MinFuture

Metal trade statistics and linking trade to the production of metals

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Agenda

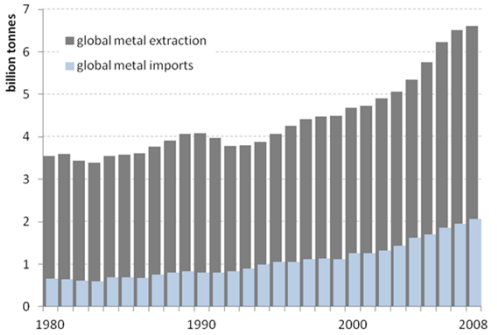
1. Statistics of trade in metals
2. Linking trade data to production data
3. Conclusion

Trade in metal – introduction

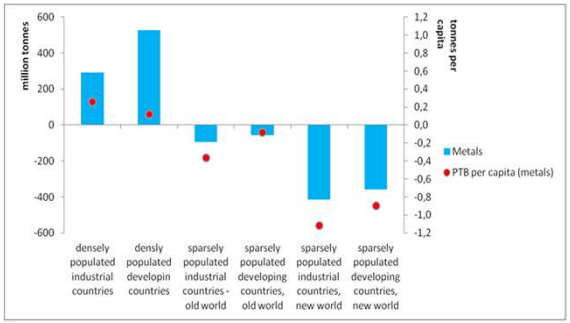
- Unequal geographic distribution of mined metals leads to high share of trade compared to extraction

- Relatively constant distribution of supplying and demanding countries in recent decades, but changes in intermediate processing steps

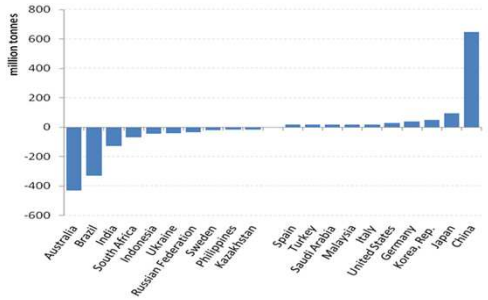
- Remarkable spread between importing and exporting countries and high import dependency in metals of those countries without sufficient domestic sources and high demand



Global metal extraction and trade, 1980–2008
UNEP, 2015



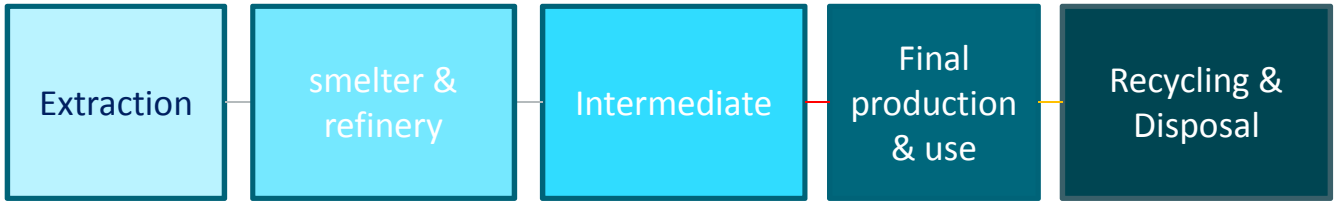
Metal trade according to population density and development status
UNEP, 2015



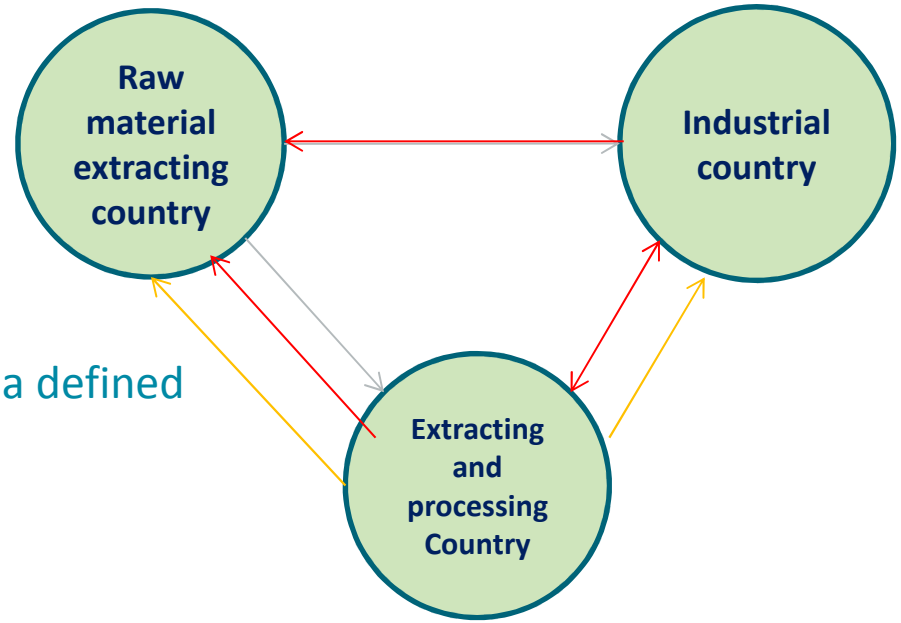
Main net suppliers and main net importers of metals in the year 2010
UNEP, 2015

