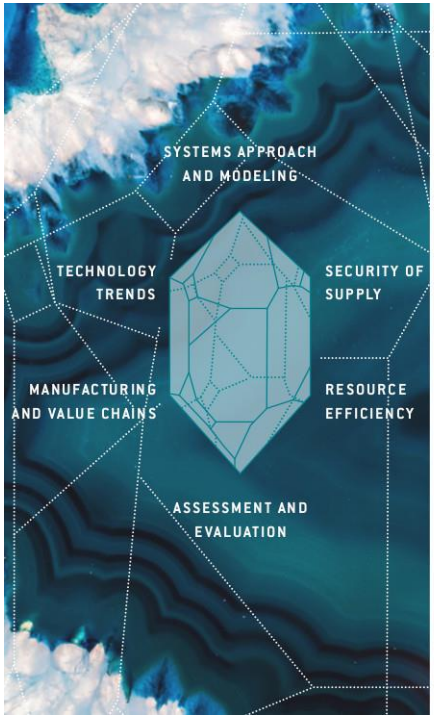
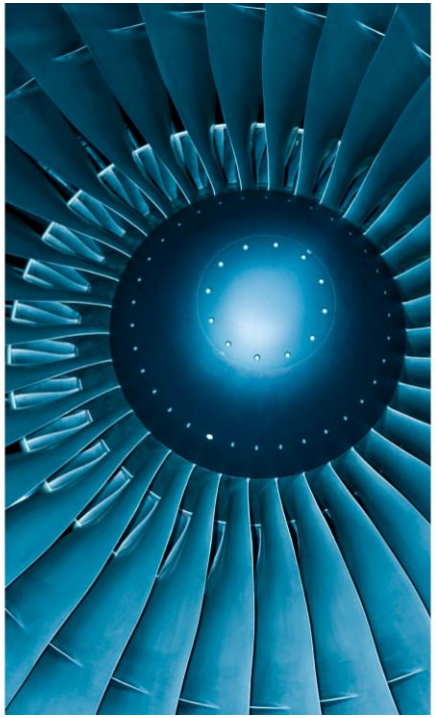
COPPER FROM CRADLE TO GRAVE TO REINCARNATION

ICA/IWCC workshop on trends in copper demand
Dr. Luis TERCERO ESPINOZA | London | 27 October 2017





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Legal Statement

The purpose of the information in the following presentations is to guide ICA programs and provide members with information to make independent business decisions.

Antitrust Guidelines for Copper Industry Trade Association Meetings

The following guidelines with respect to compliance with antitrust laws of the United States, Japan and European Community[1] are intended to govern the conduct of participants in copper industry trade association meetings, both at the meeting itself and in informal discussions before or after the formal meeting.

Price: Competitors should not discuss future prices (including terms of sale) of their products. There is no blanket prohibition against the mention of or reference to current or past prices but limits must be observed. Such references or mentions should occur only when necessary in connection with the development of association programs. For example, reference to a particular price level in comparing the cost of a copper product to a competing product is permitted. Whenever possible, such references should be discussed in advance with legal counsel.

Competitive Information: Competitors should not discuss the market share of a particular copper producer or copper fabricator's products. Furthermore, nothing should be said at a meeting which could be interpreted as suggesting prearranged market shares for such products or producer production levels. The overall market share of copper products may be discussed with regard to competition with non-copper products and general market acceptance.

New Products: Competitors should not encourage or discourage the introduction of a new product by another competitor or reveal a particular copper company's plans to change the production rate of an existing product or to introduce a new product. No company should disclose to another company whether it is in a position to make or market a new product. New products may be discussed in a technical manner or from the standpoints of competition with non-copper products and general market acceptance.
In addition, proposed methods for and results of field and laboratory testing can be considered.

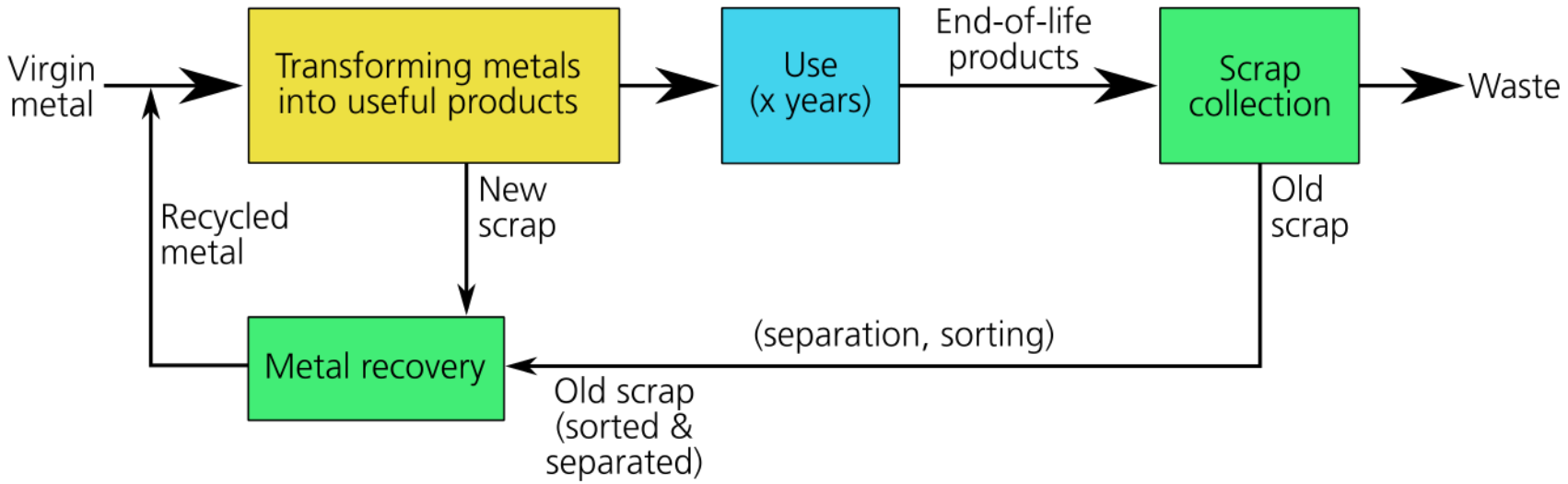
The Role of Legal Counsel: Legal counsel attends association meetings to advise association staff and other meeting attendees regarding the antitrust laws and to see that none of the matters discussed or materials distributed raise even the appearance of antitrust improprieties. During the course of a meeting, if counsel believes that the discussion is turning to a sensitive or inappropriate subject, counsel will express that belief and request that the attendees return the discussion to a less sensitive area.

