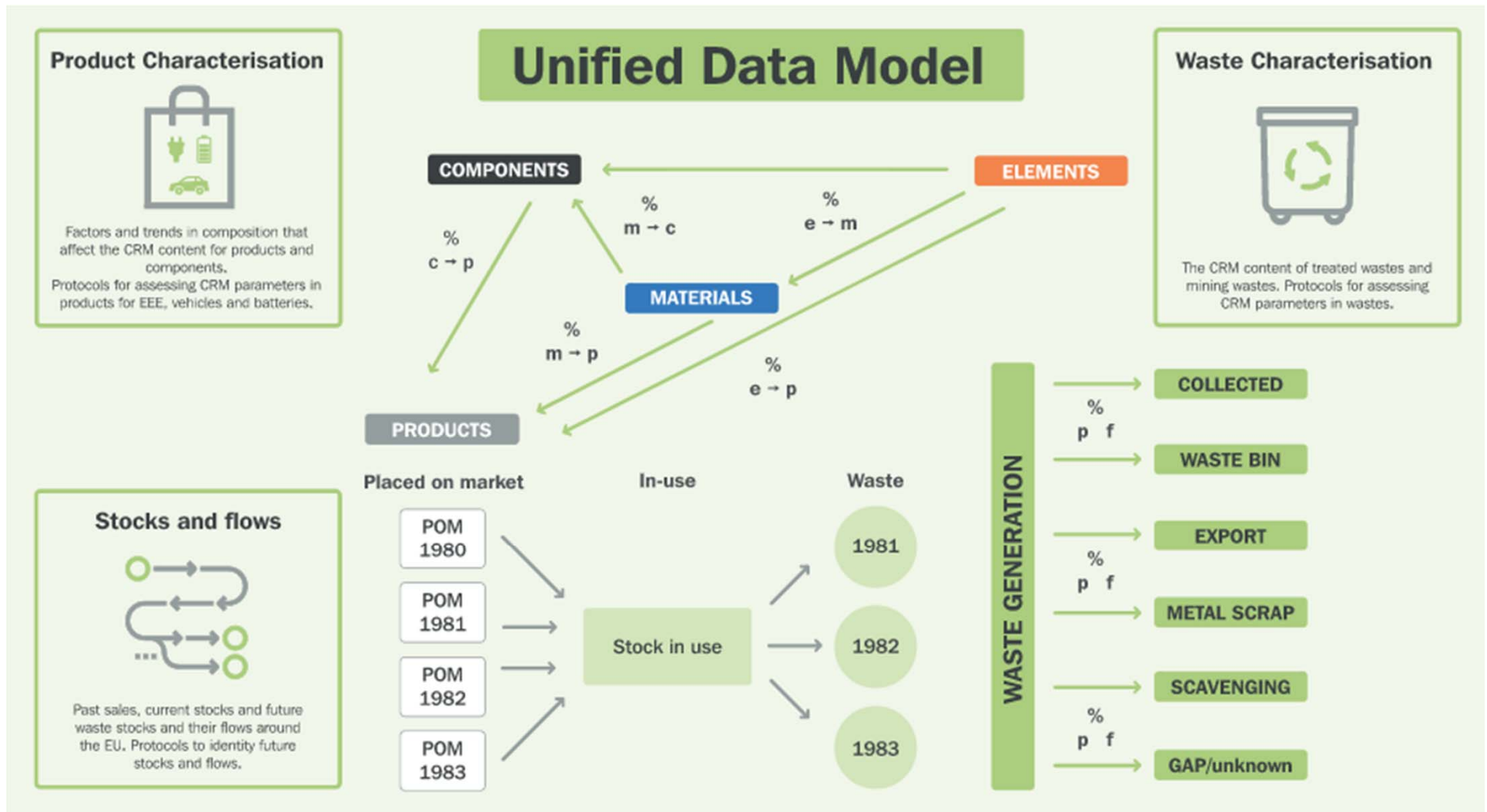


How?

- ✓ Conceptual Framework
 - ✓ Definitions, concepts
 - ✓ Classifications
- ✓ Generated data
 - ✓ based on EU-statistics + models
 - ✓ Compositional data from industry
- ✓ Focus on Critical Raw Materials (CRM), and components with CRM
- ✓ Contains latest available data > 800 sources!
 - ✓ Statistics, scientific literature, government reports, field study
- ✓ Automated data processing

Framework

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Real circular economy monitoring

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- What is the efficiency of gold recovered from E-waste in Europe?