Spatio-temporal trade data vs. a material-oriented life-cycle perspective

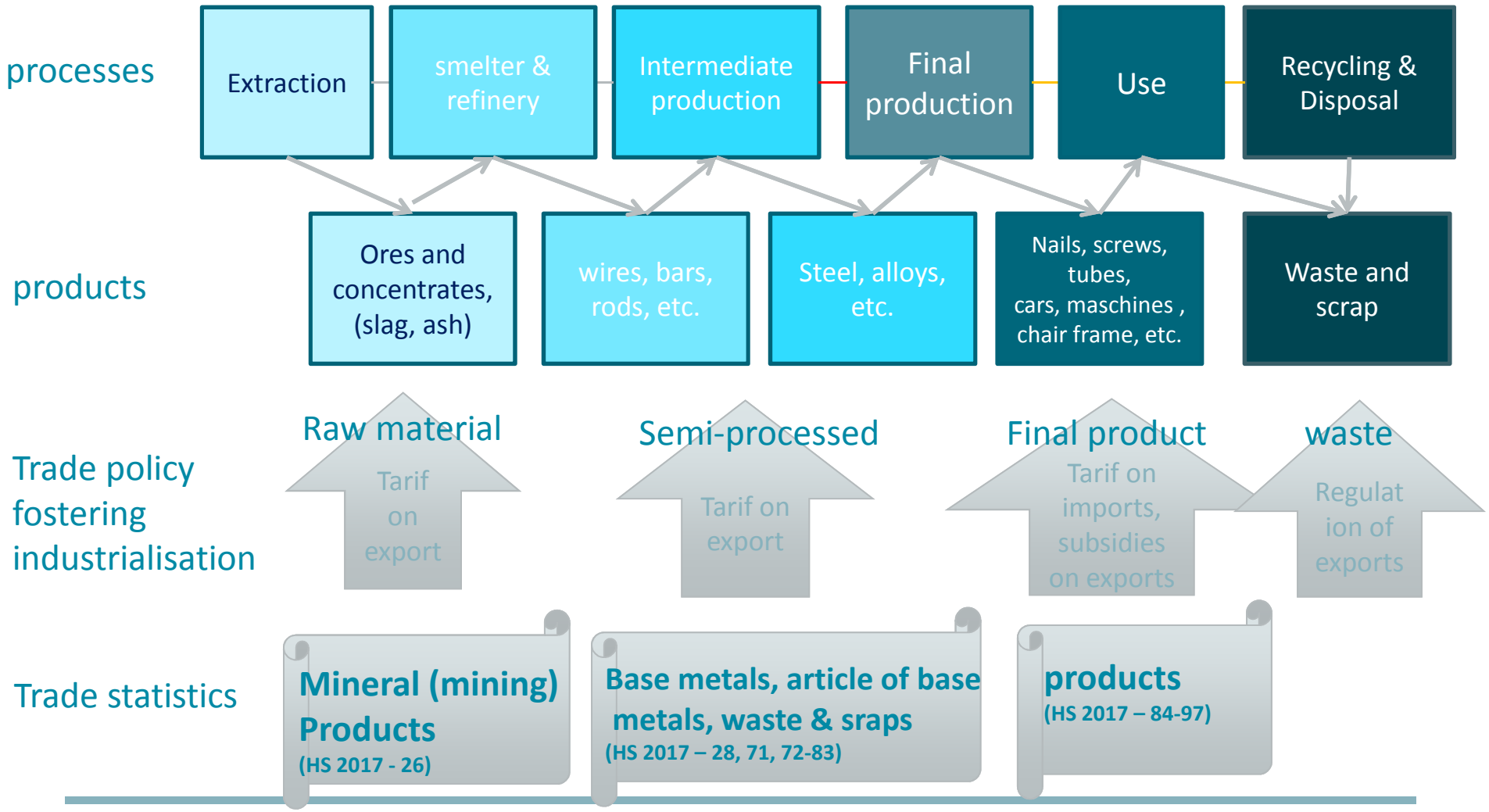
Raw material data with a perspective on the life cycle



Trade data with a perspective on region (country) and a defined time period (year)



