EuRIC – Metal Recycling Factsheet

EuRIC – Realising the circular economy

European Recycling Industries' Confederation • Europäischer Bund der Recyclingindustrien • Confédération Européenne des Industries du Recyclage

METAL RECYCLING INDUSTRY

Metals are broadly present in a variety of bulk goods from short to long-term use (i.e., steel bars in our houses, bridges, and turbines, copper cables for communication, railway tracks, kitchen equipment, etc.).

EU economic growth is deeply coupled with the use of metals with a metal supply widely depending on metal scrap. Scrap metals from recycling compete globally on commodity markets hence the need to ensure both a well-functioning internal market for metal recyclers and an unhampered access to international markets.

Source: www.unep.org/resourcepanel

Metals & Circular economy

Results of the metal growing demand on a linear economy are:

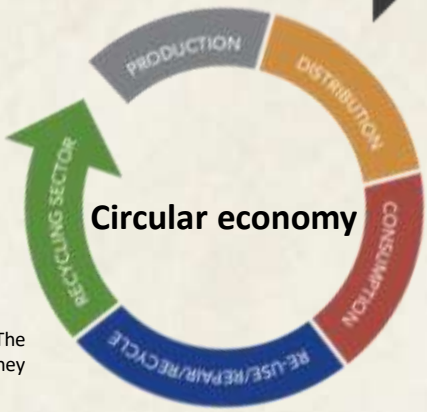
- Declining ore grades.
- Resource scarcity and price hikes.
- Environmental impacts (air and water pollution, land degradation, biodiversity loss).

Despite metal reuse has been historically used, there is an increasing need to move towards a more efficient circular economy model.

Linear economy

Thanks to their unique properties, **metals can be indefinitely recycled.** At their end of life (EoL) stage, products made of metals can be re-processed via **mechanical treatment** and re-introduced in the production process to make new metals again. As a result, **value chains** are already largely **circular** despite room for **improvements**.

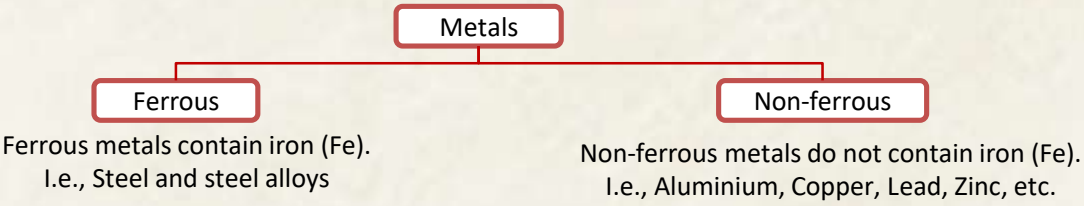
Metal recycling allows to close the loop within the production process, therefore reducing the amount of waste that goes into landfilling and the amount of primary raw materials required.



Source: The University of Sydney

Metals scrap recycling industry in EU

Common metals, that are conventionally used at household and industrial applications, can be divided into two main groups:

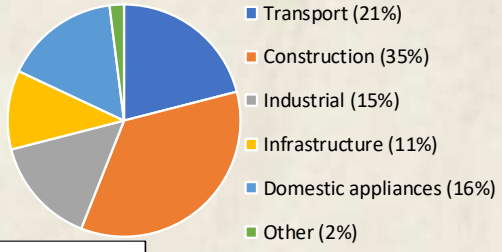


Steel, an iron alloy containing less than 2% of carbon (highly ductile), is by far the most used metal in the world. Followed by aluminium and copper, and other non-ferrous metals such as lead, zinc, nickel, titanium, cobalt, chromium and specialty and precious metals[1].

