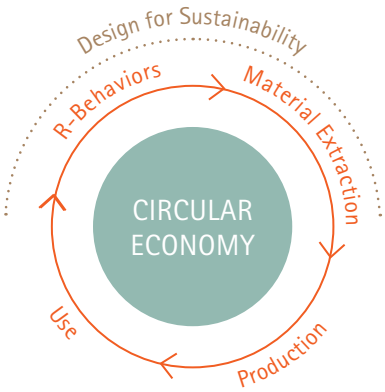
International Copper Association
Copper Alliance

Design-for-Sustainability:
The holistic solution for copper-bearing products in Circular Economy

CIRCULAR ECONOMY:
An economic system that uses a systemic approach to maintain a circular flow of resources.

A circular flow of resources is created by regenerating and retaining or adding to their value, while contributing to sustainable development. Copper supports a circular economy as a material, but the copper industry itself also contributes.

Copper acts as a carrier metal of over 20 valuable base, precious and specialty metals. The fact that it is also **recycled at a very high rate** without loss of its intrinsic properties adds to its strong circular profile. Its recyclability can be leveraged further through the application of life cycle and holistic thinking. Considering how product and system design relates to recycling stages like collection and separation, leads to a Design for Sustainability approach and supports a circular economy.



COPPER-BEARING PRODUCTS

Copper-rich products (where copper content is one of the most relevant materials, by weight)

+

Products where copper has a "carrier metal role" for a wide range of other non-ferrous metals

6 Points of Reference for CE Assessment

These parameters can be used to evaluate copper applications' best practices and initiatives. They can be seen as the first step to highlighting sustainability requirements for copper-bearing products within a sector or industry.

1 R-BEHAVIORS

Redesign / Refuse / Reuse / Reduce / Repair
Refurbish / Remanufacture / Repurpose / Recycle

2 SUSTAINABLE DEVELOPMENT GOALS

3 EU RECYCLING TARGETS

WEEE (waste electrical/electronic equipment) / Construction & Demolition Waste / Eco-Design / EoL Vehicles / Batteries

4 RESPONSIBILTY DOMAINS

Business to Business / Consumer to Business
Consumer to Consumer

5 LIFE CYCLE PERSPECTIVE

Mining / Design & Production / Use / EoL

6 SUSTAINABILITY ASPECTS

Environmental / Economic / Social

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Design for Sustainability

ICA carried out a study on sustainability principles for copper-bearing products. The driver was the principles that will be included under a Design-for-Sustainability approach announced by the European Commission in light of the EU Circular Economy Action Plan (CEAP 2.0), a notion that was already introduced by UNEP in its 2013 report. The aim of the project was to identify already applied sustainability/circularity principles in successful case studies, and consolidate them under a Design-for-Sustainability concept.

With respect to copper, the value creation potential from circular practices should be determined by **scientifically-grounded** and **metrics-based** circularity assessments.

Key Findings

Among best practices investigated, the most frequently used R-behaviors were R9 (Recycling) and R1 (Redesign), linked primarily to SDG12 (Responsible Consumption/Production) and SDG9 (Industry, Innovation and Infrastructure).

The design stage of copper-bearing products has proven to play a fundamental role in determining the sustainability with which these products are produced, used, and handled at the end of their service life. Environmental and socio-economic considerations at the design phase facilitated the decrease in environmental emissions, the increase in resource and energy efficiency, and the increase in collection and overall recycling rates.

INDUSTRY EXAMPLE

A well-known technology company conducted environmental assessments on its products.

1. The company investigated methods to manufacture components (e.g. Printed Circuit Boards [PCB], cables, and connectors) by optimizing the use of copper.
2. It invested into further research in the use of recycled copper in new products for the Printed Circuit Boards of select phone models.
3. Design for disassembling was enhanced in phones to facilitate recovery of copper in seven different components (e.g. PCB and camera). This facilitated higher recycling rates at EoL stages.

60,000
METRIC TONNES OF MINED ORE
are estimated to be spared in favour of recycled copper

Future Action Plan for Copper-Bearing Products in the CE

A focus on providing incentives and information, as well as optimizing resources will help move each sector further toward a circular approach. The ideas below are important in pursuing a successful circular economy in industries that use copper-bearing products.

INCREASE availability of information and measurability of CE progress through minimum sustainability and information requirements for specific product groups, and evaluation of qualitative and quantitative methods and CE criteria (e.g. simplified/complete Life Cycle Assessment [LCA] and evidence-based Product Environmental Footprint [PEF]).

OPTIMIZE the technical aspects of resources to secure fair balance between material and energy efficiency.

ENGAGE stakeholders fostering industrial symbiosis and multi-stakeholder involvement.

INCENTIVIZE roll out of collection, dismantling, sorting, and contaminant detection and mitigation technologies in the copper industry.

STRIVE for common regulatory rules, taking due account of sectoral specificities.

INCENTIVIZE design for disassembling (e.g. quick/easy-to-disconnect connections, ease of access to components [product architecture], modularity, selection of materials based upon their recyclability).

More information on the case studies, investigations, and takeaways for a successful design-for-sustainability approach is available upon request.

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LINKS

> Benefits of Copper

> Copper Recycling