Raw materials and Circular Economy

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EIT RawMaterials

EIT Raw Materials is supported by EIT,
a body of the European Union

SUSTAINABLE DEVELOPMENT GOALS

Raw materials and advanced materials are *THE* key enablers for the transition in the energy and mobility sectors.

Brown Economy

Fossil Fuels for combustion engines, generators and power stations: oil. gas, coal

Energy Transition

Green Economy

Functional Materials in e-motors, energy storage, energy conversion containing, for example, Co, Li, Pt, REE, Ge, Ga, Si, V

Fundamental shift in the resource basis of a society

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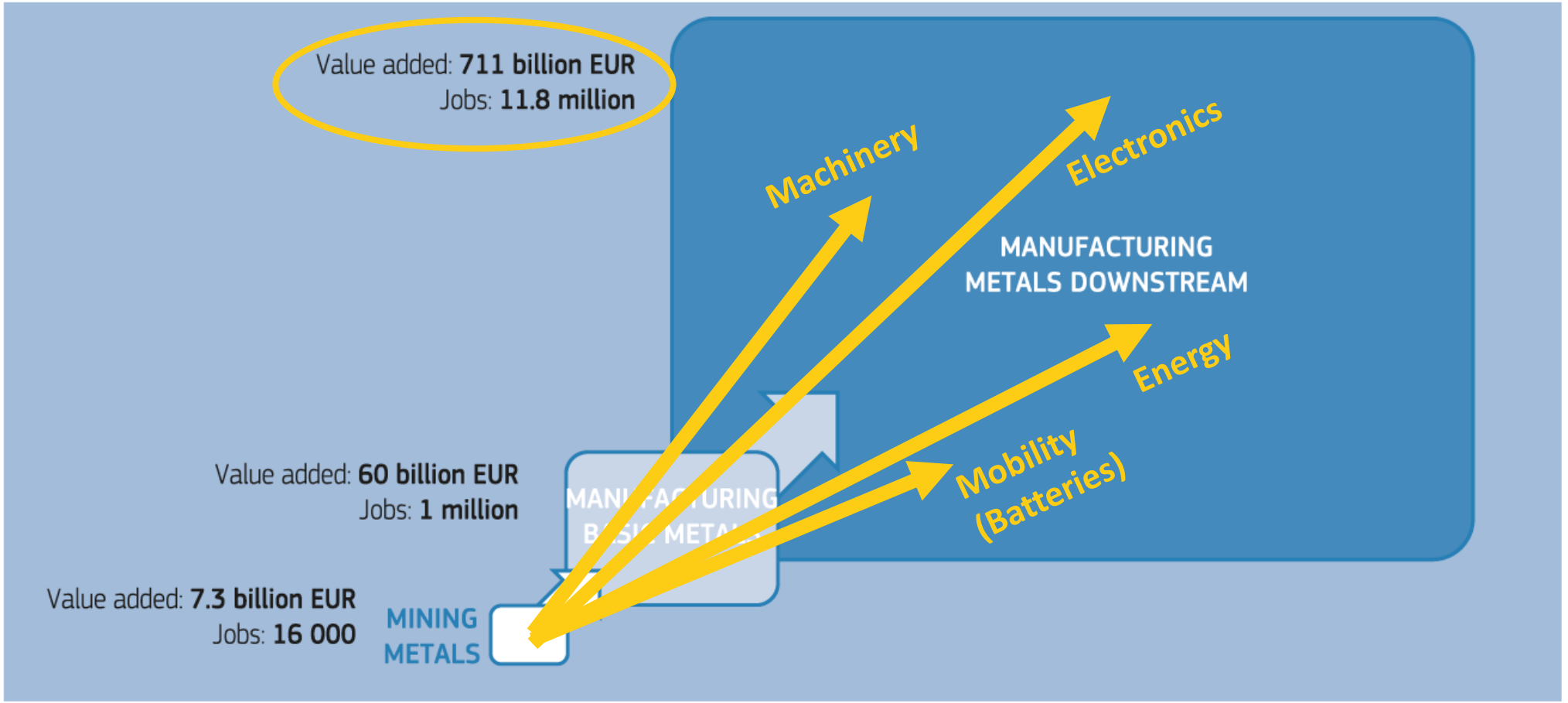
Images: Agarwal et al. 2017 Green Transparency

