Boosting steel scrap recycling in the EU

Debunking myths & setting a clear pathway to decarbonise steel through recycling

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Europe champions steel recycling, both in terms of quantity and quality delivered to steel mills every year. Since 2007, the quality of recycled steel materials is defined in an EU-27 specifications which are based themselves on earlier specifications (1995 EUROFER – EFR specifications). These specifications standardize the qualities (grades) of recycled steel scrap that are delivered by the recycling industry to steel mills. It ensues from these specifications that steel recycling facilities use as inputs waste and scrap containing ferrous metals which are reprocessed into recycled steel scrap meeting these specifications (e.g. as E1, E2…E40 quality grades). These recycled materials are used by steel mills in Europe and globally as a substitute or as a complement to iron ore, thus enabling major carbon savings and circular economy gains. The European steel recycling industry currently recycles on average 100 million tons of ferrous waste for about €40 billion turnover and employs several thousand non-outsourceable workers across Europe. On average 80% of that amount is used domestically by European steel mills and 20% are exported. With a supply of recycled steel scrap that structurally exceeds the demand in Europe, there is no risk, presently or in a foreseeable future, of supply shortages that could justify trade restrictions. In a similar fashion, while recycled steel scrap plays an essential role to decarbonize steelmaking in the EU and globally, recycled steel scrap cannot be labelled as being a critical raw material since it is everything but scarce, at least in the EU.

Steel: an endlessly recyclable metal for which there is no supply shortage of recycled materials

Alongside with other base metals, steel is one of the most recycled materials from a variety of products containing steels (including cars, construction and demolition waste, EEE, etc.).

The European recycling industry has become a global champion of steel recycling and a reliable partner that supplies the European and international steel industry with the most circular and the lowest embedded-carbon material.

The supply of recycled steel scrap structurally exceeds the domestic (EU) demand for the last two decades. Thus, there has been no past or present scarcity of steel scrap in the EU. Provided the right policy framework is maintained, there will be no problem to 'access' steel scrap in the foreseeable future. Yet, incentives are much needed to factor in the environmental benefits of steel recycling, boost the demand for recycled steel scrap and fasten in the EU the transition from primary carbon-intensive steelmaking (BOF route) to secondary climate-efficient steelmaking (EAF route).

Trade restrictions aiming at curbing access to international markets to European recyclers will solely result in less supply of recycled steel scrap within the EU and thus further diminish the strategic autonomy of the European circular value chains as a whole.

1. Steelmaking pathways – What's the least & the most circular & climate-efficient production route

The steel industry is one of the most energy and carbon-intensive industries. It is "responsible for around 5% of CO2 emissions in the EU and 7% globally"[1]. The potential to decarbonize steel is huge and mature technologies for doing so exist. There are two main routes to produce steel:

- BF (Blast Furnace) – Blast oxygen furnaces (BOF);
- Electric arc furnaces (EAF).

[1] IEA. (2020). Iron and Steel Technology Roadmap.

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BOF is by far the most carbon intensive steel route, with a carbon footprint of 1.6-2.0 tonnes of CO2 per tonne of crude steel produced. On the other hand, Electric Arc Furnaces (EAF) have the lowest carbon footprint with only 0,5 tonnes of CO2 per tonne of steel produced[2]. This means that producing steel via the EAF route is on average 75% less carbon intensive than via the BOF route. The main reason lies in the fact that EAF uses recycled steel scrap as main infeed (up to 100%) while BOF uses mostly iron ore from mining, mostly imported from non-EU countries (such as Brazil, Australia or Russia), that is significantly more carbon-intensive. In practice, a recent study conducted by the Fraunhofer IMWS showed the substitution of iron ore with steel scrap enabled, in 2018, to save 157 million tonnes of CO2, which is the equivalent of emissions released by the automobile traffic in France, Great Britain and Belgium combined[3].

2. Green Steel – Why Europe is lagging behind?

"Around 60% of EU steel is made via the energy- and CO2-intensive blast furnace process, and 40% from recycled steel scrap in electric arc furnaces."

In stark contrast, the United States or Turkey have opted for the greenest route to produce steel with more than 70% of steel produced via EAF, the remaining via BOF.

Different decisions in the EU supported by structural deficiencies in the architecture of the EU ETS, which failed to adequately reward the CO2 savings stemming from the substitution of iron ore with recycled steel scrap, delayed much needed investment to transform steelmaking in Europe and scale up EAF capacities as done in other developed countries. A recent report from the CE Delft[4] confirms that "an additional profit of € 26 to € 46 billion was earned between 2008 and 2019 from cost pass-through in industry" that consists of a mix "between free allocation and auctioning for emissions above the benchmarks". It adds that "the iron and steel sector has profited (€ 12-16 billion)" the most from this cost pass-trough.

3. Debunking lobby myths: neither scarcity nor market failure to access recycled steel scrap

While steel recycling is essential to decarbonize steel making, there is no scarcity of recycled steel scrap in the EU. The steel recycling industry recycles more steel than past, present and expected future demand, provided the right policy framework is maintained and further developed to reward CO2 savings and the use of circular materials.

On average, the European recycling industry recycles 100+ million tons of steel per annum. 80% of it is used domestically by European steelmakers, while about 20% is exported in particular to countries that rely on the EAF route (secondary steelmaking) to produce steel. With the largest built EAF capacity, Turkey remains the largest importer of recycled steel scrap globally.