Advantage of trade statistics

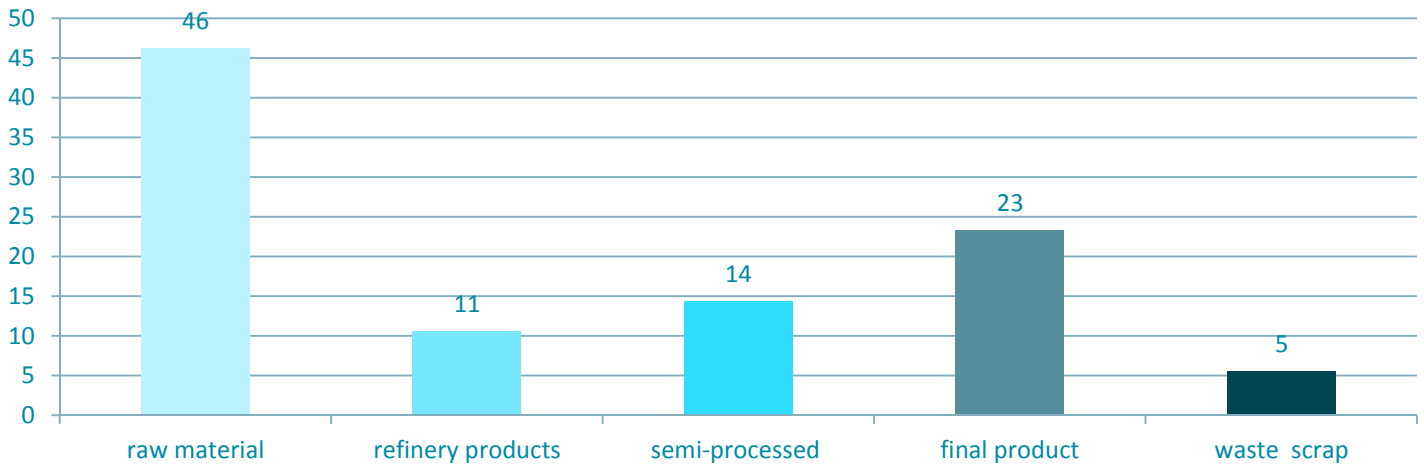


Overview on distribution of metal trade

products

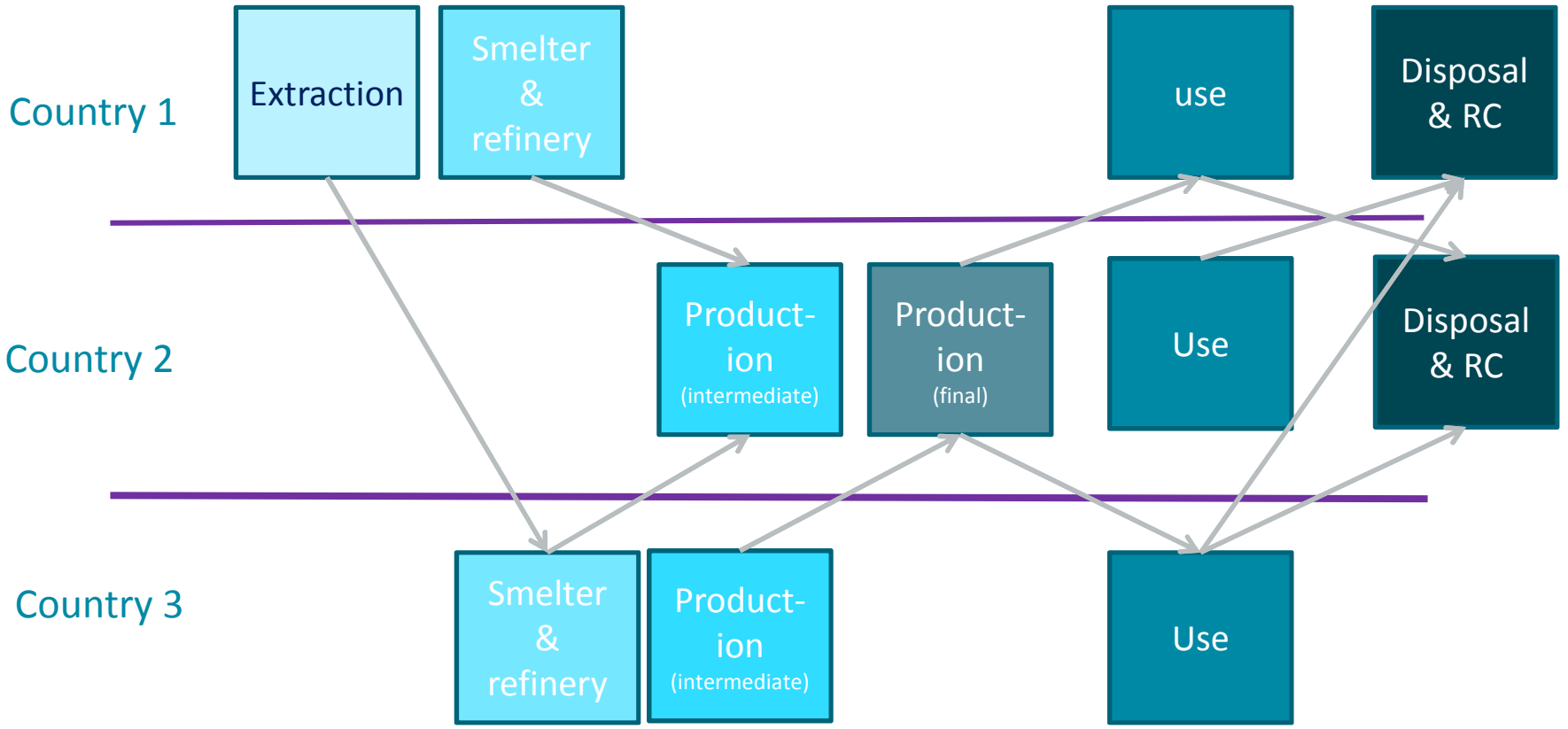
Ores and concentrates, (slag, ash)	wires, bars, rods, etc.	Steel, alloys, etc.	Nails, screws, tubes, cars, maschines , etc.	Waste and scrap