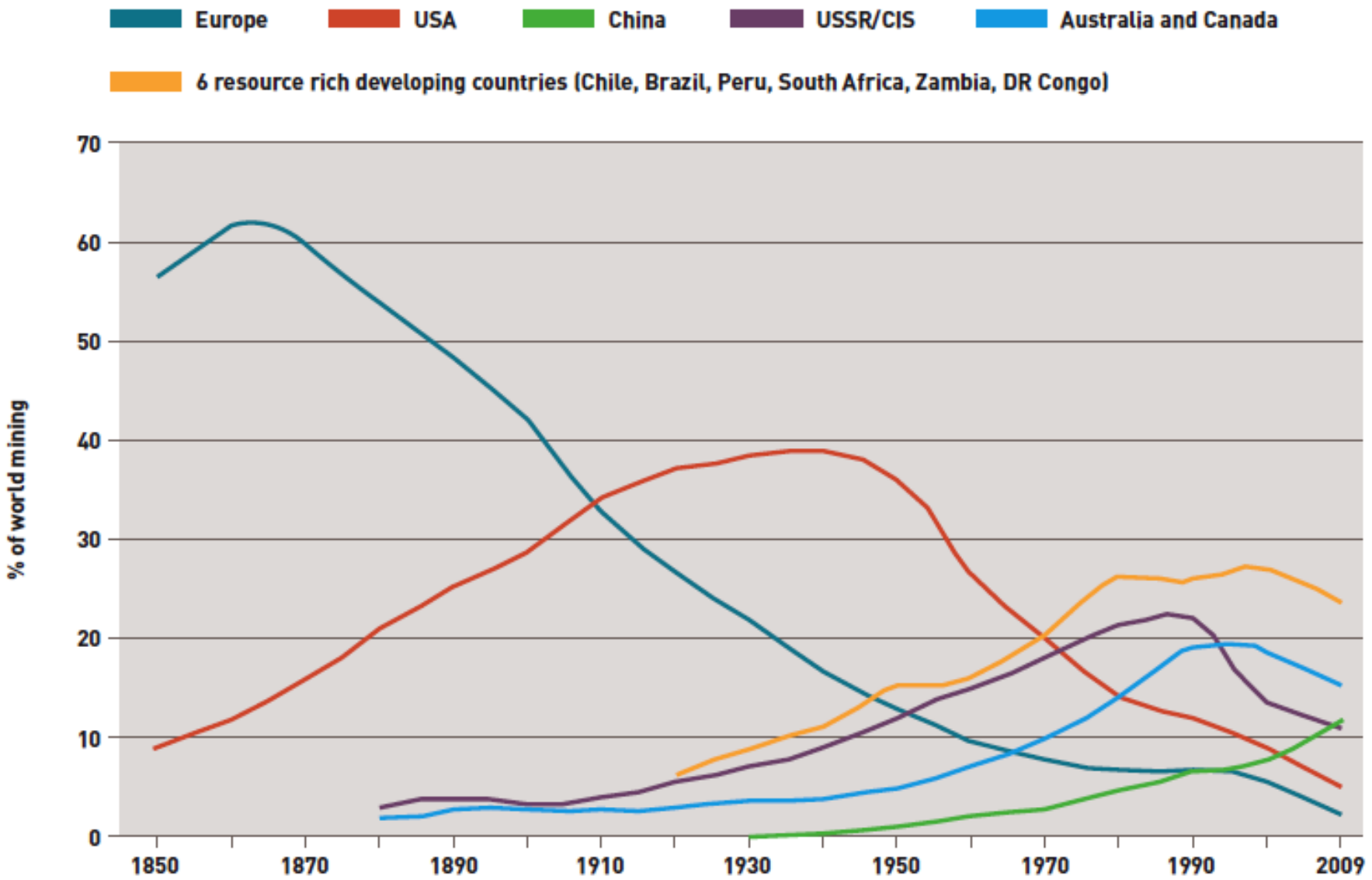
Raw Materials as key enabler for sustainability and jobs and growth in Europe

Figure 19: Value added and number of jobs associated with metals (mining, basic manufacture and downstream sectors) in the EU (2012)[82]



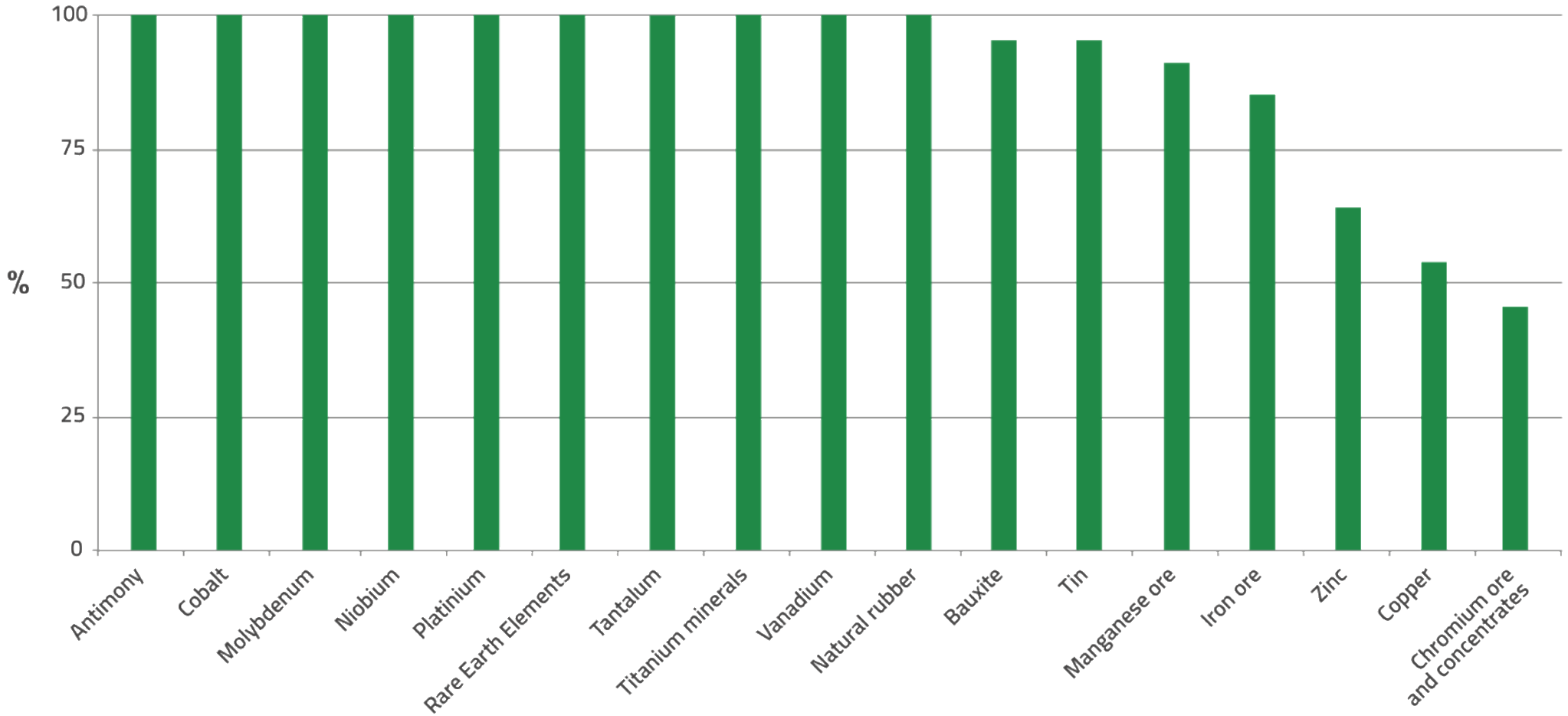
Source: JRC

Mining regions 1850 - now



Source: Raw Materials Group, Stockholm, Sweden.

