

Copper Recycling in the EU: Waste from Electrical and Electronic Equipment (WEEE)

Copper is 100% recyclable and can be reused multiple times without losing its intrinsic physical and chemical properties. Recycling depends on many factors, ranging from:

- Consumers' responsibility in returning discarded or obsolete products
- Consistent reporting of waste streams
- Products' lifespan and their subsequent decommissioning
- Overall efficiency of the waste management system

From all copper produced globally, nearly 70% is used for electrical/conductivity

applications. In the EU, the equivalent figure is 65%.

WEEE makes up around 11% of the total EU End-of-Life copper in waste. Along with other metals in WEEE streams, copper recycling offers a great opportunity for value retention in the EU.

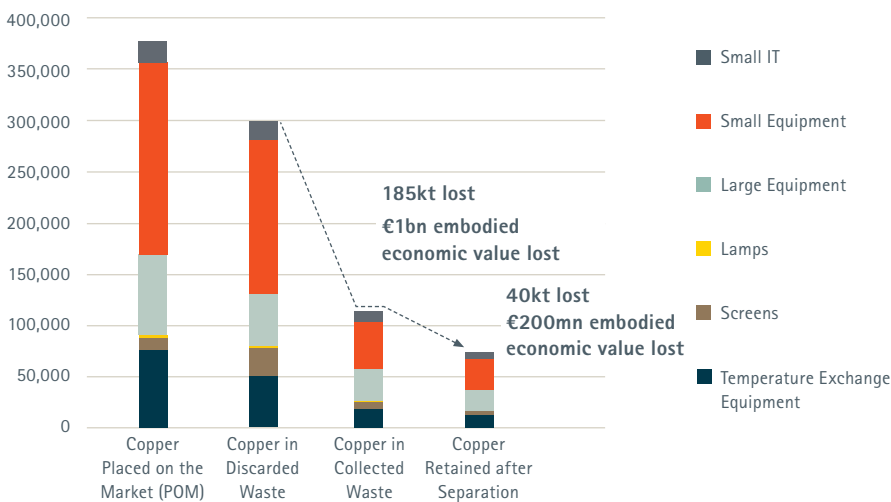
WEEE recycling inefficiencies primarily occur at the collection and separation stages.



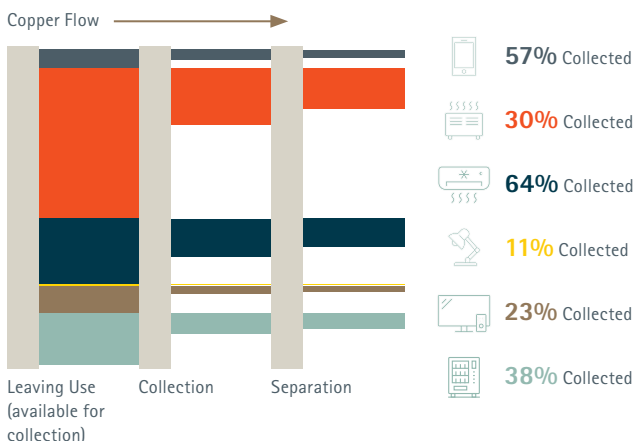
The 225kt unrecovered copper from WEEE collection and separation results in losses of EUR 1.2bn (2018), making up nearly 20% of the total value losses from copper collection and separation in the EU.

Estimated mass and embodied economic value of copper contained in 2018 WEEE flows

Total tonnes of copper content in EU28 WEEE 2018



Percentage (%) of collected copper for recovery per WEEE stream



Collection rates are highest for large equipment at 64% and lowest for lamps at 11%.

Copper content in WEEE varies from 2% to 5% out of the whole supply of materials. Products that become WEEE at the end of their service life include the following:



Small IT
Laptops • Phones



Temperature Exchange Equipment
Fridges/Freezers • Aircon



Lamps
LED • Fluorescent



Screens
TV • Monitors



Large Equipment
Vending Machine • Cashpoint



Small Equipment
Vacuum • Toys • Toaster

Challenges:

- Exports of WEEE to third countries with recycling facilities operating under low environmental and/or safety performance standards
- Exports of WEEE as second hand products (instead of waste) to circumvent controls over the country of destination, thus disappearing from EU statistics
- Unavoidable CO₂ emissions resulting from the recovery of copper out of WEEE due to the presence of organic material which cannot be fully removed prior to smelting

Illegal exports and sub-standard treatment of WEEE is estimated to be as high as 340kt.