Distribution (% of weight) of trade in metals according to processing, 2010

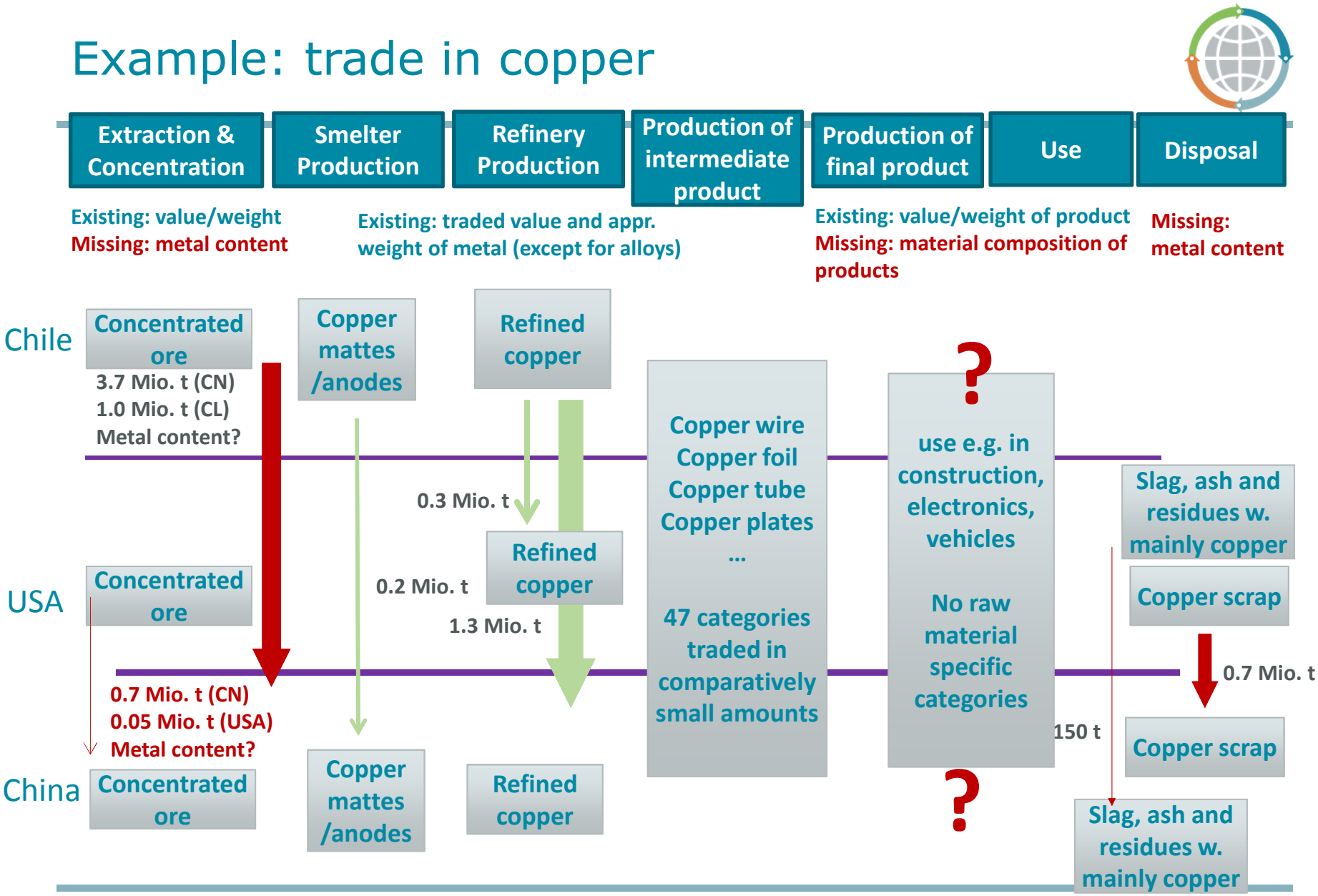


Linking trade and material use data

Trade data depicts only the flows crossing borders (horizontal lines).



Example: trade in copper



Example 1: Copper in HS Classification

Extraction	Smelter Production	Refinery Production	Intermediate products	Final product & use	Disposal
H4-2603 Copper ores and concentrate .	**H4-7401** Copper mattes; cement copper. **H4-7402** Unrefined copper; anodes for electrolytic refining.	**H4-740311** Refined copper : // -- Cathodes and sections of cathodes **H4-740312** -- Wire-bars **H4-740313** -- Billets **H4-740319** -- Other **H4-740321** Copper alloys : // -- Brass **H4-740322** --Bronze **H4-740329** --Other copper alloys	**H4-740610** **H4-740620** **H4-740710** **H4-740721** **H4-740729** **H4-740811** **H4-740819** **H4-740821** **H4-740822** **H4-740829** **H4-740911** **H4-740919** **H4-740921** **H4-740929** **H4-740931** **...** e.g. plates, wire, tubes, nails, household articles, foil **(47 categories)**	e.g. cables, electronic devices, cars, maschines, etc. **(not raw material specific)**	**H4-7404** Copper waste and scrap. **H4-262030** Slag, ash and residues containing mainly copper.

Example 2: Chromium in HS Classification

Extraction	Production & Intermediate products	Final product & use	Disposal
H4-2610 Chromium ores and concentrates. **Metal content missing**	**H4-811221** Chromium unwrought; powders **H4-811229** Chromium; --other **H4-720241** Ferro-alloys; ferro-chromium, containing by weight more than 4% of carbon **H4-720249** --containing by weight 4% or less of carbon **H4-720250** Ferro-alloys; ferro-silico-chromium **H4-721050** Iron or non-alloy steel; flat-rolled, width 600mm or more, plated or coated with chromium oxides or with chromium and chromium **oxides** **Chromium content of alloys partly known**	e.g. for tanning, surface treatment, **(no raw material specific categories)**	**H4-811222** Chromium: -- waste and scrap **Chromium content missing** **H4-262091** Slag, ash and residues containing antimony, beryllium, cadmium, chromium or their mixtures **Only aggregated with other metals**

Example 3: Gallium in HS Classification

Extraction	Production & Intermediate products	Final product & use	Disposal
	H4-811292 Beryllium, chromium, germanium, vanadium, gallium, hafnium, indium, niobium (columbium), rhenium and thallium, and articles of these metals, including waste and scrap. // - Other : // -- Unwrought; waste and scrap; powders **H4-811299** -- Other **Aggregated with other metals and scrap**		