A paper entitled 'Copper Industry Trade Associations and Antritrust Laws' is available upon request. 10/92, 5/93, 10/10

1. Other foreign competition laws apply to International Copper Association, Ltd. (ICA)'s activities worldwide.

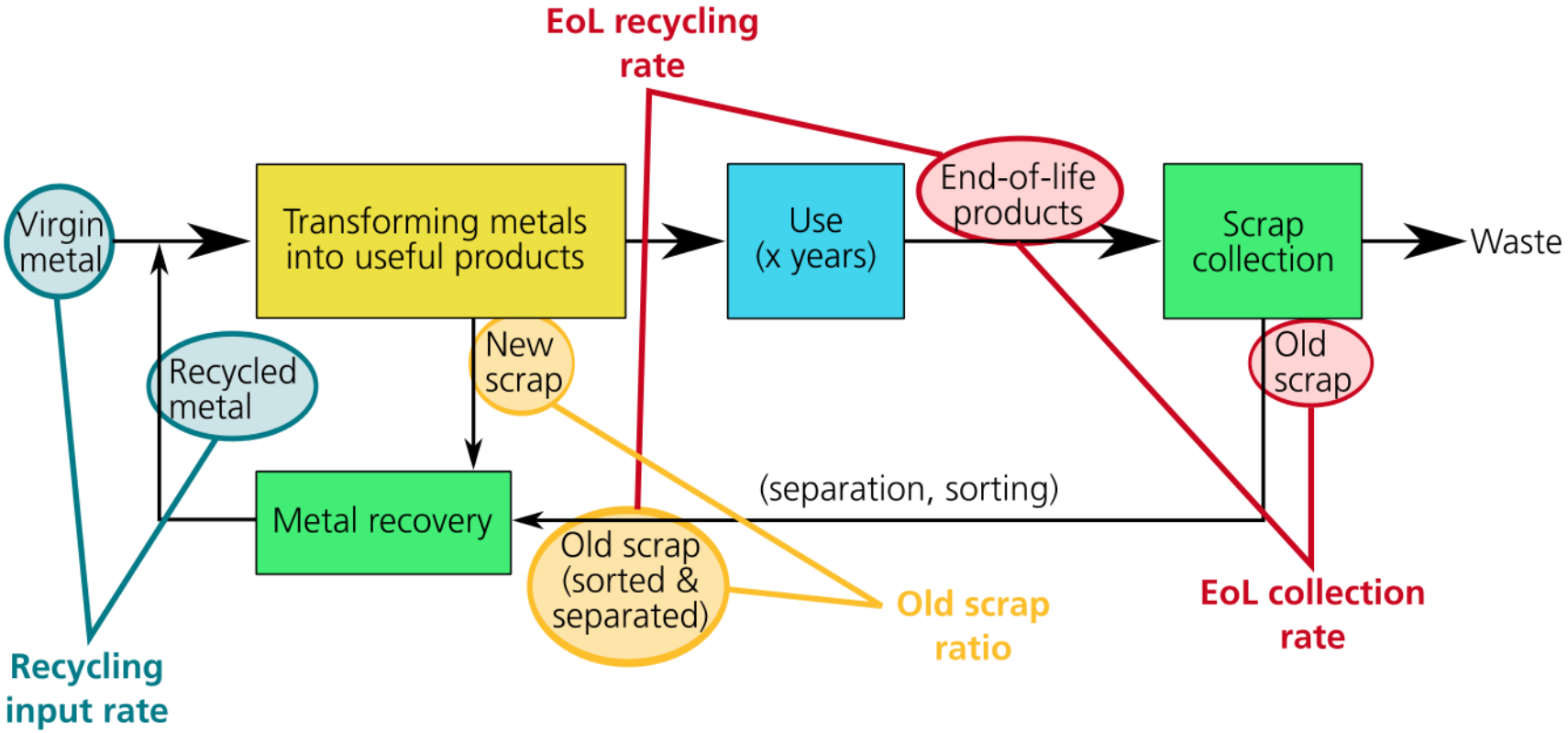
Why dynamic copper stock & flow models?

High quality information on metal cycles is not as plentiful as you may expect!



Simplified metal cycle from Tercero Espinoza (2012): The contribution of recycling to the supply of metals and minerals. POLINARES working paper Nr. 20

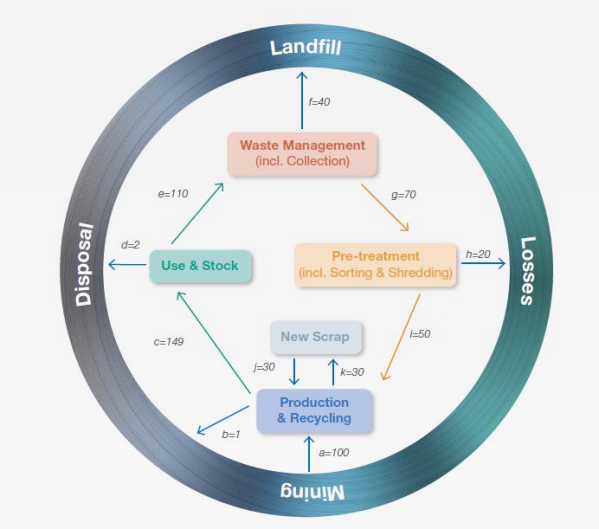
Information deficits lead to recycling indicators of poor quality



Simplified metal cycle from Tercero Espinoza (2012): The contribution of recycling to the supply of metals and minerals. POLINARES working paper Nr. 20