Import dependence for selected raw materials



Source: JRC analysis based on data from report of the Ad hoc Working Group on defining critical raw materials, 2010, 'Critical raw materials for the EU'.

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The EU action to ensure security of supply of raw materials

- The Raw Materials Initiative is the EU raw materials policy strategy
- The European Innovation Partnership on Raw Materials brings together the entire raw materials community
- Horizon 2020: EUR 600 million secured for raw materials (2014- 2020)
    - EIT RawMaterials: EUR 400 million (2015-2021)

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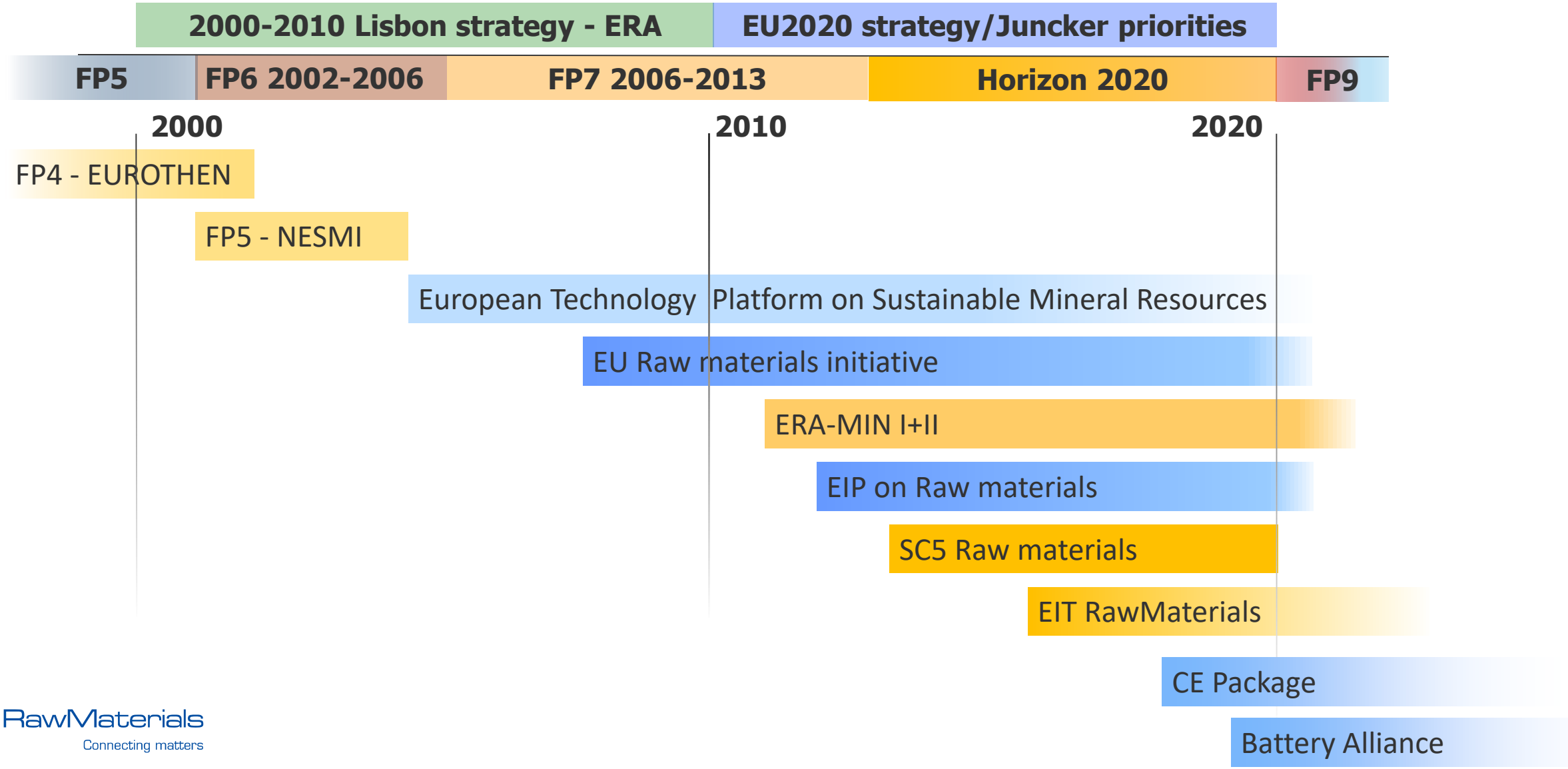
European Commission

EU Raw Materials R&I coordination



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EU action plan for the Circular Economy

The European Commission adopted an ambitious **Circular Economy Package**

The proposed actions will contribute to **"closing the loop" of product lifecycles through greater recycling and re-use, and bring benefits for both the environment and the economy**

Commitment to:

- To reduce the amount of waste generated;
- To maximise recycling and re-use;
- To limit incineration to non-recyclable materials;
- To phase out landfilling to non-recyclable and non-recoverable waste;
- To ensure full implementation of the waste policy targets in all Member States