A] 25%

B] 50%

C] 75%

D] 90%



2015

Precious Metals in tonnes

Stock

WEEE

EEE = Cooling & C&F Freezing
Ag - Silver: 2.8 ton
Au - Gold: 1.2 ton
Pd - Palladium: 0.1 ton

EEE Products in Stock EU28+2

128 million ton

C&F = 27 million ton Cooling and Freezing
Screens = 10 million ton of Displays
Lamps = 0.5 million ton of Energy Saving Lamps
LHA = 51 million ton Large Household Appliances
SHA = 33 million Small Household Appliances
IT = 6 million ton Information Technology

Elements in reported collection

Placed on Market

EEE - C&F

Ag - Silver: 0.2 ton
Au - Gold: 0.1 ton

EEE - Screens

Ag - Silver: 43.2 ton
Au - Gold: 10.6 ton
Pd - Palladium: 1.9 ton

EEE - Lamps

Ag - Silver: 0.2 ton
Au - Gold: 0.1 ton

EEE - LHA

Ag - Silver: 16.7 ton
Au - Gold: 1.4 ton
Pd - Palladium: 0.2 ton

EEE - SHA

Ag - Silver: 21.3 ton
Au - Gold: 2.5 ton
Pd - Palladium: 0.7 ton

EEE - IT

Ag - Silver: 48.9 ton
Au - Gold: 10.9 ton
Pd - Palladium: 2.6 ton
Pt - Platinum: 0.1 ton

EEE Lamps

Ag - Silver: 1.4 ton
Au - Gold: 1.1 ton
Pd - Palladium: 0.3 ton

Ag - Silver: 508.2 ton
Au - Gold: 106.5 ton
Pd - Palladium: 22.0 ton

Products POM EU28+2

11.6 million ton

EEE LHA
Ag - Silver: 235.0 ton
Au - Gold: 20.9 ton
Pd - Palladium: 3.2 ton
Pt - Platinum: 0.2 ton

EEE SHA
Ag - Silver: 230.0 ton
Au - Gold: 20.7 ton
Pd - Palladium: 7.2 ton
Pt - Platinum: 0.2 ton

EEE IT
Ag - Silver: 371.8 ton
Au - Gold: 82.6 ton
Pd - Palladium: 18.9 ton
Pt - Platinum: 0.7 ton

Waste Generated

Ag - Silver: 47.4 ton
Au - Gold: 8.1 ton
Pd - Palladium: 2.2 ton
Pt - Platinum: 0.1 ton

3.8 million ton

Collected and Reported

Waste + used products

10.3 million ton

Ag - Silver: 165.1 ton
Au - Gold: 31.3 ton
Pd - Palladium: 7.5 ton
Pt - Platinum: 0.2 ton

Ag - Silver: 117.7 ton
Au - Gold: 23.2 ton
Pd - Palladium: 5.3 ton
Pt - Platinum: 0.1 ton

Unaccounted waste flows



6.4 million ton

WEEE - C&F
Ag - Silver: 0.1 ton

WEEE - Screens
Ag - Silver: 17.5 ton
Au - Gold: 1.9 ton
Pd - Palladium: 0.7 ton

WEEE - Lamps
Ag - Silver: 0.0 ton

WEEE - LHA
Ag - Silver: 2.0 ton
Au - Gold: 0.2 ton

WEEE - SHA
Ag - Silver: 6.8 ton
Au - Gold: 0.9 ton
Pd - Palladium: 0.4 ton

WEEE - IT
Ag - Silver: 21.0 ton
Au - Gold: 5.1 ton
Pd - Palladium: 1.2 ton

Disclaimer:

- The elements presented are a selection of the metal content. Battery content is excluded.
- Uncertainty is high for reported collection.
- Unknown and other whereabouts includes export of used products outside the EU and complementary recycling within the EU. It does not imply materials are 'lost'.
- See the meta-data at the ProSUM portal for more details, incl. an overview of all data sources used and their constraints.
- Most values rounded to two significant numbers.



