Material Flow Analysis around the world

Perspectives and limitations for decision-makers

Case Study of copper for France and Oman

A. Thévenot, G. Sonnemann

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Outline

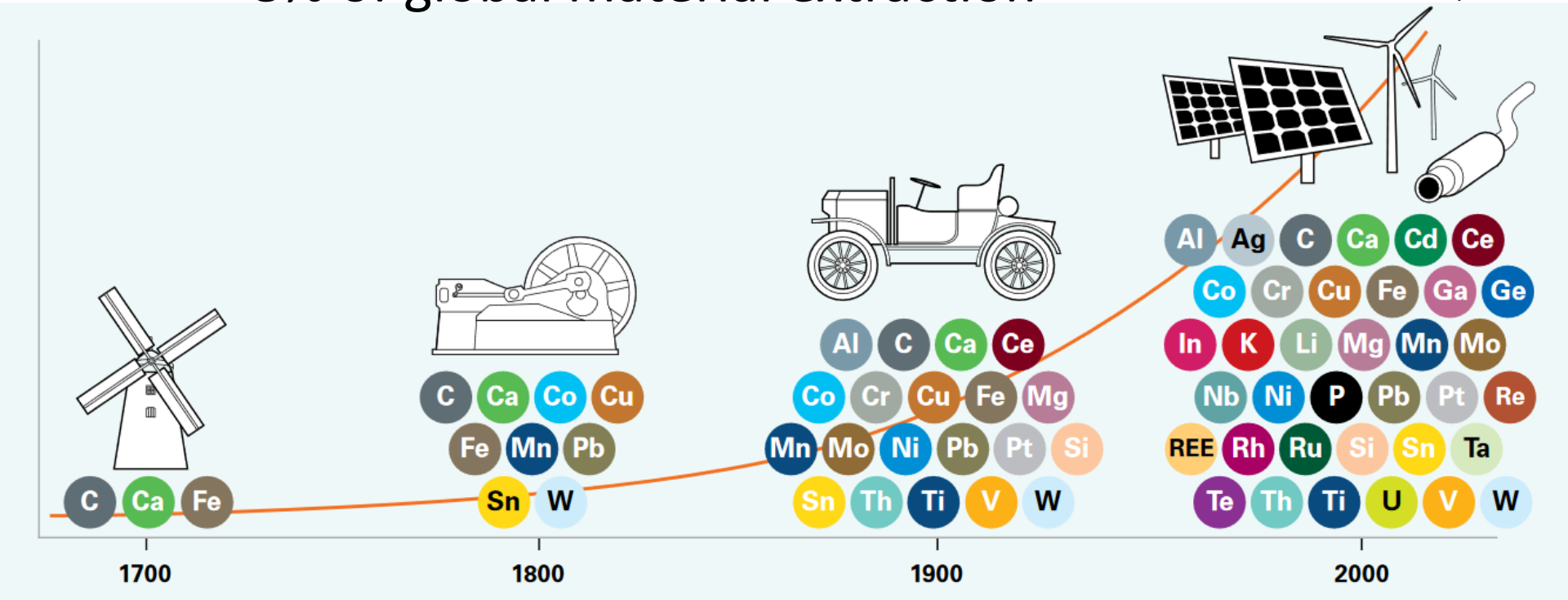
- Context of metal industry
- Objectives
- Method
- Results
- Conclusion