Circular Economy Definition

114 Definitions

Conceptualizing the circular economy: An analysis of 114 definitions

Julian Kirchherr, Denise Reike, Marko Hekkert

Resources, Conservation & Recycling 127 (2017) 221-232

Copernicus Institute of Sustainable Development; Utrecht University; The Netherlands

115 at the end of the Study…

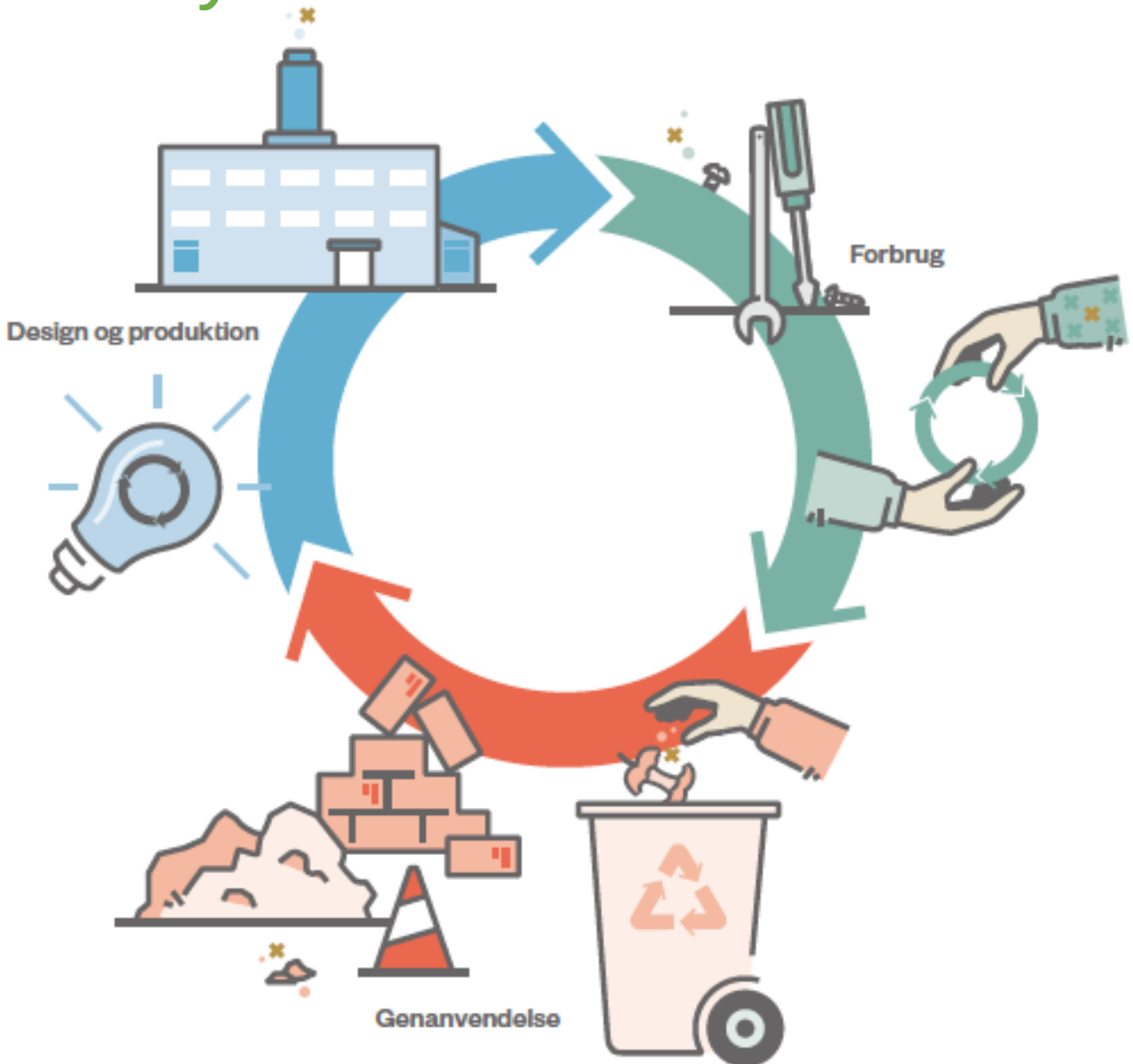
Circular Economy Definition

A circular economy is one that is restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times…

Ellen McArthur foundation 2015

What about resource efficiency in extraction and producing those products, components and materials?