Comtrade – data availability by metal

Raw Material	Ores	Slag	Refined and semi processed	Products	Waste/Scrap
Iron	Yes	Yes	Yes (HS 72/73)	Yes (HS 73)	Yes (HS 7204)
Copper	Yes	Yes	Yes (HS 74)	Yes (HS 74)	Yes (HS 74)
Zinc	Yes	Yes	Yes (HS 79)	Yes (HS 79)	Yes (HS 79)
Nickel	Yes	No	Yes (HS 75)	Yes (HS 75)	Yes (HS 75)
Antimony	Yes	Agg.	Yes (HS 8110.10)	As other (HS 8110.90)	Yes (HS 8110.20)
Chromium	Yes	Agg.	Yes (HS 8112.21)	As other (HS 8112.29)	Yes (HS 8112.29)
Cobalt	Yes	No	Yes (HS 8105.20)	Yes (HS 8105.20/90)	Yes (HS 8105.30)
Coking coal	No	No	No (coal in general only)	No	No
Fluorspar	No	No	Yes (HS 2529)	No	No
Gallium	No	No	Agg.(HS 8112.92)	Agg. & as other (HS 8112.99)	Agg. & with metal (HS 8112.99)
Platinum Group Metals	Agg.	No	Yes (Pd, Pt, Rh, agg. (Ir, Os, Ru)	Yes	Agg. (HS 7112.92)
Heavy Rare Earth Elements	No	No	Agg. (HS 2805.30)	No	No
Light Rare Earth Elements	No	No	Agg. (HS 2805.30)	No	No
Silicon Metal	No	No	Yes (HS 2804.61)	No	No
Tungsten	Yes	No	Yes (HS 8101.94)	Yes (HS 8101.96/99)	Yes (HS 8101.97)
Silver	Yes	No	Yes (HS 7106)	Yes (HS 71)	Agg.

Linking trade and material use data

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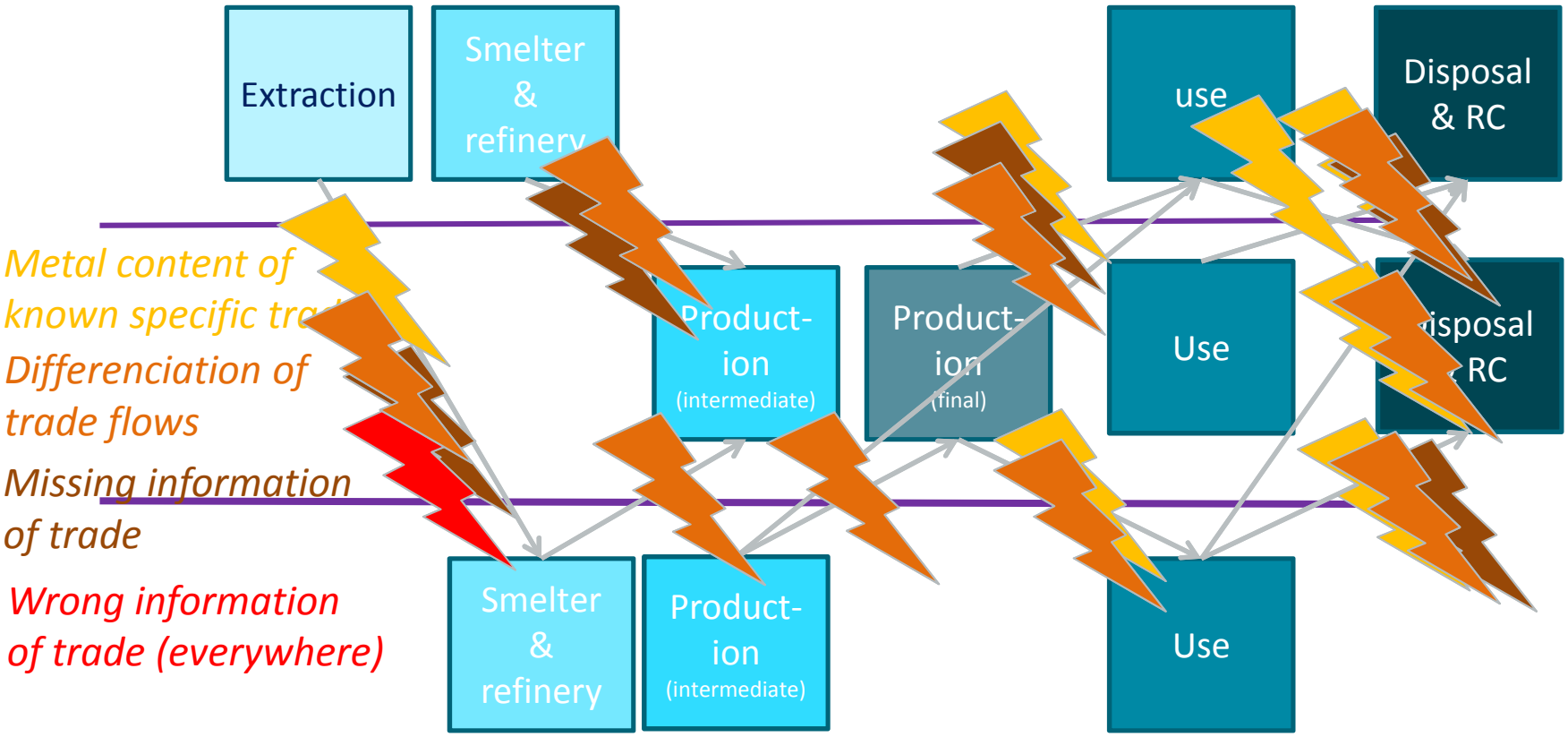

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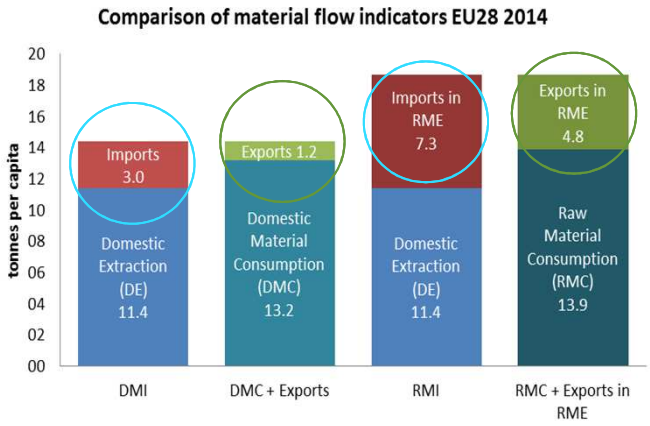
How do we combine trade information with economic activities in countries?