Context of metal industry

- Increase of metal demand…

8% of global material extraction

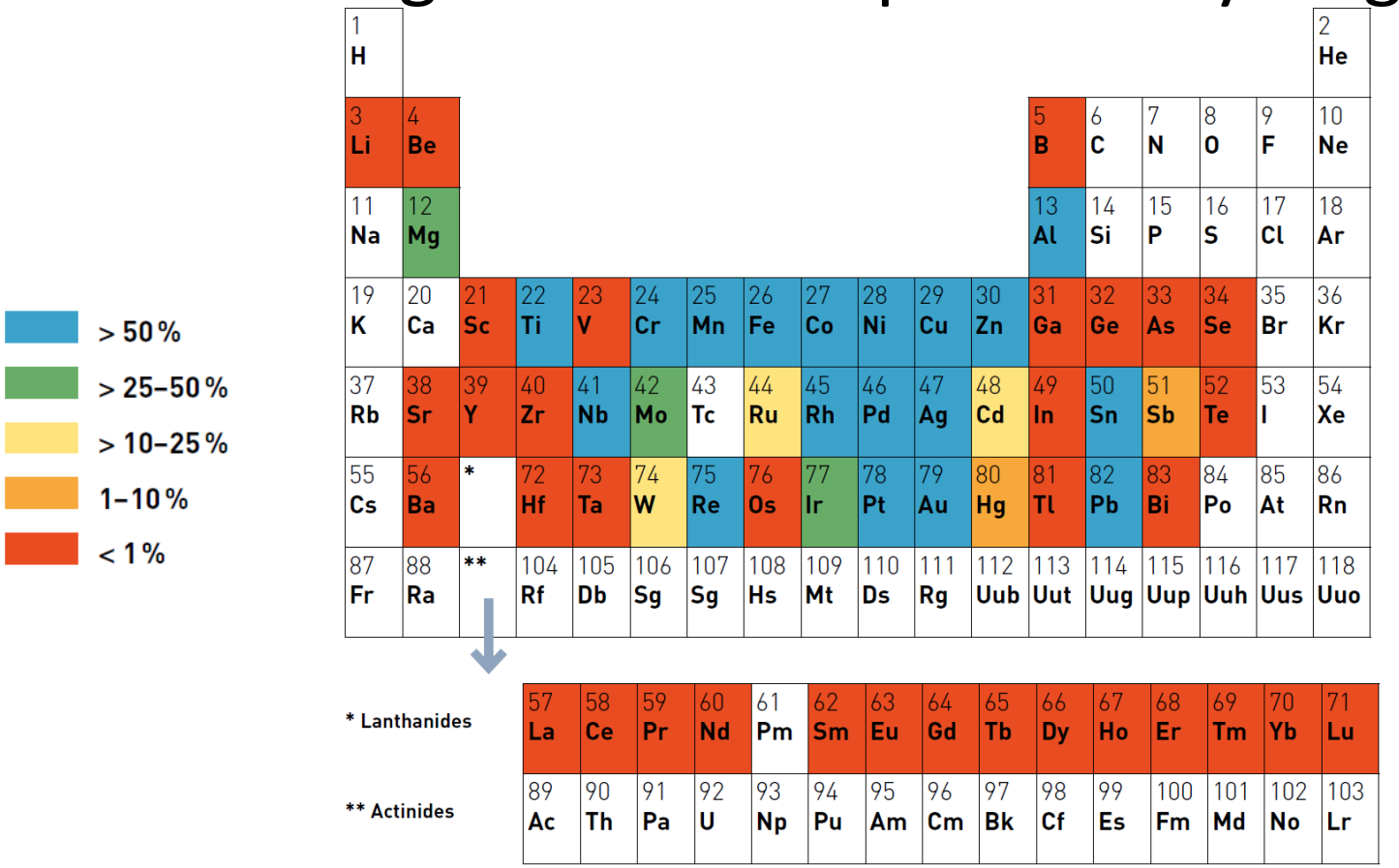
Source: *Haas et al., 2015*



Source: *Achzet and Reller, 2011*

Context of metal industry