Circular economy



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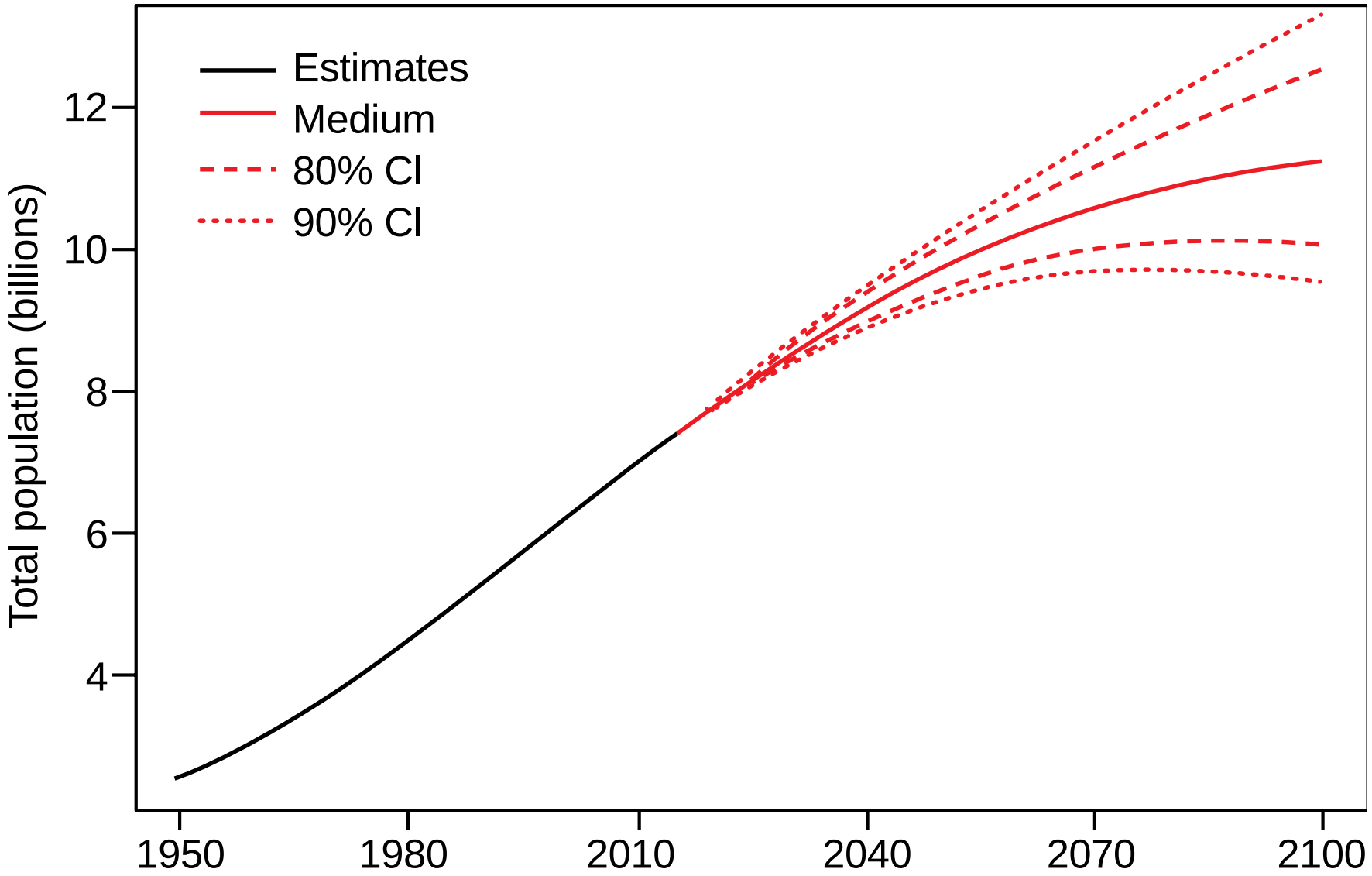
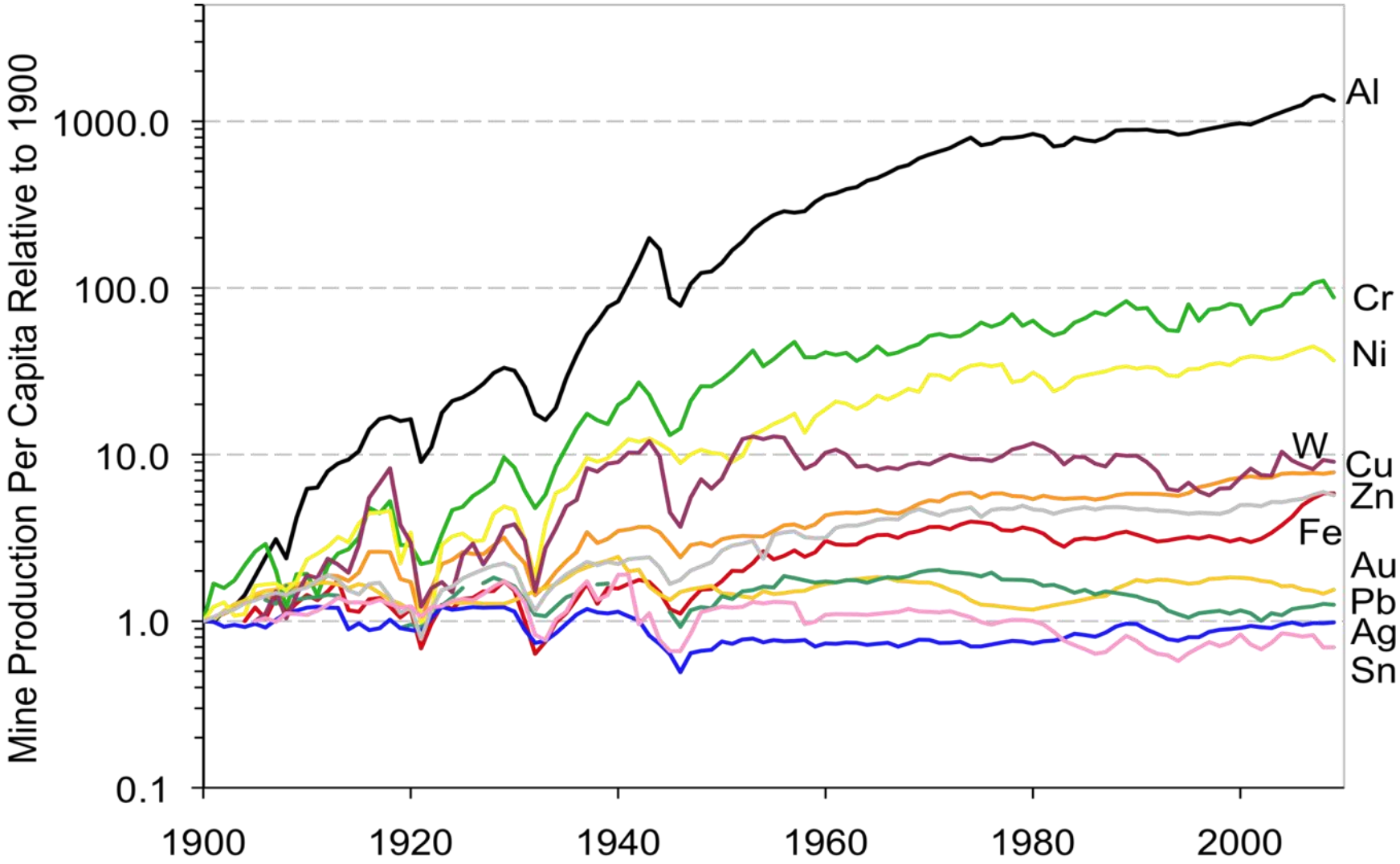
World population