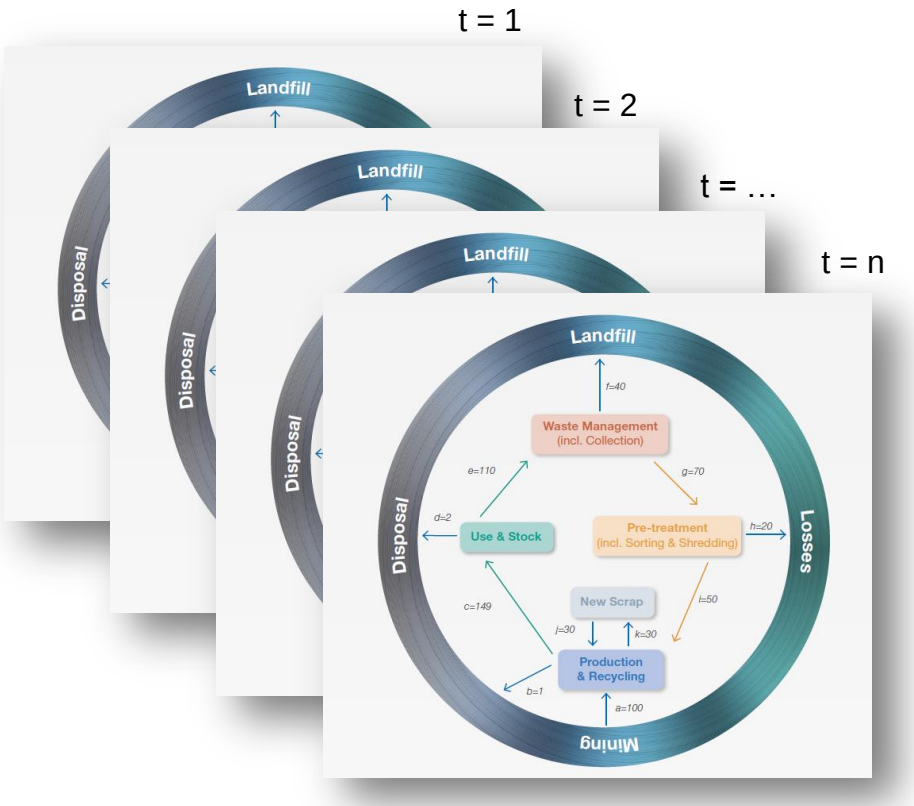
A dynamic model delivers more and better quality information

static



vs.

dynamic



Cycle graphic from Eurometaux (2012): Recycling rates for metals.

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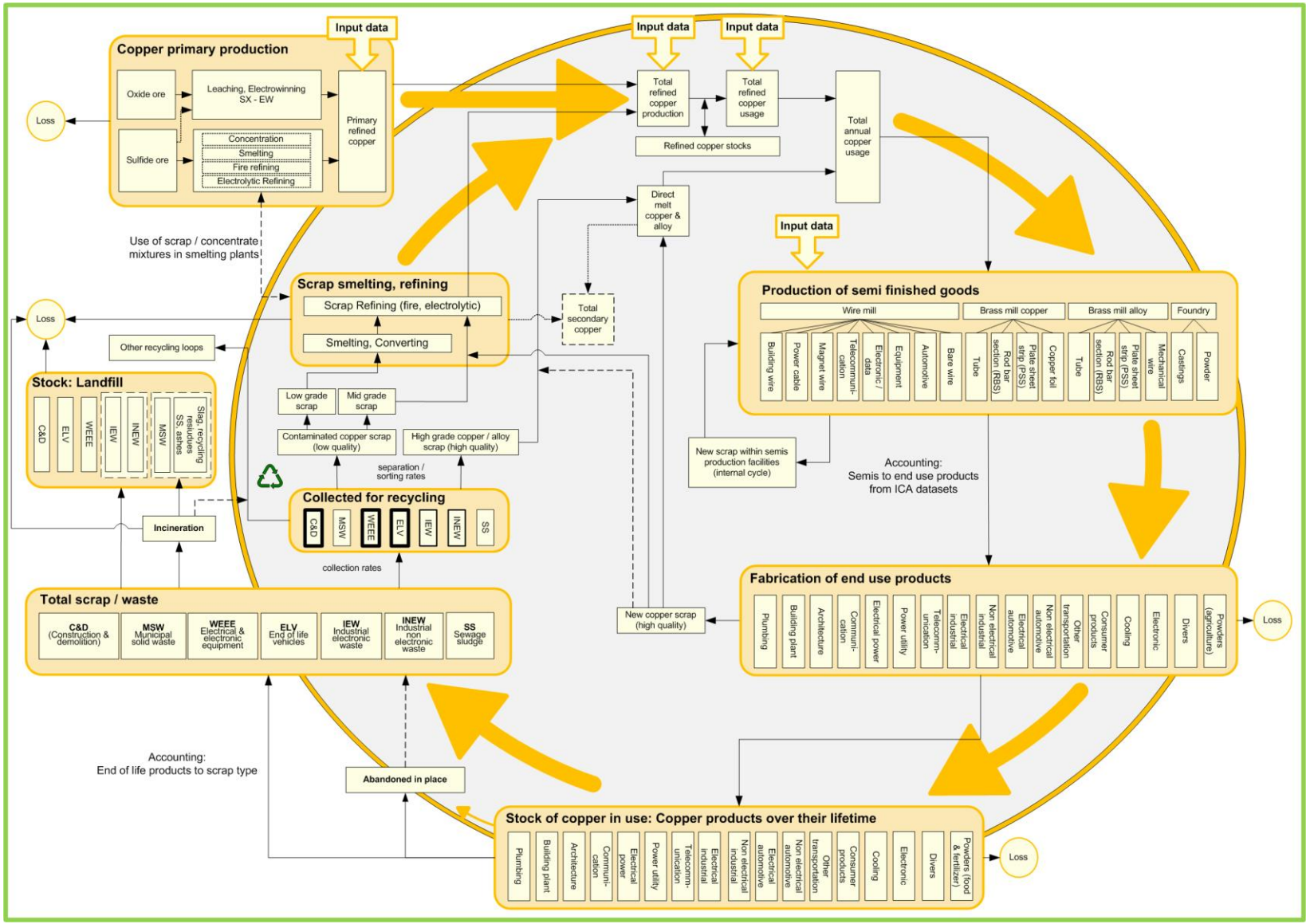
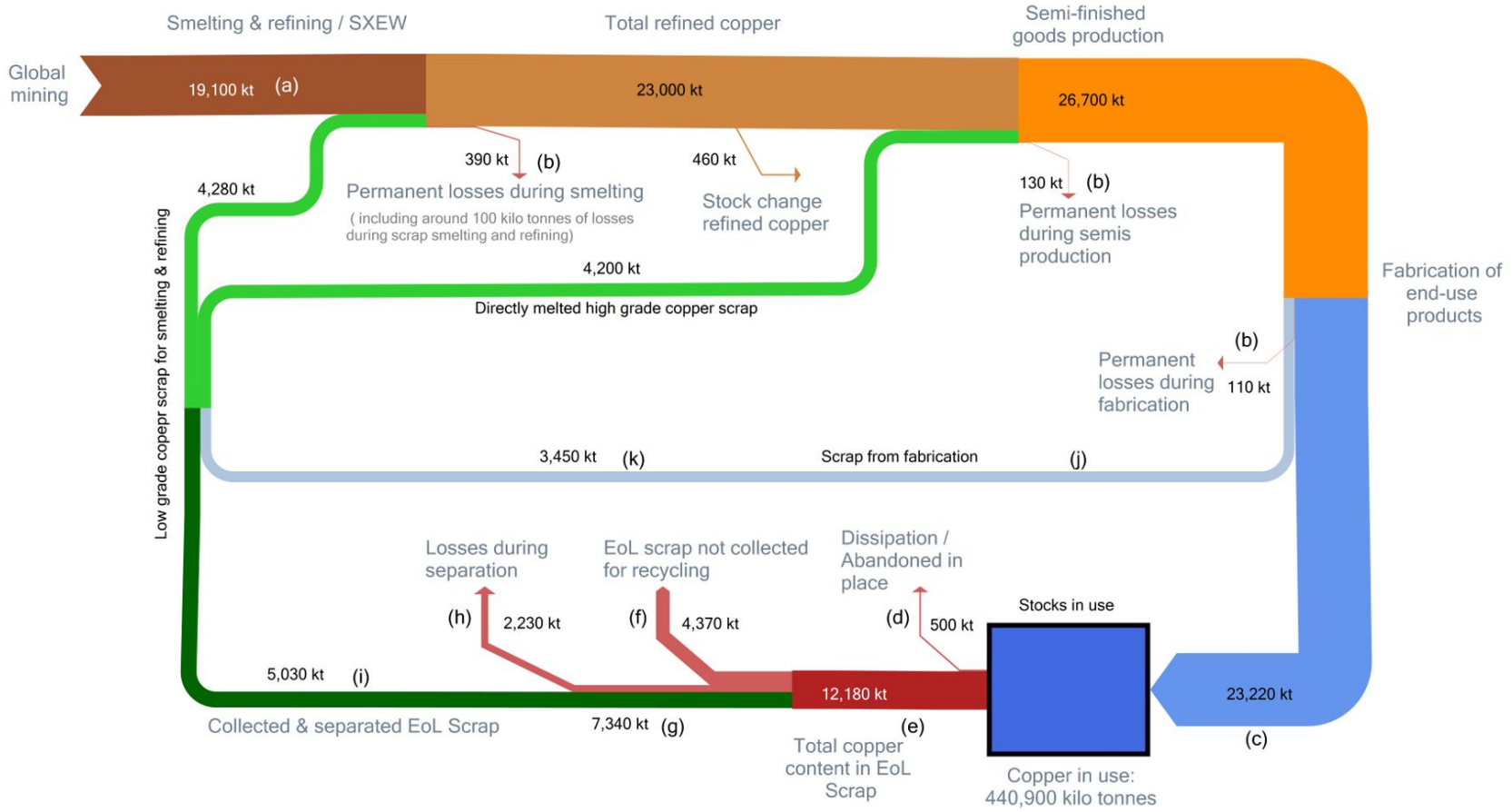