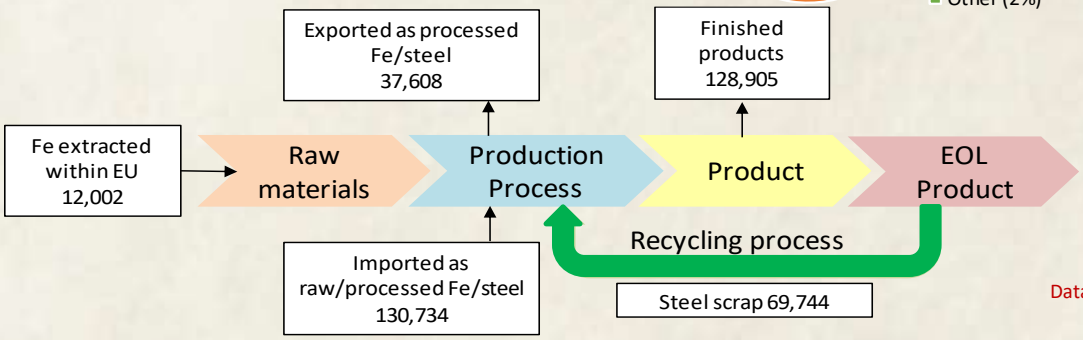
Steel recycling sector in EU

Ferrous metals are mainly composed of iron and have magnetic properties. Amongst them, steel is the most widely used metal, in large and small appliances (i.e., cars, railways, bridges, household equipment, etc.).

End uses of steel in EU[2]



Steel flow analysis in EU[3] (in thousand tonnes/year)



Data from 2015

Steel Recycling Industry in EU[1,2,4,5,6,7,8,9,10]

Economic importance

- Over 90% of end-of-life stainless steel is currently collected and recycled into new products.
- 600 million tonnes of steel scrap world-wide were used in 2017 for producing steel.
- 35.5% of global crude steel was produced from secondary raw materials in 2017. Steel scrap use (consumption) for steelmaking was 93.8 t in the EU in 2018.
- 70% of the steel produced to-date is still in use.
- Annual savings on environmental costs by using steel scrap in Europe can achieve up to € 20 bn (2018).

Environmental benefits

- Using steel scrap in the production process saves 58% of the CO_2 emissions.
- Recycling steel saves 72% of the energy needed for primary production (i.e., 4,697 kWh per tonne).
- Recycling one tonne of steel saves 1.4 tonnes of iron ore, 0.8 tonnes of coal, and 0.3 tonnes of limestone and additives and 1.67 tonnes of CO_2.
- In 2018 157 million tonnes of CO_2 were saved in EU by recycling 94 million tonnes of scrap, an equivalent amount to all automobiles in France, Great Britain and Belgium.
- Using recycled steel to make new steel reduces air pollution by 86%, water use by 40% and water pollution by 76%.

International trade

- The European steel scrap recycling collects and reprocess more than the demand for steel scrap in Europe. Hence, there is no steel scrap shortage in Europe.
- The EU-28 steel scrap apparent domestic supply comparing is consistently positive, showing that there is no scrap shortage in Europe. For example, in 2018, the apparent domestic supply of the EU-28 exceeded 112 million metric tonnes.
- The largest importer of steel scrap from the EU-28 is Turkey whose imports represents more than 50% of EU-28 steel scrap exports (11.09 million tonnes in 2018), given the fact that Turkish steel industry relies in vast majority on the EAF steel production route using steel scrap as main infeed.
- In 2018, European scrap recyclers exported more than 21,400 thousand metric tonnes and imported 2,850 thousand metric tonnes.
- The proportion of steel scrap used in relation to crude steel production in EU is 56%.

