

# Copper Recycling and Sustainability (1)

You're most likely already familiar with the concept of recycling, and probably recycle paper, glass, clothing, shoes, aluminium drink cans and baked bean tins, but have you ever thought about recycling copper?

Brass bathroom taps, copper water pipes and electric cables all contain copper and are much longer-lasting and more valuable than any of the above. When these components eventually become available, possibly due to refurbishment or rebuilding, they are too valuable to be dumped in the bin or thrown into skips, ending up in landfill. They too can be recycled and the recovered copper used to make new products that will have the same properties as those made from 'virgin' copper that has been newly mined and refined.

Recyclability is one property that helps to establish the 'green credentials' of a material, which is to say how environmentally friendly it is.

Demand for copper, along with other metals such as steel, aluminium and nickel, is growing as countries throughout the world continue to develop industrially with a consequent requirement for more raw materials. To help conserve the world's raw materials, there is a growing emphasis on recycling; however, for a more meaningful 'green' rating, a material's sustainability needs to be considered.

The widely-accepted description of sustainability is the concept of meeting present needs without compromising the ability of future generations to meet their own needs.

A complete explanation of sustainability is beyond the scope of this e-source; however, some environmental aspects of sustainability, such as energy conservation and reduction in landfill, and some social aspects such as maintenance of public health are considered.

## Did You Know?

Nearly one-third of copper demand each year is met through recycling.



[Click here](#) to watch a video containing facts and figures about modern copper recycling.



*Finished copper. (Courtesy of Aurubis.)*



*Process scrap, or 'new scrap', comes directly from manufacturers and has a very high value. (Courtesy of Aurubis.)*

## World Copper Mine Production, 1900-2013

(thousand metric tonnes)

Source: ICSG

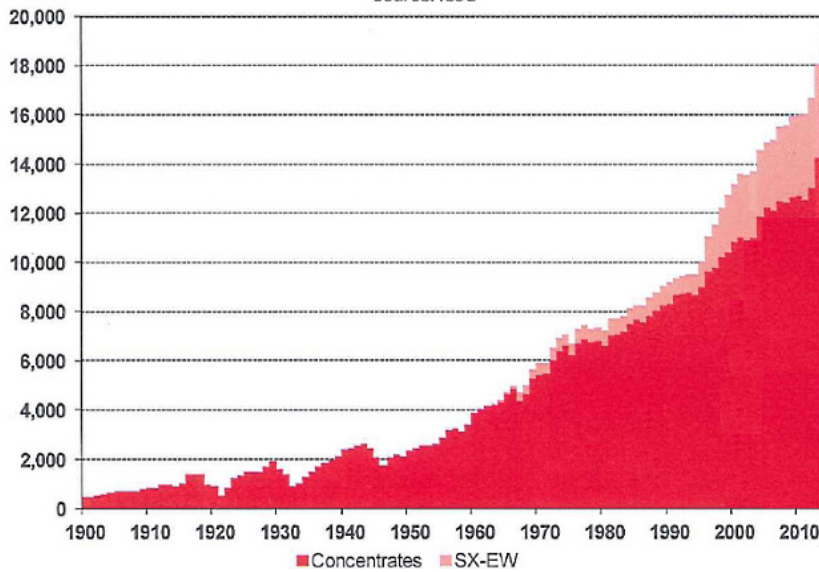


Figure 1: Since 1900, when world production of copper was less than 500 thousand tonnes, world copper mine production has grown by 3.4% per year to 21 million tonnes in 2013.

Solvent Extraction and Electrowinning (SX-EW) production, virtually non-existent before the 1960s, reached nearly 3.8 million tonnes of copper in 2013, that's 18% of the total. (Courtesy of ICSG).

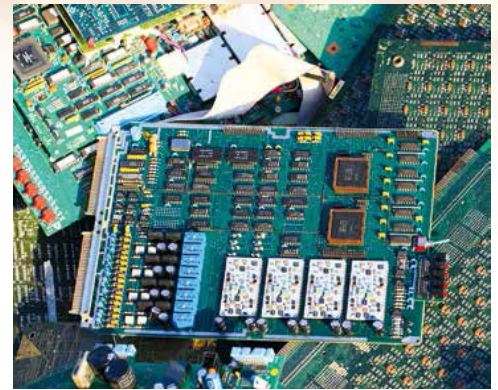
Copper is a metal that is naturally present in the Earth's crust, is essential to the development of all forms of life and has been a vital metal in the development of civilisation. It is the oldest metal used by man - the first copper coins date from 8700 BC - and when alloyed with tin, forms the first alloy ever used, called bronze.

The total global demand for refined copper in 2013 was approximately 21 million tonnes.

Copper comes from two sources:

### Primary sources

Mining of the raw material is called 'primary production'. This is split between sulfide copper ore concentrate that is smelted and Solvent Extraction-Electrowinning (SX-EW) of oxide ores. SX-EW uses the sulfuric acid produced by smelting of sulfide ores. (See [Copper Mining and Extraction: Sulfide Ores](#) and [Mining and Extraction: Oxide Ores](#).)