Glöser, Soulier & Tercero Espinoza, *Environmental Science and Technology* **47** (2013) 6564-6572 dx.doi.org/10.1021/es400069b

Global copper stocks & flows in 2015



update of Glöser et al. *Environmental Science and Technology* **47** (2013) 6564-6572 dx.doi.org/10.1021/es400069b to be published in the 2017 World Copper Factbook

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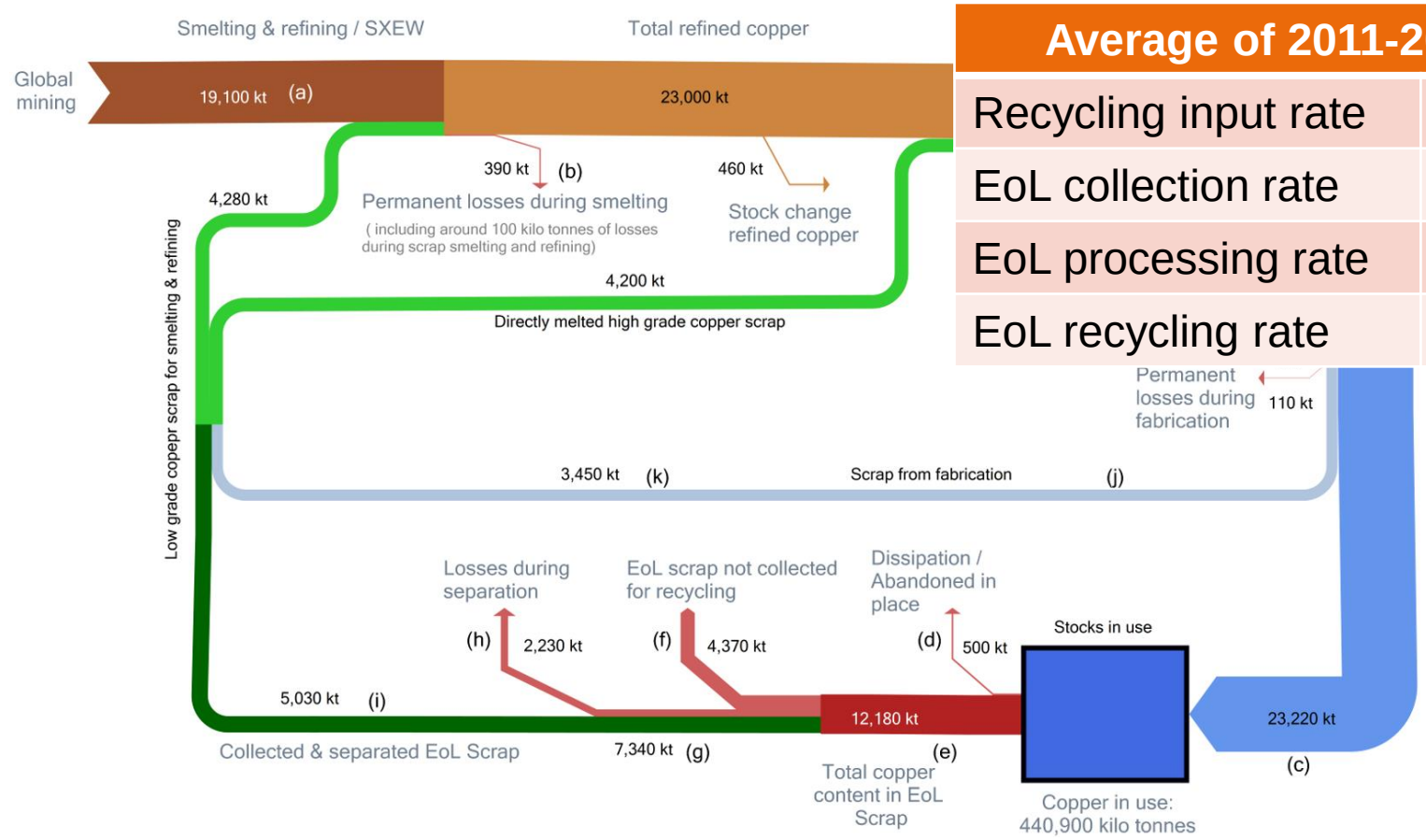
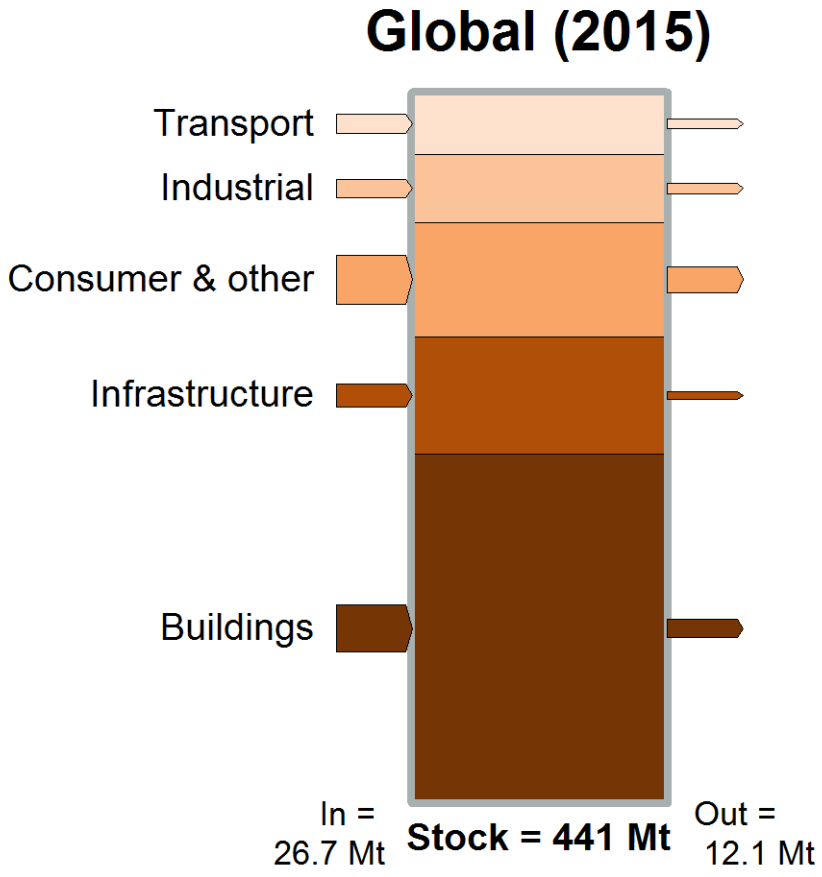