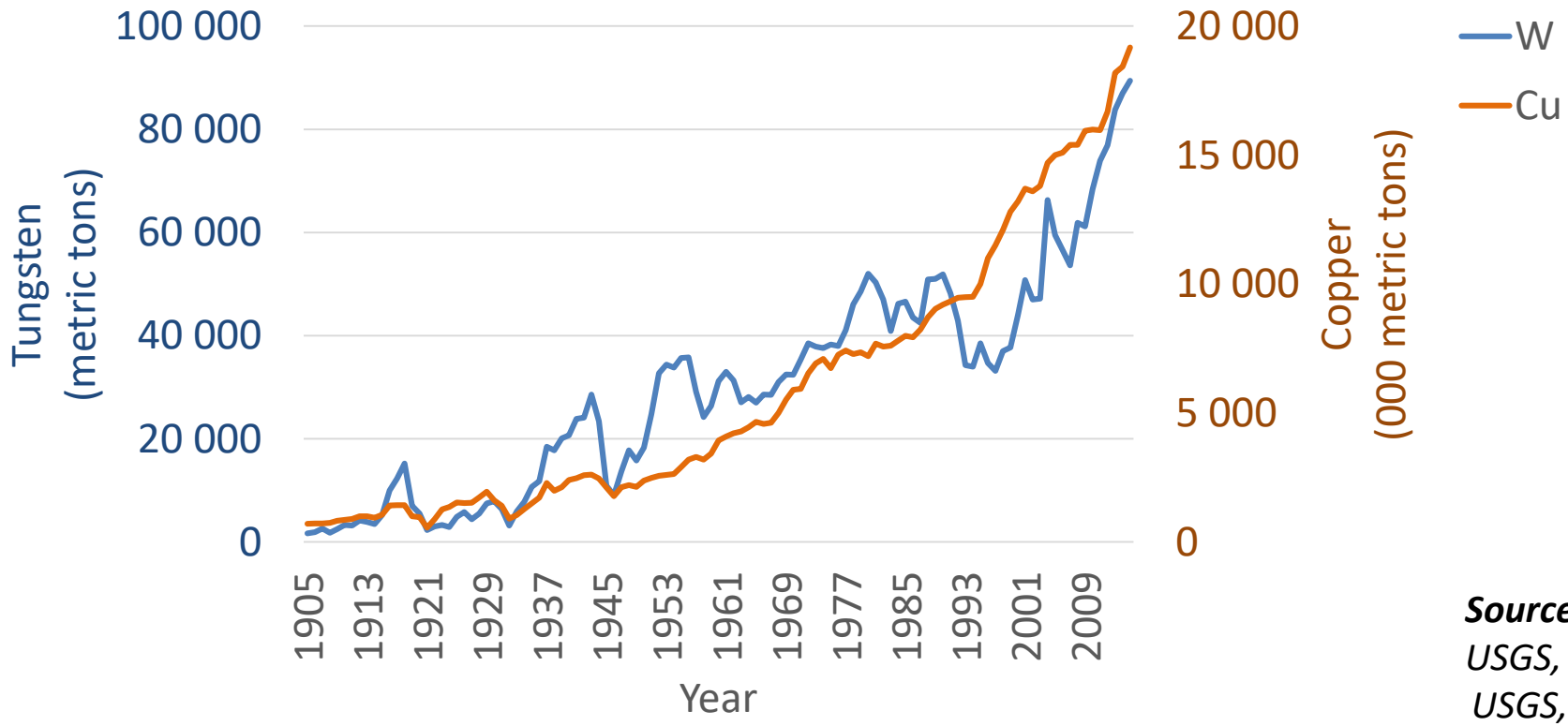
- … Though no follow up with recycling plan…



Source: *UNEP, 2011*

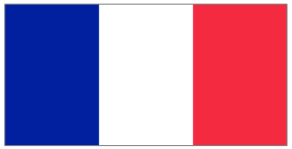
Context

- … And no decrease of world mining production.