*End of life scrap is often combined with solder, plastics and other metals, making it more costly to recover. The amount of this type of scrap is rising dramatically as governments ban disposal in landfill or by incineration.*

*Metals recovered from this scrap include gold, platinum, silver and rare earth metals such as neodymium.*

## Secondary sources

Secondary sources of copper include recycling of end-of-life products and direct melt of 'new scrap' (waste resulting from the manufacturing process).

In Europe the sources of copper are as follows:

- 59% from mining copper ore
- 41% from recycling.

Refining from scrap uses 80% less energy than refining from ore concentrates. In the EU alone this represents a saving of 650,000 tonnes of CO<sub>2</sub> a year.

The German company Aurubis is Europe's largest producer of copper from concentrate and scrap. The chart below shows the primary and secondary sources of copper for the company. You can see that recycling is essential to this huge business. Compare the sources for each. Increasing the amount of copper recovered from scrap will have a big impact on copper producers, reducing their energy use.

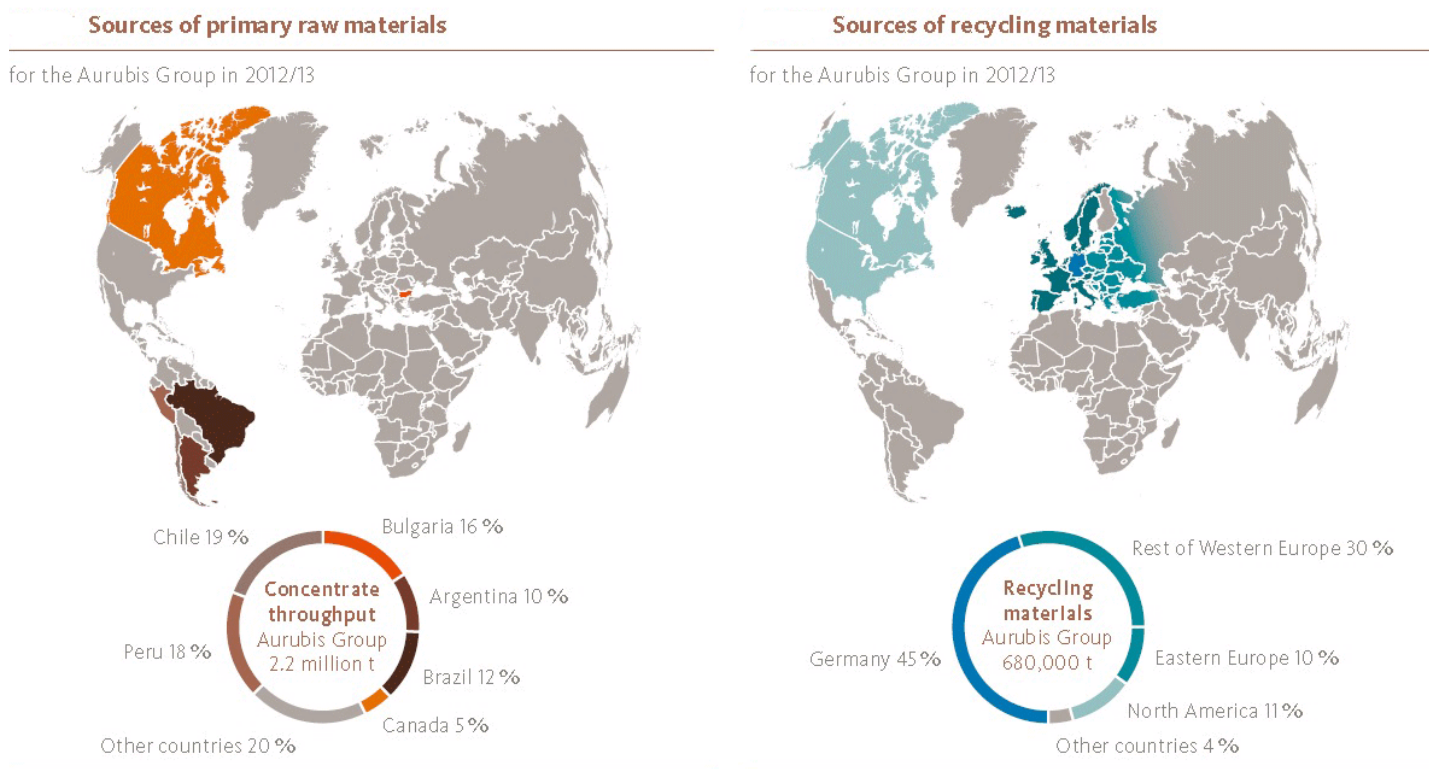


Figure 2: Primary and secondary production sources for copper at Aurubis. [Click to view a larger version.](#) (Courtesy of Aurubis.)

## Continue to Copper Recycling and Sustainability 2

Copper Development Association is a non-profit organisation that provides information on copper's properties and applications, its essentiality for health, quality of life and its role in technology. It supports education through a collection of resources spanning biology, chemistry and physics. These materials have been developed in conjunction with the Association for Science Education, and reviewed by teachers.

For more resources, visit [www.copperalliance.org.uk/education](http://www.copperalliance.org.uk/education).