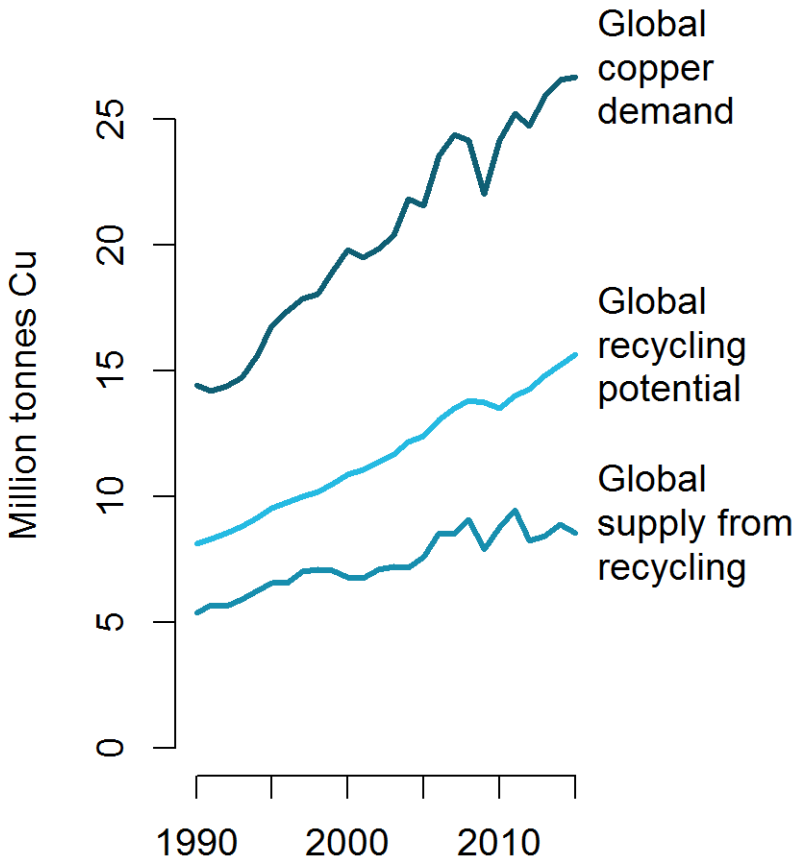


Average of 2011-2015	
Recycling input rate	≈ 33%
EoL collection rate	≈ 70%
EoL processing rate	≈ 70%
EoL recycling rate	≈ 50%

update of Glöser et al. *Environmental Science and Technology* **47** (2013) 6564-6572 dx.doi.org/10.1021/es400069b to be published in the 2017 World Copper Factbook

Getting copper from the “urban mine”





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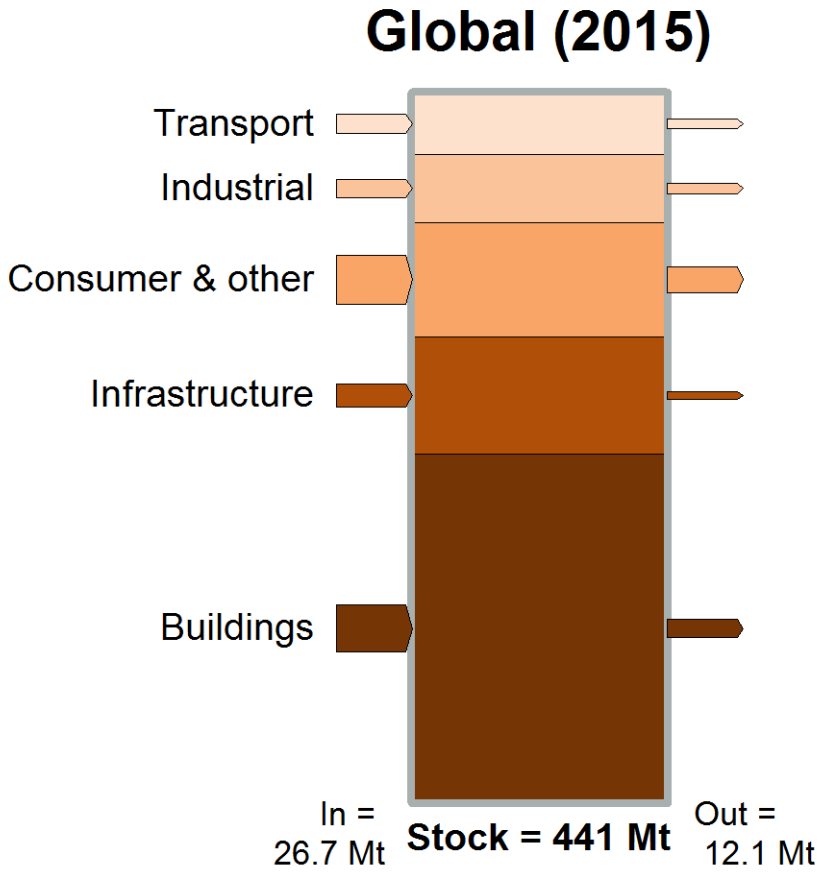

