

Global overcapacity slows down the sustainable steel transition

- **The steel industry accounts for approximately 8% of global CO2 emissions, and reducing these emissions is complex**
- **The steel industry has a long investment cycle due to the long service life of its installations, which are also very capital-intensive**
- **Global overcapacity and dumping of cheap steel are putting pressure on the steel industry and slowing down investment in low-carbon production processes**
- **Decarbonisation projects are mainly being developed in Europe, but challenges such as high costs and limited availability of raw materials are slowing down the investments**
- **The additional EU import measures and the CBAM-regulation are restoring confidence in the European steel industry, but the costs of sustainability are still high**



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Introduction

The steel industry is one of the world's most energy-intensive sectors. Globally, it accounts for approximately 8% of total CO2 emissions. For policymakers, making steel production processes more sustainable and reducing emissions is of critical social importance. Sustainability can also provide advantages for many steel producers. The sooner they take concrete measures to improve sustainability, the earlier this can create a competitive advantage, provided these sustainable steps are economically viable.

This is the first analysis in a two-part series on the steel industry. With these reports, we aim to provide insights in potential risks and opportunities for companies in the sector and their suppliers. In this first analysis, we focus on the most polluting steel production processes and trends in their associated CO2 emissions. We compare the CO2 emissions from the two main production routes for steel. Additionally, we identify where the globally the most polluting processes are concentrated, with China playing a leading role. China is also the world's largest steel-exporting country, and a portion of this steel flows to the EU-27, causing significant negative impacts for Europe's businesses and also society. We conclude with an overview of expected decarbonisation projects in the global steel sector in the coming years and how they contribute to reducing CO2 emissions. In the second analysis, we will explore whether producing more sustainable steel is economically viable compared to non-sustainable steel.

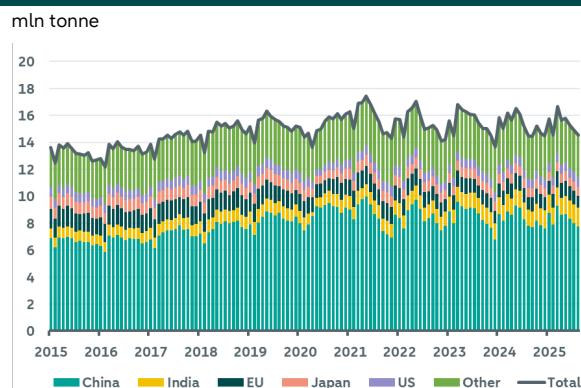
Steel production and China's influence

As of August this year, global steel production has fallen by almost 1% compared to the same period last year, continuing a trend over the past five years where production has remained relatively stable. Overcapacity, low utilization rates, and weak demand are currently plaguing the global steel industry. In particular, demand in China has been relatively weak since 2021, due to declining activity in the real estate and infrastructure sectors. With a 55% share in global steel production, trends in China heavily influence the global steel sector, especially in international trade.

This year, China's steel exports have grown by 3% as of August. The annual increase in Chinese steel exports places significant pressure on steel producers outside China. Excess Chinese steel is sold on international markets at relatively low prices. Approximately 10% of Chinese steel exports are destined for Europe. To protect its "strategically important" steel industry from Chinese dumping, the EU has recently announced new measures. These include halving the amount of tariff-free imported steel and proposing a doubling of import tariffs on all non-tariff-free steel imports. The ultimate goal of this plan is to increase the utilization rate of the European steel industry to 85%, up from the current 65% according to Eurofer,

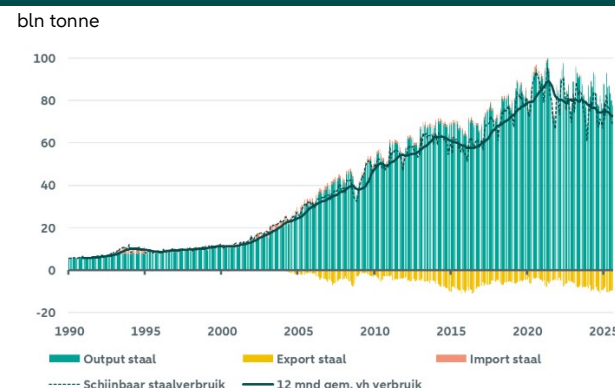
the European Steel Association. Additionally, within three months, a carbon content levy will be applied to imported steel. By early 2026, the "Carbon Border Adjustment Mechanism" (CBAM) will take effect. Under this environmental policy initiative, EU importers of CBAM goods—including steel—will pay a price for the CO₂ emissions generated during production. Both measures are expected to positively impact the EU steel sector. However, many steel end users may be less enthusiastic, as they will face higher steel purchasing costs starting next year.