Recommendations to improve copper recycling in WEEE:

- Improve design-for-repair, reuse and recycling of electrical and electronic equipment (e.g., batteries, PCBs) in facilities with high environmental and/or safety performance
- Improve collection, separation, sorting and subsequent treatment via state-of-the-art technologies
- Optimize discarded products' detection and tracing underpinned by economic incentives and increased enforcement in cooperation with developing countries
- Redesign Extended Producer Responsibility schemes
- Improve control over WEEE exports, and harmonize waste classifications
- Raise consumer awareness of the importance of the correct WEEE disposal and the routes available to do so
- Ensure that carbon tax schemes do not penalise recycling of copper from WEEE (e.g., through carbon tax exemptions) and provide support for research and innovation into technologies that could help reduce CO₂ emissions from copper recycling in the long-term

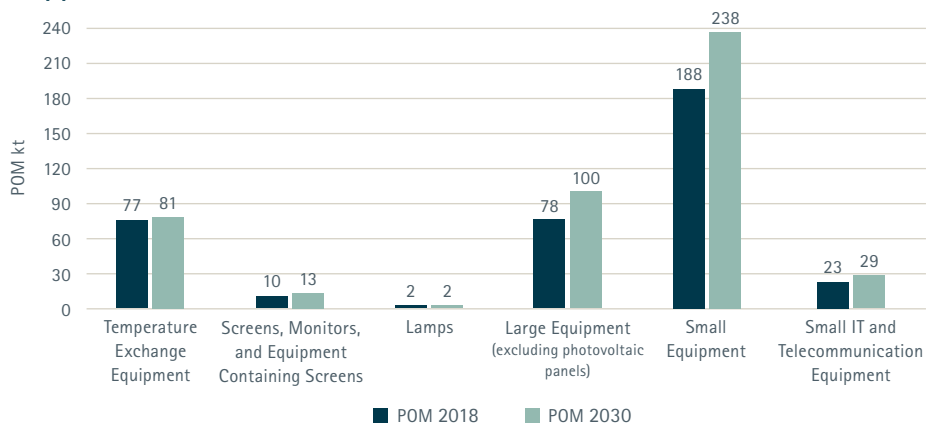


The amount of copper in electronics, along with its embodied economic value, is projected to grow by 22.5% from 2018 to 2030.

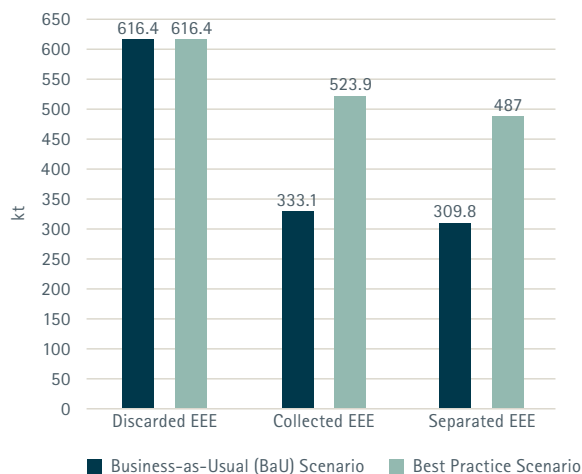
This will be driven by demand growth in large and small equipment and the transition to more copper-intensive technologies.

With framework conditions that incentivize investments in state-of-the-art infrastructure technology, and by addressing recycling inefficiencies, it is expected that **the embodied economic value retention in WEEE can increase from 31% in 2018 to 65% in 2030**. This will be a significant progress towards a fostered Circular Economy, considering that 100% recycling is unrealistic. First, because there will always be inevitable losses at other recycling stages further down from collection and separation, due to the increasing product complexity and miniaturization trend. And second, because there are technological and thermodynamic boundaries beyond which recycling can become inefficient.

Copper Placed on the Market (POM) in 2018 and 2030



Estimated value retention scenarios for Electrical & Electronic Equipment (EEE) in 2030



With the increasing demand for copper due to the green and digital transition, and assuming that electronic products continue to be discarded with the same ratio, **by 2030 Electrical & Electronic Equipment collection and separation will increase exponentially thereby increasing the amount of copper available for recycling and recovery, if best practice is implemented.**