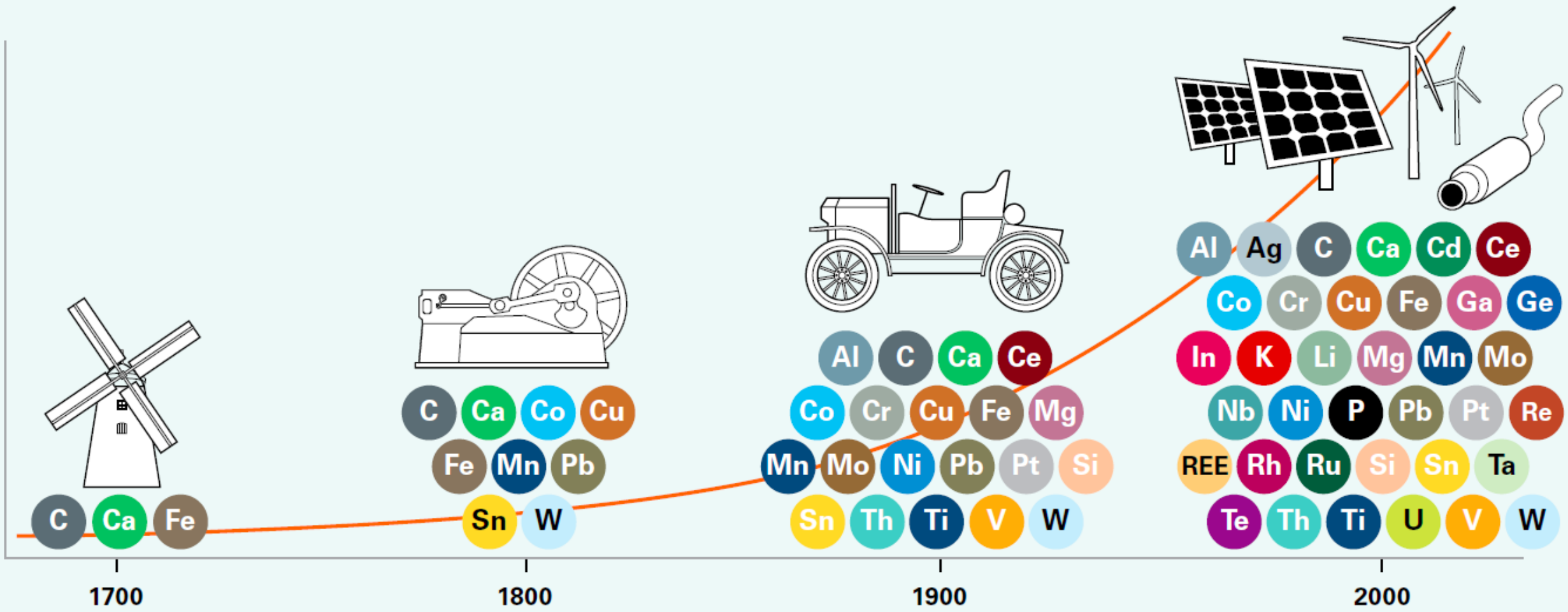
Source: United Nations, Department of Economic and Social Affairs. Population Division (2015). World Population Prospects: The 2015 Revision, New York, United Stated.

Global per Capita metals use 1900-2008



Graedel, Pers. Comm. (2015)