World steel production by country



Source: LSEG, World Steel Association, ABN AMRO Group Economics

Chinese steel production, trade and end use



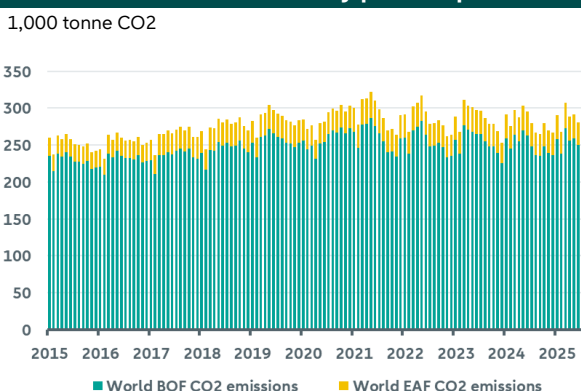
Source: LSEG, World Steel Association, ABN AMRO Group Economics

Despite China's persistently high steel exports, the country faces increasing challenges. More and more anti-dumping measures are being implemented in China's key export markets—not only in the EU but also in the US, Japan, and South Korea. Southeast Asia is particularly important for China, with more than half of its steel exports shipped to this region. Next to that, many Southeast Asian countries are accelerating the expansion of their local production capacities, which could reduce reliance on Chinese steel.

Steel production processes and environmental impact

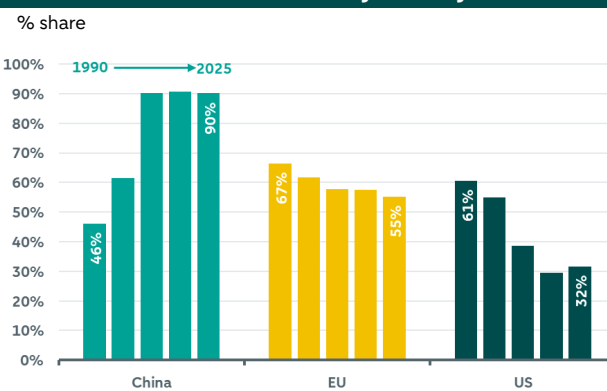
Broadly speaking, there are two routes to produce steel. The integrated route involves producing iron from iron ore and is referred to as the "Blast Oxygen Furnace" (BOF) route, the primary steel production route. The secondary route involves recycling, using primarily scrap metal as the main iron-bearing raw material, and operates via the "Electric Arc Furnace" (EAF) method. The BOF route predominantly relies on fossil fuels (mainly coking coal), whereas the EAF route primarily uses electricity. The EAF route is significantly less energy-intensive, consuming about 80% less energy than the BOF route. According to the World Steel Association, producing one ton of steel via the BOF route emits 2.32 tons of CO₂, compared to 0.7 tons via the EAF route. Based on this ratio, we can estimate the total global CO₂ emissions from steel production. This is shown in the figure on the left below.

World steel CO₂ emissions by process per month



Source: LSEG, World Steel Association, ABN AMRO Group Economics

Share BOF-route since 1990 by country



Source: World Steel Association, ABN AMRO Group Economics

Note: the five bars per country in the graph above relate to the period 1990-2025. There are 10 years between each of the first four bars; the last bar relates to five years.

In the United States, approximately 32% of steel production occurs via the BOF route, with the majority produced via the EAF route. In contrast, the BOF route dominates in China, accounting for the bulk of steel production, while only about 10% of Chinese steel is produced via the less polluting EAF route. This is because China has historically been rich in raw materials

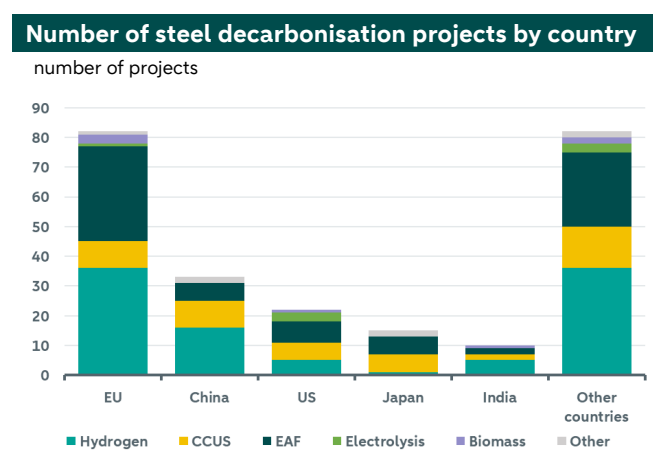
such as coal and iron ore, making the BOF route economically advantageous. The rapid expansion of capacity in China after 2004, further cemented the importance of the BOF route. In the US, reliance on foreign raw materials has driven the preference for the EAF route for economic and strategic reasons. In the EU, around 55% of steel is produced via the BOF route, 12 percentage points lower than in 1990.