The 20 million tons of exports of recycled steel scrap shall be put into perspective with the 128,9 million tons of iron ore imported annually into the EU in 2021[5] to produce steel from countries such as Brazil where mining contributes to deforestation and loss in biodiversity.

Recycled steel scrap use in the EU has declined from 102,2 million tons per annum in 2005 to 87,9 million tons in 2021. This decrease is entirely proportional with the drop of crude steel production in the EU from 182,3 million tons to 152 million tons during the same period. As a result, recycled steel scrap usage in the EU has remained on average in the EU at the same level of +/-57% while it reaches 70% in Turkey and the US, which mostly rely on secondary steelmaking (see table in Annex I).

[2] JRC 2022. Technologies to decarbonise the EU steel industry.
CRU 2022, Steelmaking Emissions Report.
[3] Fraunhofer IMWS (2020), Scrap Bonus external costs and fair competition in the global value chains of steelmaking.
[4] CE Delft (2021), Additional profits of sectors and firms from the EU ETS.
[5] Steel Statistical Yearbook, 2022, table 52.

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4. Key policy measures to further boost steel recycling and incentivize green value chains

➢ Strong domestic supply goes hand in hand with free and fair trade of recycled steel scrap

The European steel recycling industry, despite two landmark economic crisis (in 2008-2009 and in 2020-2021), has steadily increased without benefiting from any subsidies. The industrialization of metal recycling combined with the multiplication of recycling facilities across the EU enables metal recyclers to cope with a foreseeable increased demand for steel scrap within the EU or outside the EU. In addition, recycled steel scrap enables to decarbonize steel wherever it is used, thus helping to cut climate emissions in the EU and globally.

Curtailing access to international markets through regulation will simply distort well-functioning markets and artificially decrease the value of recycled materials. This will result in less collection and less recycling as empirically observed in all regions across the globe where such measures have been put in place. In addition, lower or no profit margin will deprive European recycling companies, the majority of them being SMEs, from having the ability to invest into capacity and innovation needed to meet the needs of steelmakers and end-producers (be it in the automotive, aeronautic or construction sectors).

Worse, it will further unlevel the playing field with extracted raw materials, mostly imported from non-EU countries, which are not subject to any trade restriction and have not been included in the scope of CBAM despite their intrinsically high carbon-content. From a strict environmental and human health standpoint, stricter regulations to ensure that extracted raw materials are mined in conditions equivalent to the ones set in the EU shall be a priority, also to incentivize sustainable mining in Europe.

➢ Genuine EU industrial policy with correct market signals to boost green steelmaking

Access to affordable and green energy supply is essential to energy intensive industries, including steelmaking, and to the steel recycling industry to stay competitive and invest. High-quality recycled grades require more processing and very often more energy as well.

Non-recyclable waste with a calorific value from post-treatment recycling facilities[6] shall be valorized in dedicated waste to energy facilities processing refuse-derived fuel (RDF) Energy produced can then be re-injected in industries and district heating, thus enabling local and competitive energy supply.

Last but not least, it is essential to bridge EU climate and circular legislations by:

- Directing investments towards the most climate and circular-efficient industrial processes, namely EAF in the case of steelmaking, and
- Incentivizing in BOF facilities – needed to produce different types of steel (flat products) – the use of an increased share of scrap (up to 30% of the total infeed) to reduce their carbon footprint and improve circularity.

➢ Recycled content in specific legislative instruments

Recycled content for steel in specific end-products can help bridging overarching EU circular economy and climate objectives. While EuRIC supports targets for recycled content in EAF as set in the Delegated Act on Climate Change Mitigation and the prioritisation of steel and aluminium for the first working plan of the ESPR, setting recycled content at product level has the potential to both direct investments into secondary steelmaking, thus reducing reliance on iron ore, and adding value to the recycled steel grade, with very low levels of impurities, that the market fails to reward in prices. Setting pragmatic yet ambitious recycled content targets for long steel products in new cars, as part of the revision of the ELV Directive, is worth to investigate and support. Steel products in the construction sector shall also be a candidate for such targets.

[6] To recover organic fractions such as plastics for material recycling.

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Annex I – Steel production in Germany and the EU and steel scrap consumption from 2005 till 2021

	Germany			EU (27)				
Year	Crudesteel-production	Scrap consumption*	Scrap-Share in %	Crudesteel-production	Scrap Consumption	Scrap Share in %	Exports	Imports
2005	44.5	19,6	44	182.3	102.2	56,1	8.4	7,9
2012	42.7	19,7	46.1	159.0	91.4	57,5	14.8	5.3
2013	42.6	19,4	45.5	154.3	86.9	56,3	14.5	5.4
2014	42.9	19,1	44.5	157.1	87.5	55,7	12.5	5.1
2015	42.7	18,6	43.6	155.1	86.9	56,0	9.5	5.2
2016	42.1	18.0	42.8	154.3	85.8	55,6	11.7	4.5
2017	43.9	19,5	44.4	160.9	91.0	56,6	13.4	4.9
2018	42.4	18,6	43.9	160.1	88.5	55,3	15.1	4.5
2019	39.7	17,7	44.6	150.2	83.8	55,8	15.6	4.3
2020	35.7	16,6	46.5	132.2	75.3	57,0	17.5	4.1
2021	40.2	18,1	45.0	152.6	87.9	57.6	19.4	5.4
Source: worldsteel, WV-Stahl, *own estimate, own calculations, Eurofer, BIR, BDSV, bvse, Bonn, status 10.09.2022								

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