Consumption of mineral raw materials



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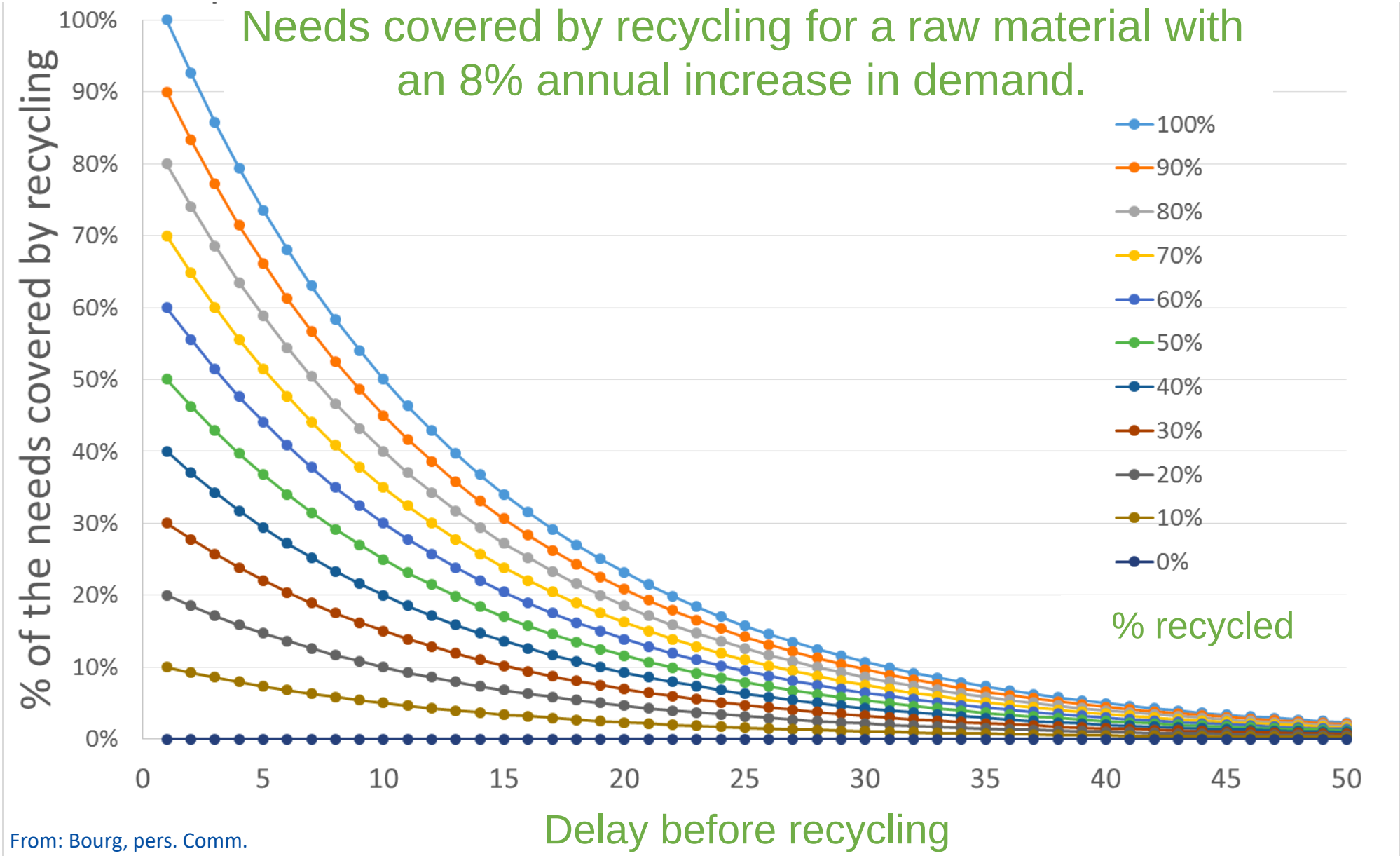
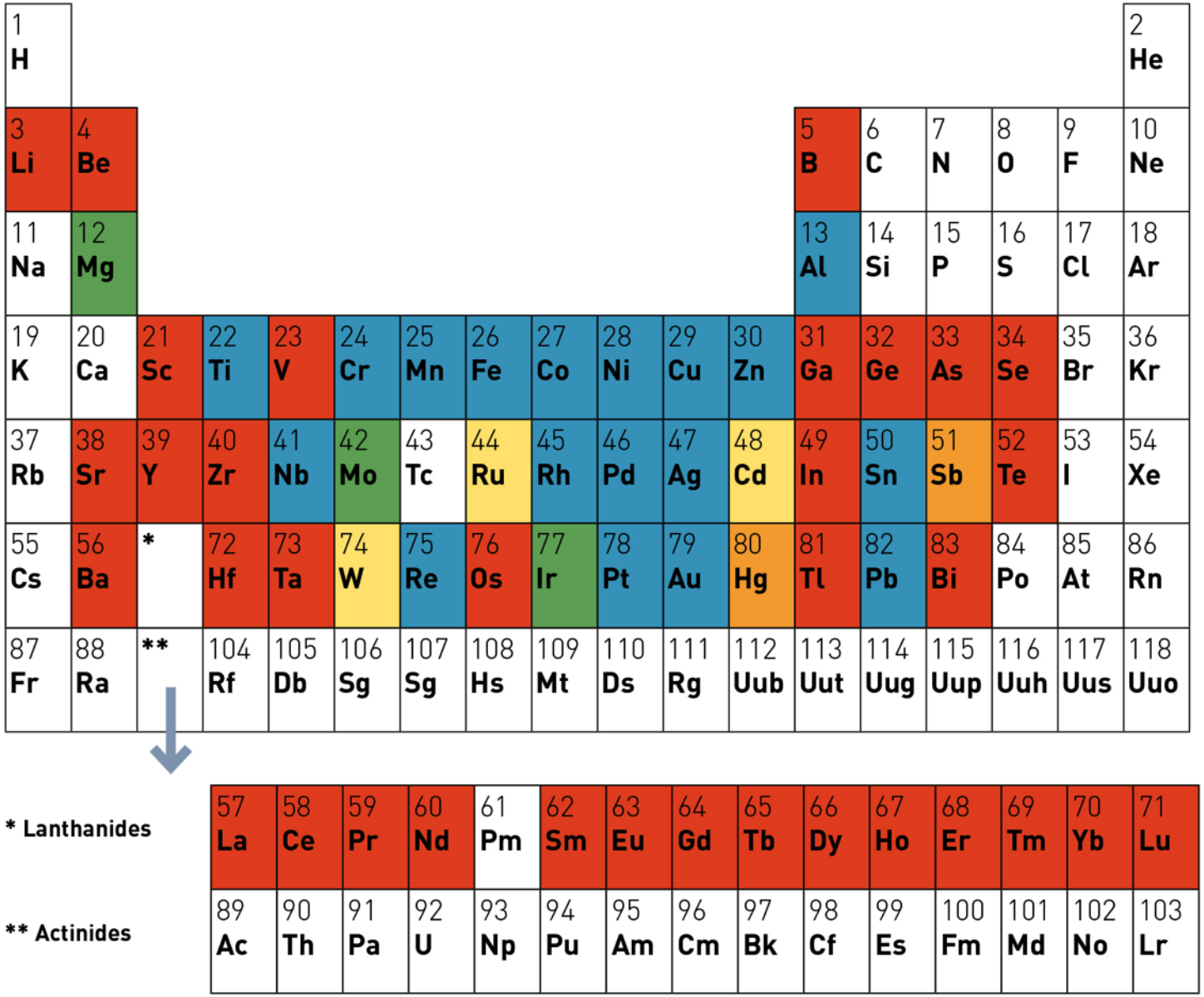
Source: Achzet et al (2009)