Source:
USGS, 2009
USGS, 2017

Context: Case study



Context: Case study

Forming
↑
SX-EW
↑
Furnace
↑
Crushing

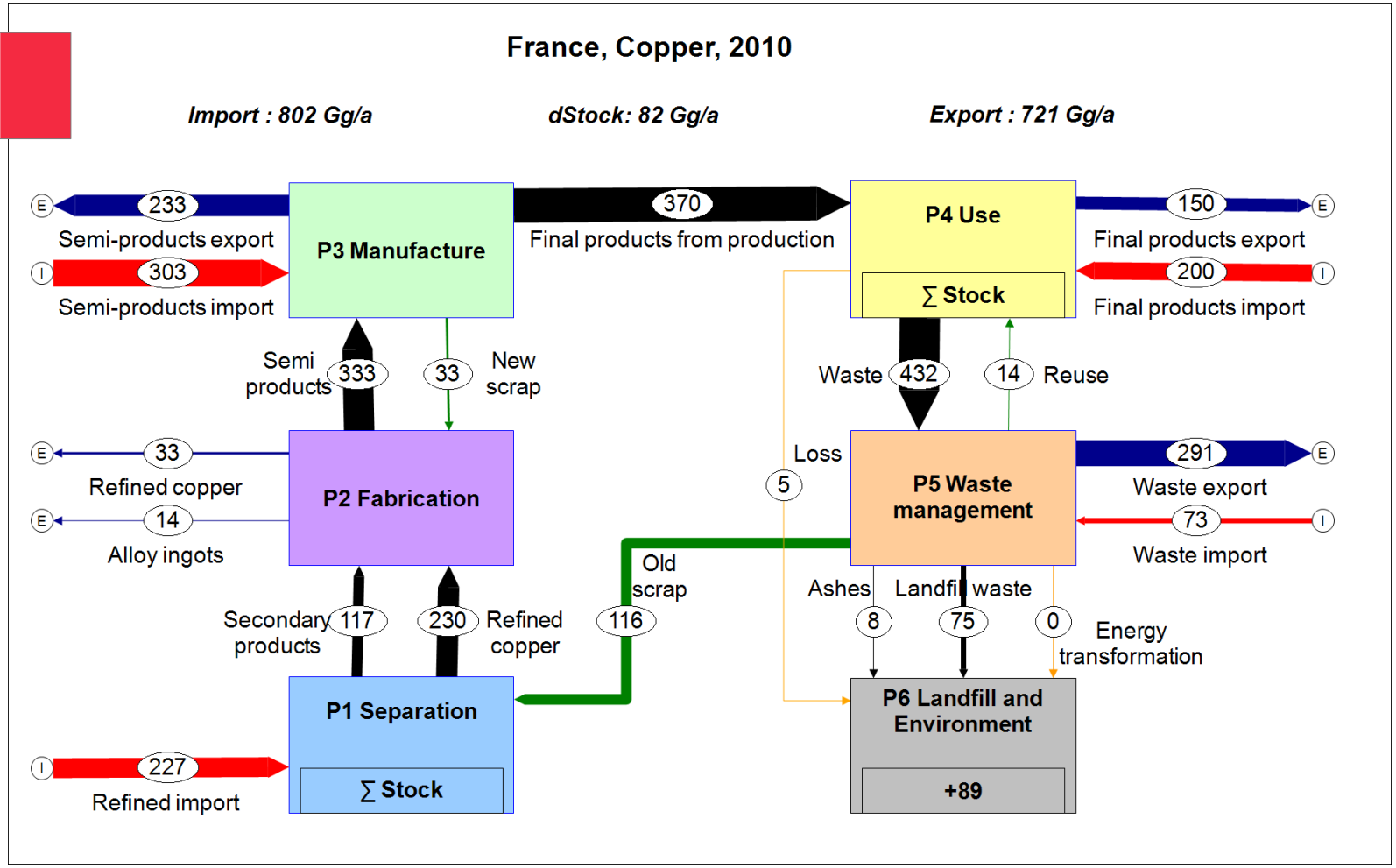
Objectives

1. Present MFA of copper for two countries;
2. Study the reliability of their data source;
3. Highlight of the process of decision-making.