Ag-Silver



Au-Gold



Pd-Palladium



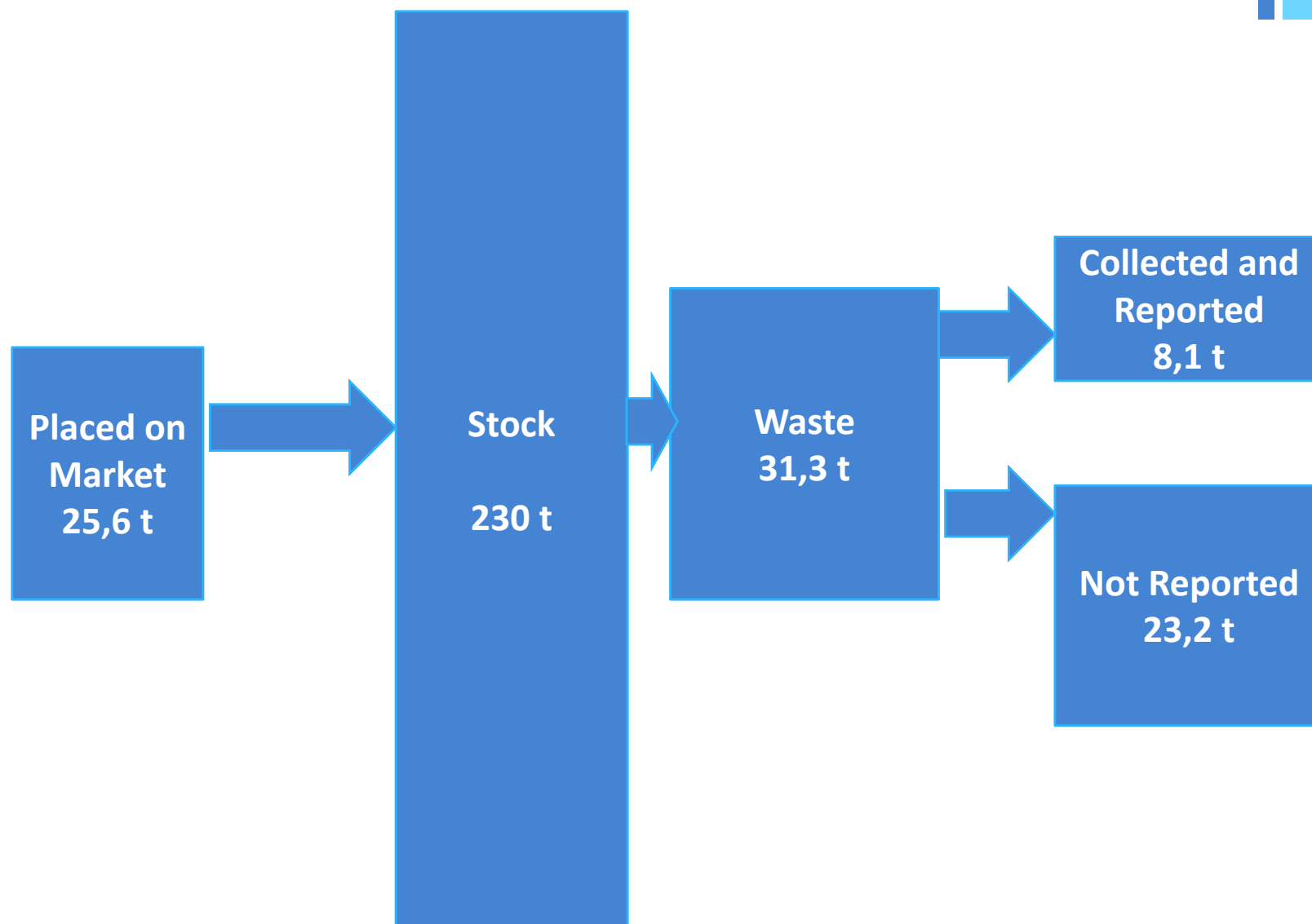
Pt-Platinum



Data with high uncertainty!

Gold in E-Waste

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Conclusion

- MFA are widely used in Dutch policy making
 - Circular Material Use
 - DMC
 - Material Footprints
- Need to zoom into 4 categories
 - Metals, Minerals, Biomass, Fossil
- But...sometimes more detailed data is needed
 - Then substance flow accounting is needed
 - With current data, we can compile similar data also for Kazakhstan, and other countries in the region