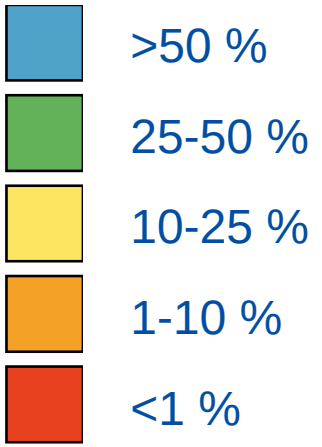
Recycling opportunities



From: Bourg, pers. Comm.

Recycling Opportunities





Source: UNEP 2011.
Recycling rates of metals

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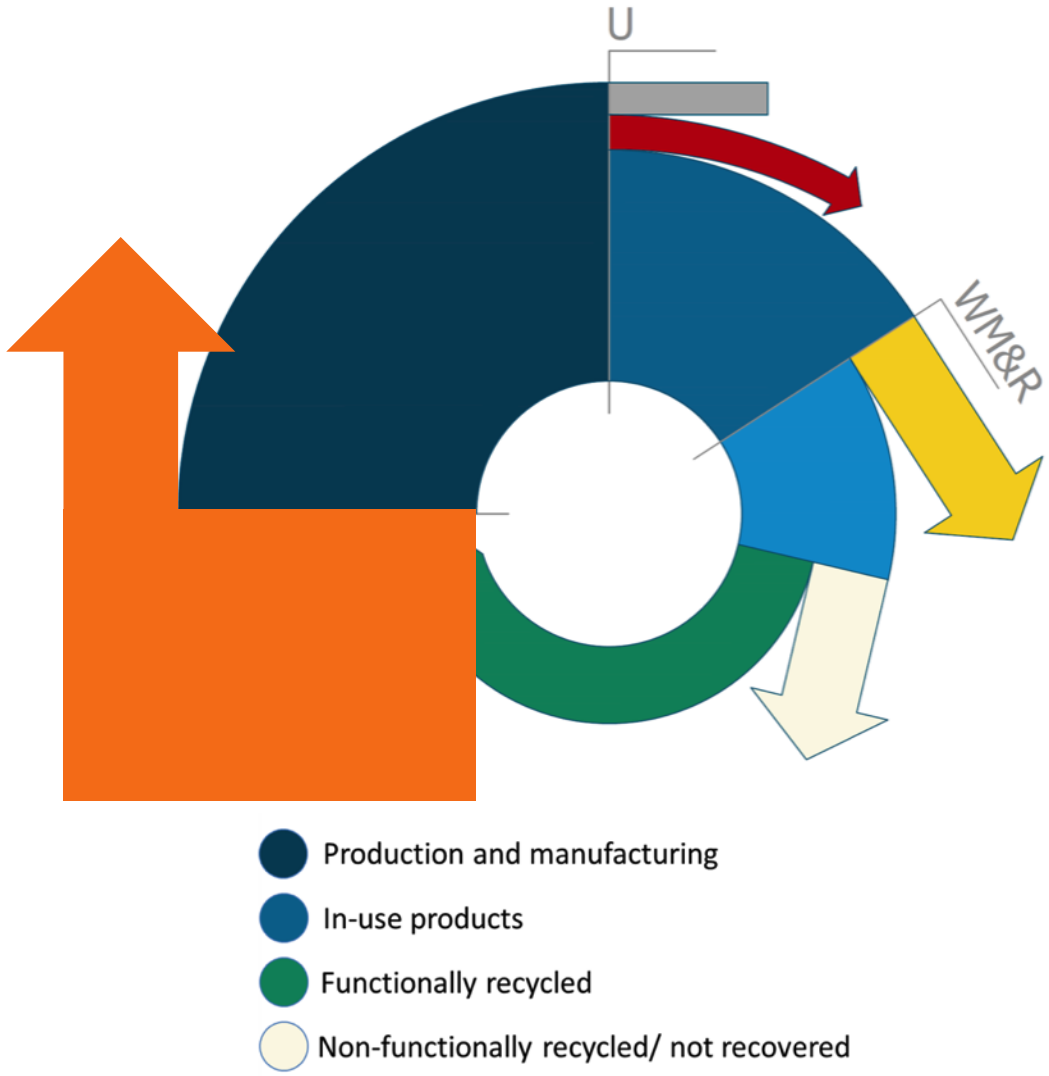
Recycling opportunities



(From Graedel Pers. Comm. and Ciacci et al. *Environ Sci. Technol.* 2015.)

In-use dissipated

- Se, Mn in fertilizers
- Al, Cu, Mg in pyrotechnics

Currently unrecyclable

- REEs in polishing powders
- Al in steelmaking

Potentially recyclable

- Alloying elements recoverable/recyclable

Unspecified

- Miscellaneous uses

Circular economy

… and

The value chain

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Modified from: http://www.europarl.europa.eu/resources/library/images/20150703PHT73954/20150703PHT73954_original.jpg

The raw materials value chain

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Thank you for your attention

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