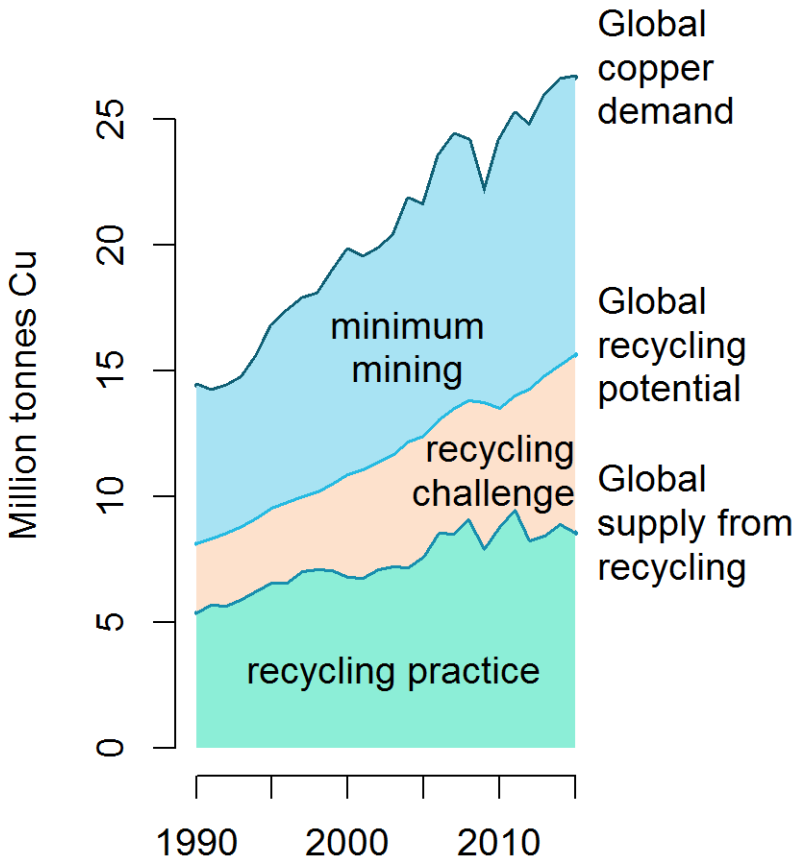

update of Glöser et al. *Environmental Science and Technology* **47** (2013) 6564-6572 dx.doi.org/10.1021/es400069b