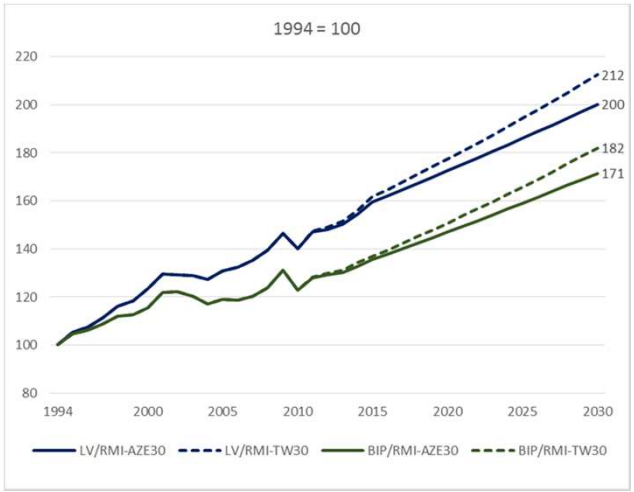
- On behalf of Eurostat, calculation of RME of im- / exports of EU-28
- On behalf of UBA, development of German model URMOD for predicting raw material demand (RMI & RMC)

Comparison of indicators EU 28, 2014 Schoer et al., 2016



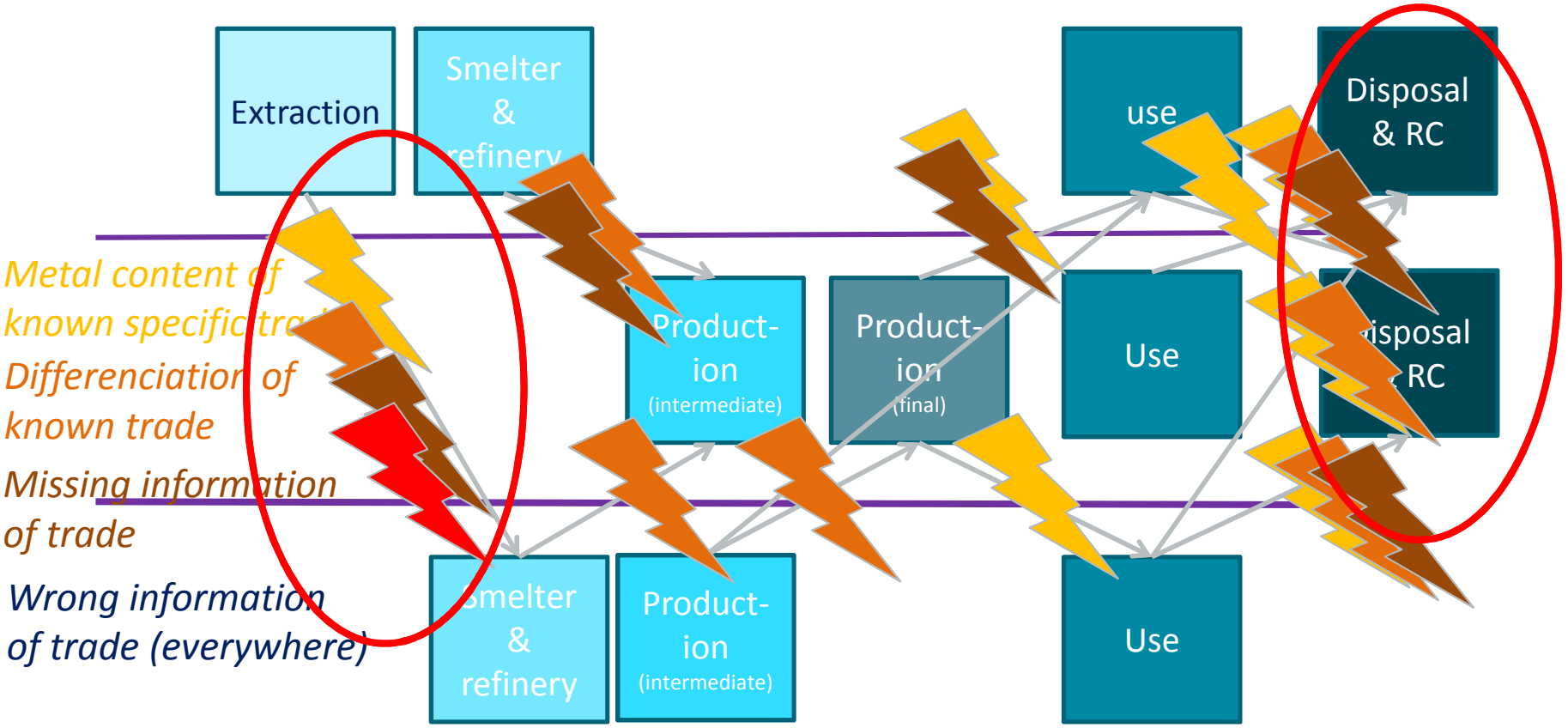
- Challenges:
  - Estimation of material embodied in imports from other countries ($RME_{imports}$) and
  - estimation of materials embodied in exports from domestic extraction and imports ($RME_{exports}$)

2 scenario on resource efficiency of Germany (Dittrich et al., forthcoming)

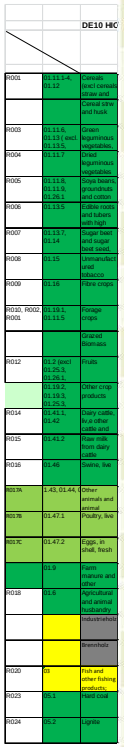


Most crucial & sensitive for results

Trade data depicts only the flows crossing borders (horizontal lines).