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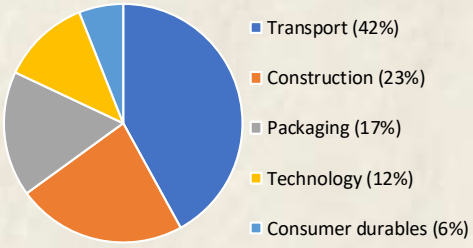
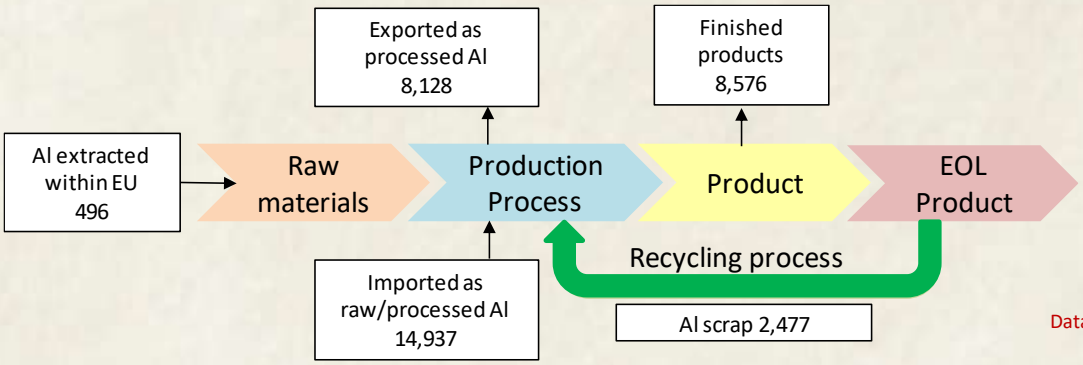
Aluminium recycling sector in EU

Aluminium is a widely popular metal due to the vast variety of its possible uses. Its superb characteristics include malleability, high strength, low density, high thermal and electrical conductivity, corrosion resistance, great recyclability, and it is non-toxic. This versatile metal can be found in car parts, window frames and pieces, doors, and cans for beverages, canned goods, and more.

End uses of aluminium in EU[11]



Aluminium flow analysis in EU[3] (in thousand tonnes /year)



Data from 2013

Aluminium Recycling Industry in EU[4,3,6,7,11,12,13,14,15,16]

Economic importance

- Thanks to its endless recyclability, 75% of all aluminium ever produced is still in use today.
- > 90% of Aluminium recovered from construction and transport in 2018.
- 4.9 million tonnes of Al were recycled in Europe in 2017.

Environmental benefits

- By using aluminium scrap, CO_2 emissions can be reduced by 92% compared to raw aluminium.
- Recycling aluminium saves 95% of the energy needed for primary production.
- One tonne of recycled aluminium saves up to 8 tonnes of bauxite, 14,000 kWh of energy, and 7.6 cubic meters of landfill.

International trade

- In the coming decades demand for aluminium is expected to increase by a further 50% by 2050, reaching over 9 million tonnes of scrap demand in Europe.
- Secondary aluminum production represents globally twice the production of primary aluminum. As a result, aluminium scrap from recycling is a valued commodity traded worldwide and the major source of the total aluminium production.
- Of the total amount of aluminium old scrap generated in Europe at end-of-life (i.e., 4,338 thousand tonnes Al), about 2,986 thousand tonnes Al were collected and recycled, resulting in an end-of-life recycling rate of 69%.
- Domestic recycling of the aluminium scrap currently exported outside EU, would reduce the current volume of primary imports in Europe by about 24%.

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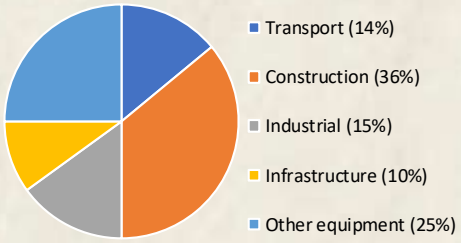
Copper recycling sector in EU

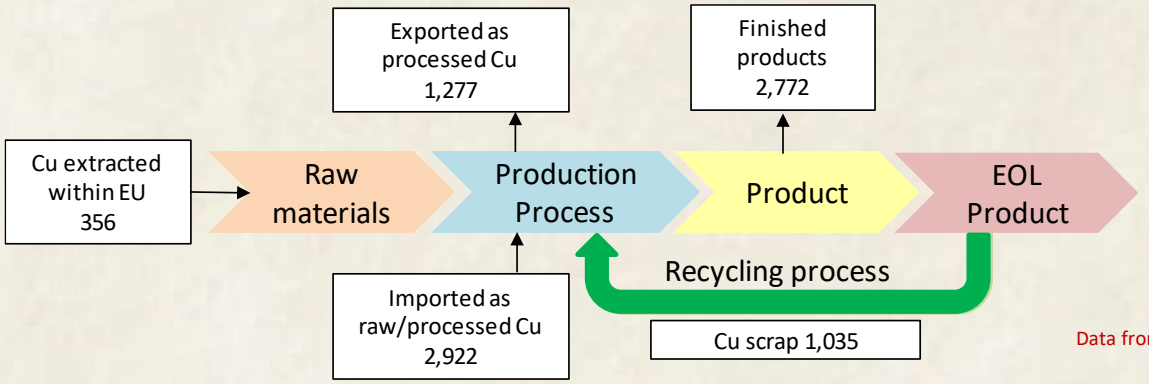
Copper is the best conductor of electricity after silver.