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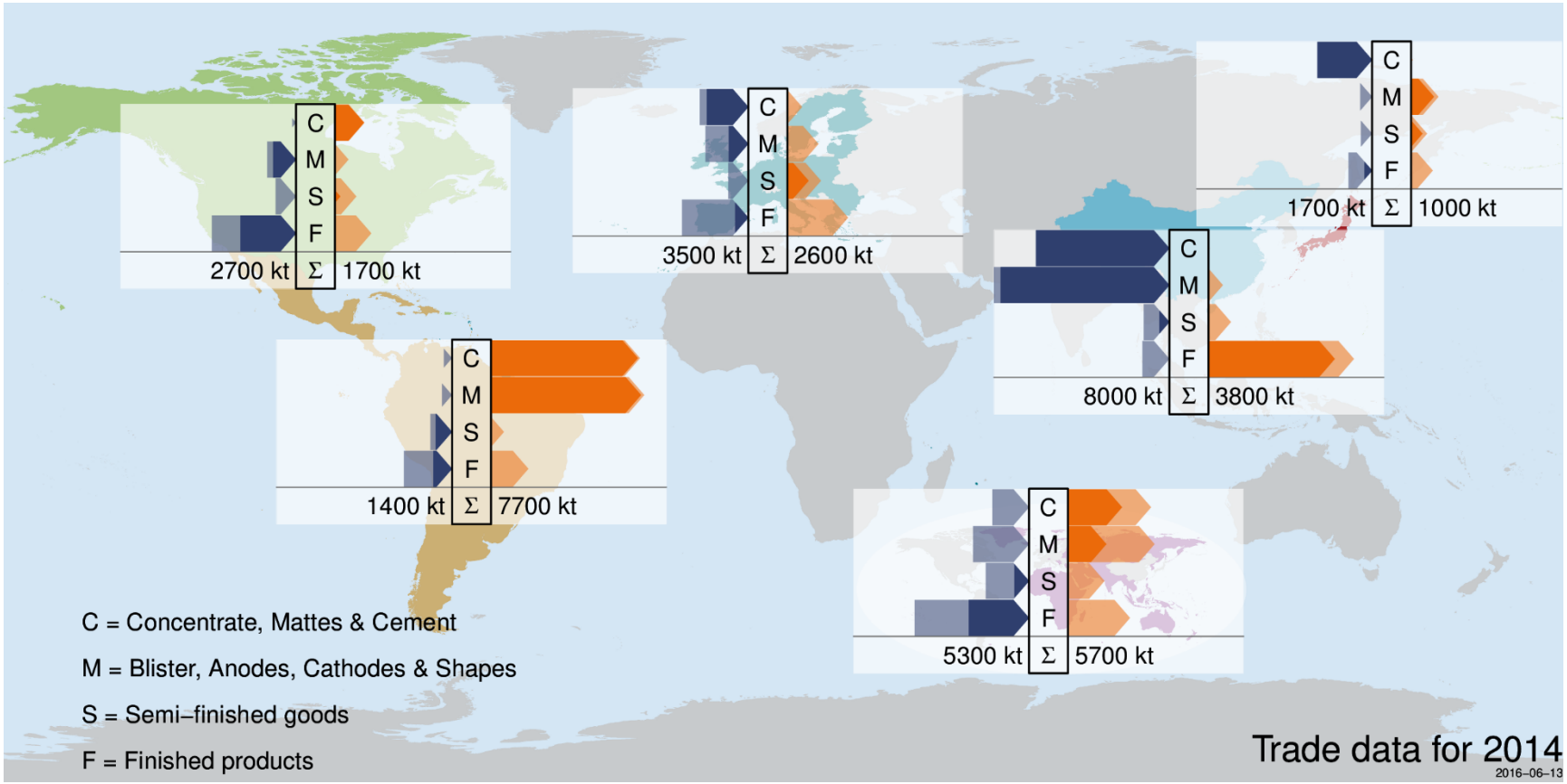
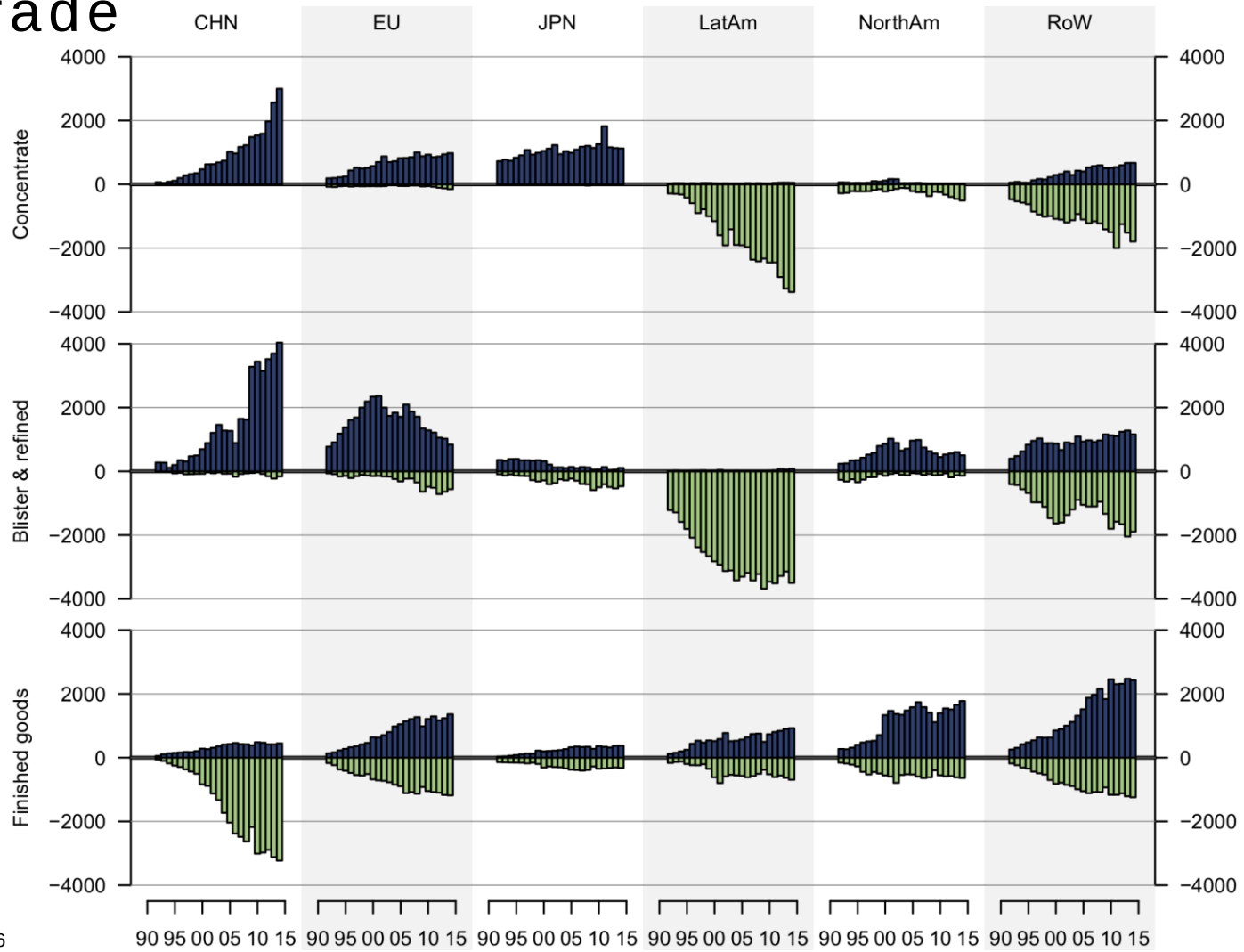
Copper contained in foreign trade along the value chain



Tercero Espinoza & Soulier: *Mineral Economics* **29** (2016) 47-56 dx.doi.org/10.1007/s13563-016-0087-2

Dynamics of copper trade



Tercero Espinoza & Soulier:
Mineral Economics **29** (2016) 47-56
dx.doi.org/10.1007/s13563-016-0087-2

Summary

- A global stock & flow model is available for copper
  - Dynamic modeling tracks copper through time
  - Is based on the best available data, both public and proprietary
  - Allows quantification of recycling → pinpoint areas of improvement
    - Approx. 1/3 of global copper supply comes from recycling
    - There are still significant opportunities for increase through better collection and separation
- Strong regional differences in production and use of copper become visible through foreign trade statistics
  - Extensive coverage of copper in end use products extends knowledge of copper flows worldwide

Further information

Environmental Science & Technology

Article

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Dynamic Analysis of Global Copper Flows. Global Stocks, Postconsumer Material Flows, Recycling Indicators, and Uncertainty Evaluation

Simon Glöser, Marcel Soulier, and Luis A. Tercero Espinoza*

Competence Center Sustainability and Infrastructure Systems, Fraunhofer Institute for Systems and Innovation Research ISI, Karlsruhe, Germany

Supporting Information

ABSTRACT: We present a dynamic model of global copper stocks and flows which allows a detailed analysis of recycling efficiencies, copper stocks in use, and dissipated and landfilled copper. The model is based on historical mining and refined copper production data (1910–2010) enhanced by a unique data set of recent global semifinished goods production and copper end-use sectors provided by the copper industry. To enable the consistency of the simulated copper life cycle in terms of a closed mass balance, particularly the matching of recycled metal flows to reported historical annual production data, a method was developed to estimate the yearly global collection rates of end-of-life (postconsumer) scrap. Based on this method, we provide estimates of 8 different recycling indicators over time. The main indicator for the efficiency of global copper recycling from end-of-life (EoL) scrap—the EoL recycling rate—was estimated to be 45% on average, ± 5% (one standard deviation) due to uncertainty and variability over time in the period 2000–2010. As uncertainties of specific input data—mainly concerning assumptions on en
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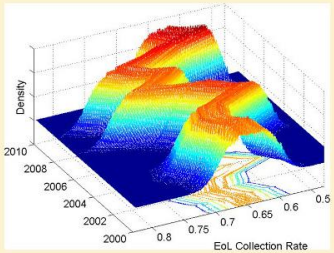
Carlo) uncertainty



