

Synergy Fact Sheet

WASTE STEEL

Recovery of waste steel for recycling
(secondary steel making)

Introduction

Every year, millions of tonnes of steel waste are generated from construction and infrastructure projects as well as from end-of-life vehicles. Instead of sending this waste to landfill, it can be recycled and used as a raw material for steel production. By using modern technologies such as electric arc furnaces (EAF), recycled steel can be processed more efficiently. This not only reduces the energy consumption and emissions compared to traditional methods based on the extraction of iron ore but also allows for the integration of innovative valorisation opportunities. For example, waste steel by-products can be repurposed for use in alternative materials such as construction aggregates or in the production of advanced composites for various industrial applications (Pauliuk, Wang, & Müller, 2013).

Recycling steel is not only good for the environment, it is also a big win for the economy. It fits perfectly with the European Union's goals such as the European Green Deal, which emphasises the need to reduce waste and move towards a circular economy (Metabolic, 2021). Furthermore, industrial symbiosis, as demonstrated in the steel industry, shows how cross-sector collaboration can unleash innovation and efficiency gains (Lombardi & Laybourn, 2012, AIDRES, 2023).

By closing the loop on materials such as steel, industries can reduce their dependence on raw materials, ensure a more secure supply chain and improve their resilience to economic and environmental challenges.

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Beyond the numbers and the politics, this approach has other benefits for society. It encourages innovation in recycling technologies, creates skilled jobs and helps companies to remain competitive on a global scale. Additionally, the valorisation of steel industry by-products can extend into unconventional areas, such as the development of biodegradable packaging materials or nutrient-rich soil amendments for agricultural use, demonstrating the versatility of industrial symbiosis. With industrial symbiosis, the steel industry is proving that sustainable practises can go hand in hand with economic growth, paving the way for a greener future.

In short, recycling steel waste is more than just a smart use of resources – it's a multi-faceted strategy that supports circular economy goals, drives innovation across industries, and contributes to a cleaner, more sustainable industrial economy. It's a win-win situation for businesses, the planet, and future generations.

Supplying sector(s)



Urban, Various

Receiving sector(s)



Iron and steel production

TECHNICAL FEASIBILITY

Industrial scale – the processing of steel waste is tailored to industrial conditions so that large quantities of recyclable materials can be processed

Low technical requirements – the implementation of processes for recycling steel waste requires relatively little technological effort compared to alternatives based on new raw materials.

Electric Arc Furnace (EAF) – technologies enable a significant reduction in greenhouse gas emissions and an improvement in energy efficiency in secondary steel production.

PPP IMPACT – EU wide potential



Wins in industry- ca. 79 Mt of steel scrap (EU, 2022)

Steel recycling makes a significant contribution to industrial efficiency. In 2022, around 79 million tonnes of steel scrap will be recycled in the EU, which corresponds to 56% of total crude steel production (European Recycling Industries' Confederation)



Environmental gains resource efficiency ca. 160 Mt avoided CO₂-eq

The recycling of 94 million tonnes of steel scrap in 2018 avoided an estimated 157 million tonnes of CO₂-equivalent emissions in the EU (European Recycling Industries' Confederation.)



Wins for society environmental and health improvement skilled employment

The European steel industry directly secures around 306,000 skilled jobs and indirectly millions more jobs, while improving public health through lower emissions and pollution (EUROFER, 2023).

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About this factsheet

This fact sheet is based on the findings of the RISERS project. Led by Ghent University with the support of project partners, the study involved a systematic assessment of 600+ industrial symbiosis (IS) cases across urban-industrial and cross-sectoral clusters in Europe. These cases formed the basis for the mapping of over 300 MES (Materials, Energies, Services) streams, categorised by output (source) and input (sink) sectors.

The fact sheet provides a detailed overview of a high-potential and high-impact IS synergy, evaluating its implementation feasibility and sustainability impact. Supported by data from public databases (MAESTRI, SCALER, EPOS, AIDRES, etc.) and literature, it offers a generalised insight into the economic, environmental, and social benefits per synergy.

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About the RISERS project

RISERS is a Horizon Europe project aimed at developing an Industrial Symbiosis Standardisation Roadmap supporting the uptake of high impact synergies and resources considering:

- identification of the needs, gaps and opportunities,
- revision of current standards and standardisation efforts relevant for CE and the priority synergies and resources,
- initiating the process of new standards development (especially for newer technologies and pilot-scale synergies).

The RISERS project was launched in January 2024 with a duration of 3 years.

For more information visit: <https://risers-project.eu>



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