Working with high resolution IOT – Germany



07.1	Iron ores	1000 t metal
07.21	Uranium and thorium ore	
07.29.11	Copper ores and concentr	
07.29.12	Nickel ores and concentra	
07.29.13	Aluminium ores and conc	
07.29.14.a	Gold	
07.29.14.b	Silver	
07.29.14.c	Platinum MG	
07.29.15.a	Lead	
07.29.15.b	Zinc	
07.29.15.c	Tin	
07.29.19.a	Tungsten ores and concer	
07.29.19.b	Tantalum ores and concer	
07.29.19.c	Magnesium ores and conc	
07.29.19.d	Titanium ores (Ilmenite) a	
07.29.19.e	Manganese ores and conc	
07.29.19.f	Chromium ores and conce	
07.29.19.g	Other ores and concentra	

24.1-3	Basic iron and steel and ferro-alloys (excl gazes)	1000 t metal
B-24.1-24.3	Blast Furnace Gas,	
O-24.1-24.3	Oxygen Steel Furnace Gas	
S-24.1-24.3	Granulierte Schlacke (Schlacke u.a.Schlacken	
24.41.1, 24.41.4, 24.41.5, 24.41.9	Silver, unwrought or in semi-r or in powder form	
24.41.2	Gold, unwrought or in semi-m or in powder form	
24.41.3	Platinum, unwrought or in ser forms, or in powder form	
24.42	Aluminium	
24.43.11, 24.43.21, 24.43.9	Lead	
24.43.12, 24.43.22, 24.43.23	Zinc	
24.43.13, 24.43.24	Tin	
24.44	Copper	
24.45.1, 24.45.2, 24.45.9	Nickel, unwrought; intermedi nickel metallurgy	
24.45.3.a	Tungsten products	
24.45.3.b	Tantalum products	
24.45.3.c	Magnesium products	
24.45.3.d	Titanium products	
24.45.3.e	Manganese products	
24.45.3.f	Chromium products	
24.45.3.g	Other non-ferrous metal prod	
24.46	Processed nuclear fuel	
24.51	Casting services of iron	
24.52	Casting services of steel	
24.53	Casting services of light metal	
24.54	Casting services of other non-	

38 others	Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services, excl waste of metals, glass, paper, rubber, textile, wood and macadam , excl recycling	Mio EUR
T.a.38.3	Stoffliche Verwertung Abfälle - Holz	1000 t
T.a.38.3	Stoffliche Verwertung Abfälle - Papier	1000 t
T.a.38.3	Stoffliche Verwertung Abfälle - Plastik sortenrein	1000 t Plastikäqui-valent
T.a.38.3	Stoffliche Verwertung Abfälle - Plastik nicht sortenrein	1000 t
T.a.38.3	Stoffliche Verwertung Schrott und Abfälle - Eisen und Stahl	1000 t metal content
T.a.38.3	Stoffliche Verwertung Schrott und Abfälle - Kupfer	1000 t metal content
T.a.38.3	Stoffliche Verwertung Schrott und Abfälle - Aluminium	1000 t metal content
T.a.38.3	Sonstige Abfälle	Mio EUR
T.a.38.3	Stoffliche Verwertung Abfälle - zur Verwendung im Hochbau	1000 t
T.a.38.3	Stoffliche Verwertung Abfälle - zur Verwendung im Verkehrswegebau	1000 t
T.a.38.3	Energetisch verwertete Abfälle - Holz- und Bioabfälle	1000 TOE
T.a.38.3	Energetisch verwertete Bioabfälle - zur Biokraftstofferzeugung	1000 TOE
T.a.38.3	Energetisch verwertete Bioabfälle - zur Biogaserzeugung	1000 TOE
T.a.38.3	Energetisch verwertete Abfälle - Deponiegas	1000 TOE
T.a.38.3	Energetisch verwertete Abfälle - Klärschlammgas	1000 TOE
T.a.38.3	Energetisch verwertete Abfälle - Hausmüll	1000 TOE
T.a.38.3	Energetisch verwertete Abfälle - Industrieabfälle	1000 TOE