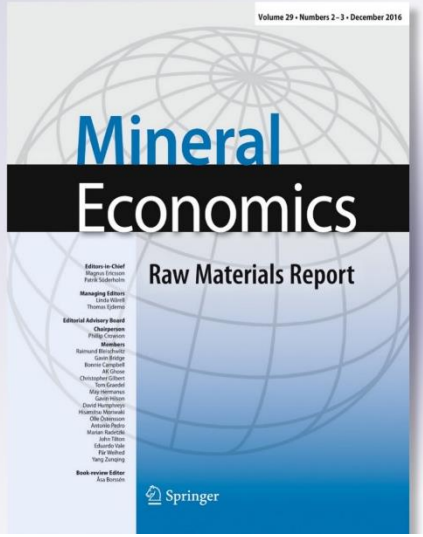
An examination of copper contained in international trade flows

Luis A. Tercero Espinoza & Marcel Soulier

Mineral Economics
Raw Materials Report

ISSN 2191-2203
Volume 29
Combined 2-3

Miner Econ (2016) 29:47-56
DOI 10.1007/s13563-016-0087-2



Dynamic analysis of European copper flows

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currently under peer review

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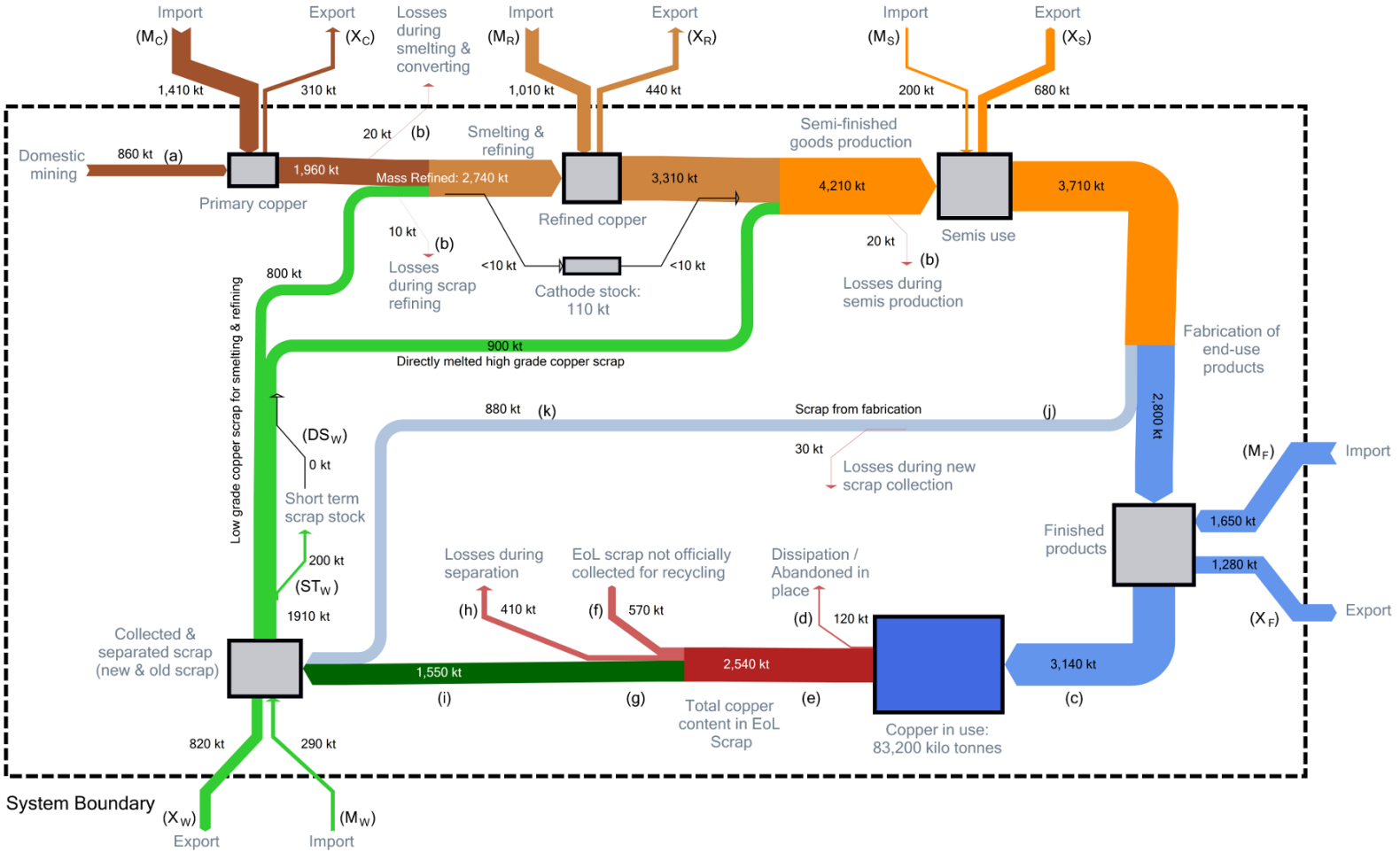
EU28 copper stocks & flows in 2015



Soulier et al (2017) *currently under peer-review*

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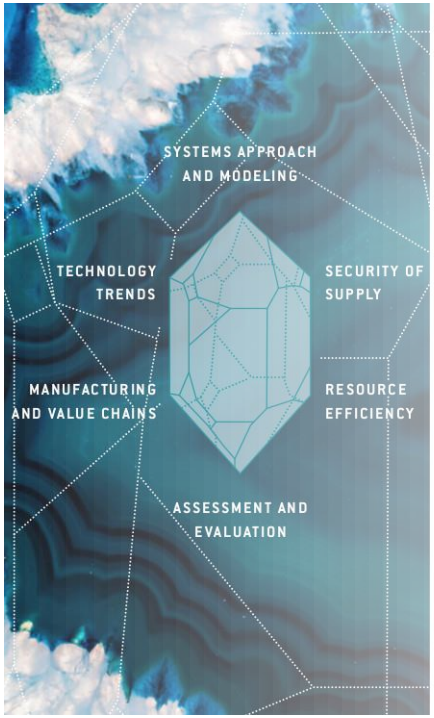

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