It is the third most used metal in manufacturing, which is used in a variety of applications such as pipes, electrical components, and electric wires. For example, a computer contains around 1.5 kg of copper, a typical home about 100 kg, and a wind turbine 5 tonnes.

End uses of copper in EU[3]



Copper flow analysis in EU[3] (in thousand tonnes /year)



Data from 2014

Copper Recycling Industry in EU[3,7,17]

Economic importance

- 44% of copper EU demand comes from recycled sources.
- 70% of copper in end-of-life products is recycled.
- 90% of copper in civil infrastructure is recycled.

Environmental benefits

- By using copper scrap, we reduce CO_2 emissions by 65%.
- Recycling copper saves 85% of the energy needed for primary production.

International trade

- The modest natural deposits of copper within EU (48,000 thousand tonnes) determine a strong reliance on recycling, otherwise imports of primary and secondary forms to meet the domestic demand.
- Despite the amount of secondary copper sent to domestic processing is supplemented by imports of copper waste and scrap, in absolute terms, the EU-28 is a net-exporter of secondary copper forms.
- EU exported 986,000 tonnes of copper scrap with a value of €1.91 bn to third countries in 2016.
- Of the total amount of copper scrap generated at end-of-life (i.e., 2,625 thousand tonnes Cu), about 1,603 thousand tonnes (61%) Cu were collected and recycled within EU.

Benefits of metal recycling

"Metals can be indefinitely recycled"

Metals, including Critical Raw Materials, are an ideal candidate for a circular economy as they are eternally recyclable, and properly treated secondary metals do not face downcycling or quality issues. Since they do not lose their intrinsic properties during recycling, metals can be used and re-used multiple times, maintaining their quality and functionality.

Socio-economic benefits

- Europe produces only about 3% of the primary raw materials required to sustain a growing demand for metals. In this context, Europe's metal recycling value chain contributes to reduce Europe's dependency on imported materials.
- Recycling of metals is job intensive and create a wide variety of job opportunities from skilled workers able to carry out a range of functions related to collection and sorting of end of life products containing metals, the daily operation of metal recycling facilities, up to engineers expert in materials or chemicals as well as traders marketing secondary materials recycled locally and globally.

Environmental benefits

- Metal recycling industry is a major contributor to both the circular economy and climate policy by saving primary resources, energy and CO_2. However, European policy framework fails so far to reward the environmental benefits of metal recycling which could further boost its circularity.
- Metals recycling will avoid landfill of metals, which is not only a loss of valuable raw materials, but could also generate an impact on the environment (i.e., leaching into water courses).
- Metals recycling saves up to 20 times (i.e., between 60-95%) the energy needed compared to the extraction of those metals from ores preserving the same quality. That will directly impact in the costs of re-processing those metals into final products.
- Production of metals from secondary raw materials reduces significantly the CO_2 emissions compared to their primary production (i.e., mining), and also reduces the derived impact on the water and the land. Using recycled metal instead of finite virgin ores reduces air pollution by 80%, water pollution by 76%, and water use by 40%.

International trade

- Metal waste collected and reprocessed into scrap compliant industry specifications and standards compete on commodity markets with primary materials. Recyclers are not competing on a level playing field since the market fails to reward the environmental benefits - in terms of resource, energy and CO_2 savings - resulting from the use of secondary materials.
- Removing the barriers affecting the internal market for recycling resulting from complex waste shipment procedures as well as ensuring free and fair trade of secondary raw materials is crucial to balance supply and demand and guarantee the proper functioning of recycling markets.

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