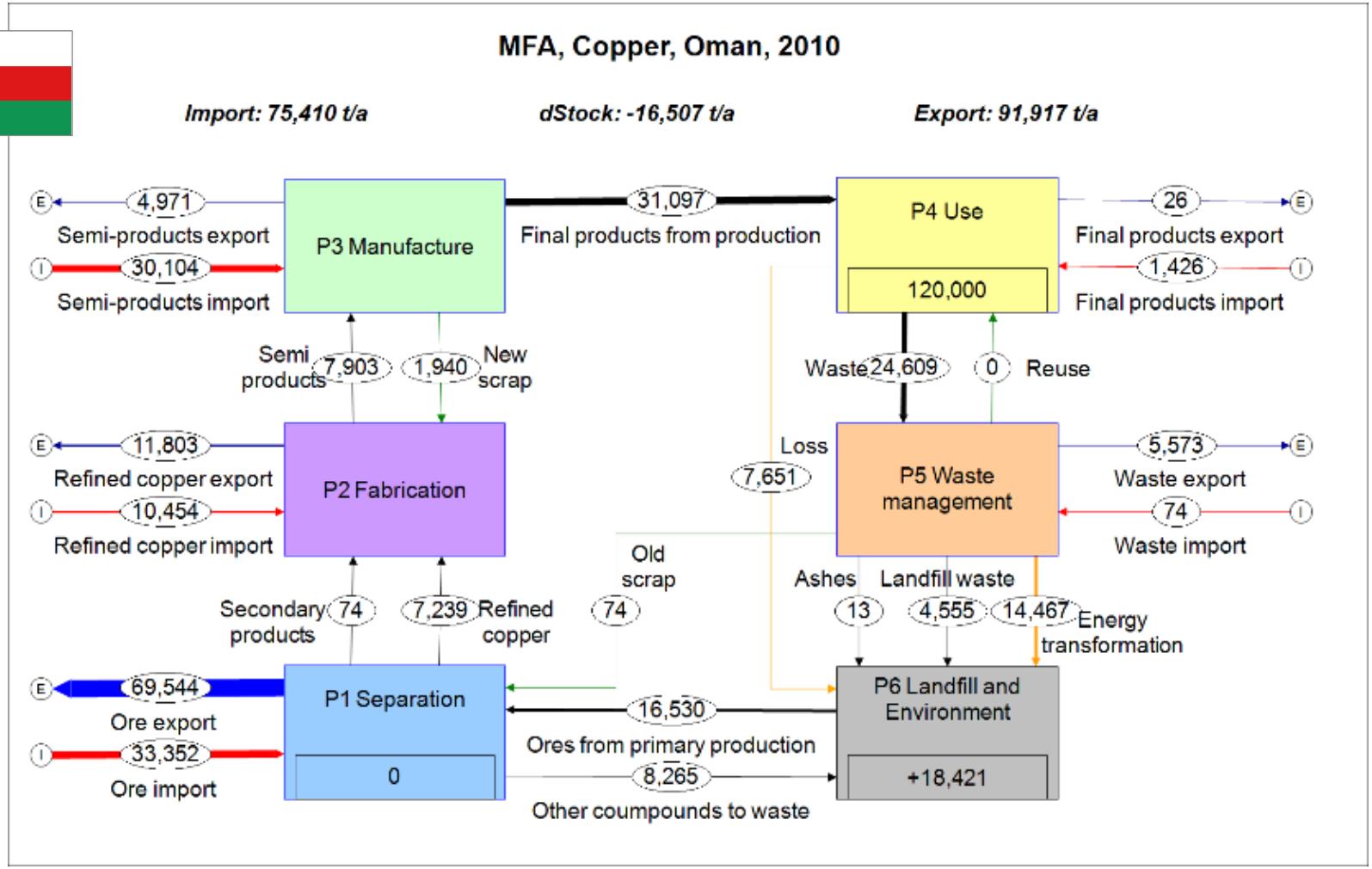
Method

- Use of most common flow representation:
  - Material Flow Analysis Brunner & Rechberger, 2003
  - STAN software
  - Illustration adapted from Guyonnet, 2014
- Study of data reliability
  - Bonnin, USGS, UNEP, Ademe, BRGM, UNcomtrade etc.
  - Assumptions
- Link with other countries