URMOD

Procedure of linking, „simplyfied“ steps

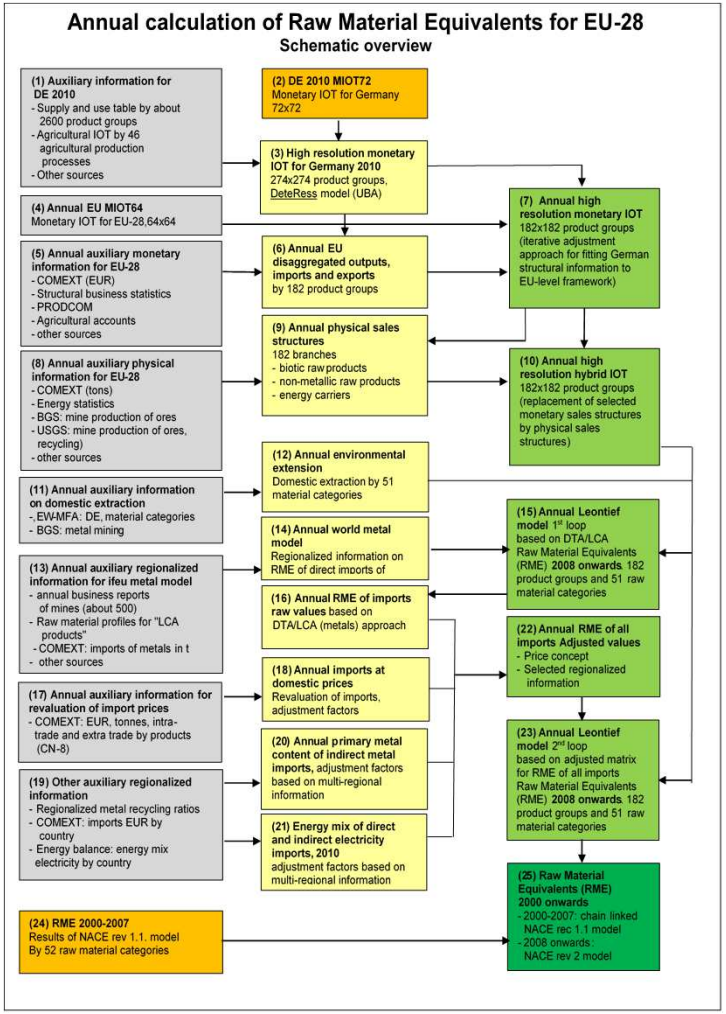
- Production statistics => IOT of country / region
- Trade statistics => VGR

- Use further information on production (various sources incl. SBS etc), trade (dito) and recycling (dito) to reach high differentiation and thus high quality of IOT

- Include LCA-based statistics where there is no production in Germany/Europe

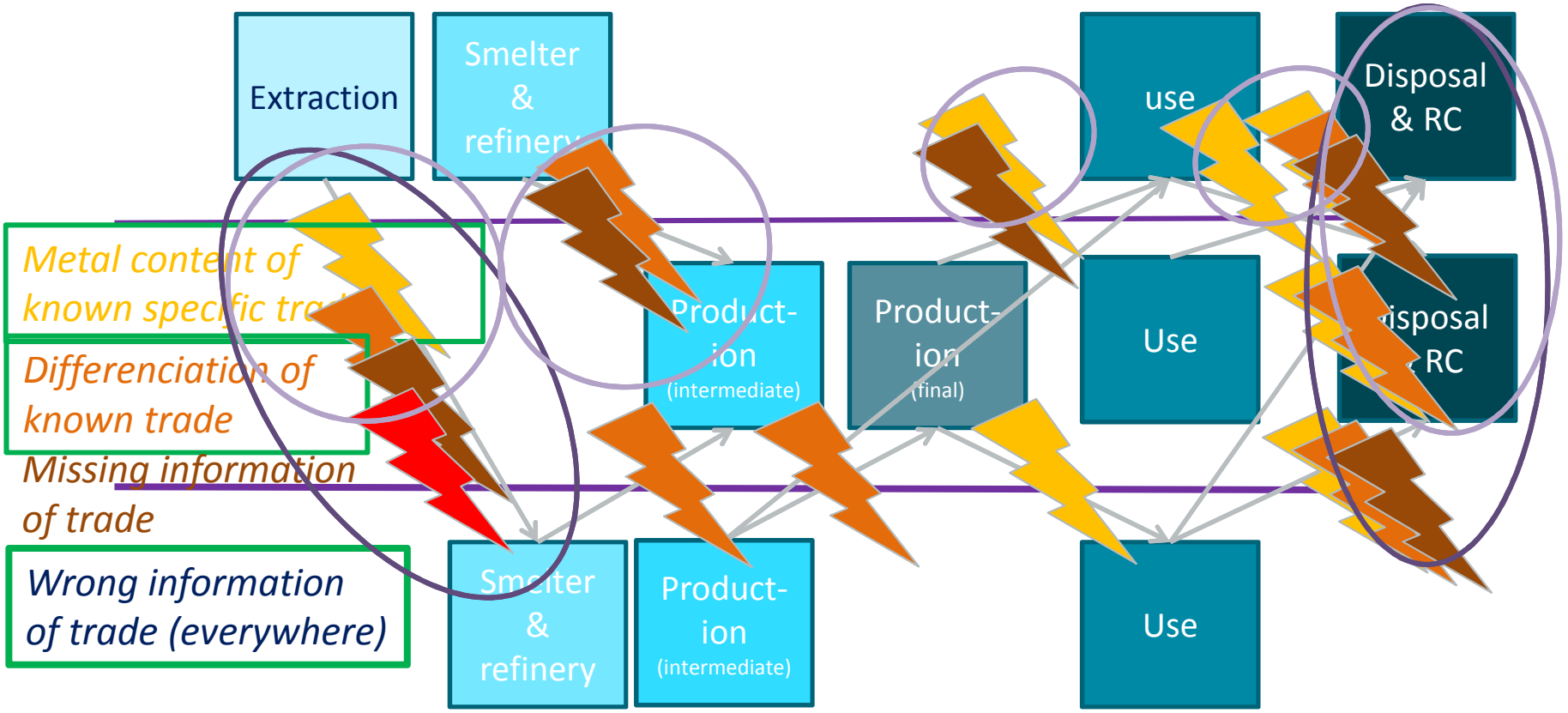
- Than: calculation of RME of imports and exports

Procedure in Eurostat RME-model



Conclusion: focus in MinFuture?

Trade data depicts only the flows crossing borders (horizontal lines).



Thank you for your attention!

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