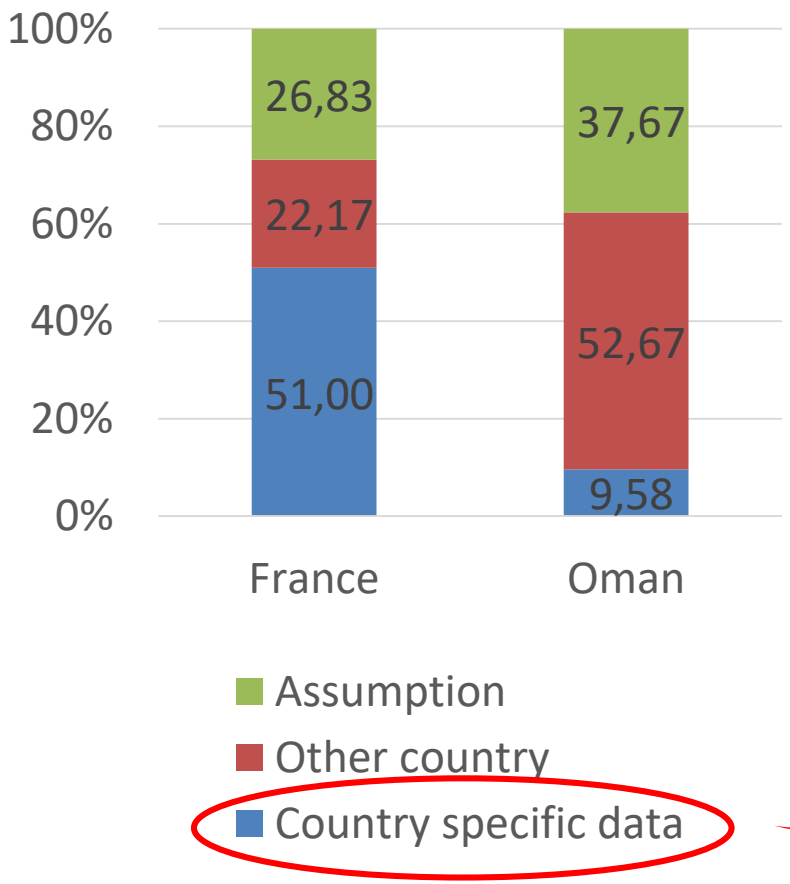
Results: MFA of Copper in 2010



Results: MFA of Copper in 2010



Discussion: Data source of MFA



		France	Oman
P1	Separation	43%	0%
P2	Fabrication	0%	0%
P3	Manufacture	100%	0%
P4	Use	63%	13%
P5	Waste Manag.	100%	45%
P6	Landfill & Env.	0%	0%

Conclusion

- Perspectives
  - Mining // Non-mining
  - Importance of country specific data
  - Need of standard

- Limitations
  - Analytic Hierarchy Process (AHP)
    - Scale of number to prioritise each element
    - « Indicator »
  - Material Flow Analysis (MFA)
    - Back to raw data to analyse countries' economy
    - « Process knowledge »

Source: *Saati, 2008*

History of import-export

« I should ask myself:

- Who owns the means of production in my country?
- What are its main imports and exports?
- What's the connection between the ruling politicians and international banking?

Only by common action can we change the system. »

Source: *Harari, 2017*

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amelie.thevenot@u-bordeaux.fr

guido.sonnemann@u-bordeaux.fr

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