The shift toward less polluting steel production methods—such as the EAF route—is gaining preference in many countries. However, the sector faces long investment cycles due to the extended lifespan of steel plant installations. Additionally, these installations are highly capital-intensive, making replacements economically challenging. As a result, the transition to more sustainable production methods is progressing relatively slowly compared to less capital-intensive sectors.

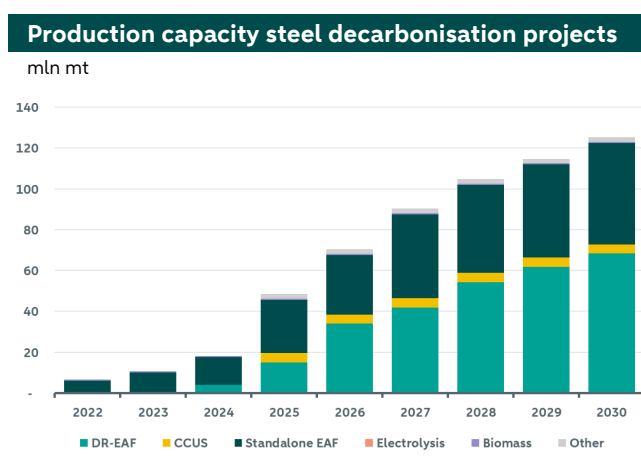
Beyond the EAF route, other production methods are emerging. Numerous technologies are already available to reduce greenhouse gas emissions, and new techniques are expected to become viable in the medium to long term. The "Direct Reduced Iron" (DRI) production process is considered a promising low-emission steelmaking method. This process uses green hydrogen as a reducing agent instead of fossil fuels. However, the availability of green hydrogen on a large scale remains limited. Additionally, this process requires very high-quality iron ore, which is relatively scarce and expensive. While DRI holds potential for the future of the steel sector, several obstacles must still be overcome.

Decarbonisation in the steel industry

Overcapacity has plagued the steel industry for years. This structural issue has proven difficult to resolve and exerts pressure on profitability, reducing available capital for investments in new technologies. Given the long lifespan of steel production installations, producers must have confidence that current investments will remain economically viable in the long term. Without this confidence, progress toward low-carbon production processes is hindered. For EU producers, recent import measures—such as additional tariffs and the upcoming CBAM—have increased confidence in a level playing field.



Source: Bloomberg NEF



Source: Bloomberg NEF

Despite relatively weak market conditions, several global decarbonisation projects in the steel industry are underway. According to Bloomberg New Energy Finance (BNEF), most of these projects originate in Europe. Many focus on EAF-based production or hydrogen-based processes for converting iron ore into iron. Expectations for hydrogen in the coming years are particularly high.

According to BNEF-data, steel production via hydrogen (labeled as DR-EAF in the above figure on the right) is expected to triple between 2025 and 2030, if all projects were to actually go ahead. Not all projects are in the same stage of development. Carbon capture and storage (CCS) is also a crucial technology for achieving net-zero emissions in the steel industry. However, the relatively low number of CCS projects is primarily due to high costs (see also our publication [here](#)). Assuming that all the projects mentioned do indeed go ahead, the planned decarbonisation projects will only affect 3% of total production capacity in 2025. By 2030, the decarbonisation projects will collectively account for around 7% of total steel production capacity (in terms of 2025 production levels). This shows that the decarbonisation projects currently on the agenda will not achieve the necessary acceleration in reducing emissions from the steel industry.

Conclusion

Steel production is highly polluting. However, the material is also partly sustainable and an important component in the energy transition. The production process via the BOF route is especially heavily polluting. Historically, the abundant

availability of raw materials (coal and iron ore) has favored the BOF route. With the growing need for sustainability, the demand for greener steel—via methods such as the EAF route and hydrogen—is gaining attention.

Global overcapacity hinders the steel sector, undermining confidence and slowing investments in low-carbon steel production methods. Furthermore, the availability of necessary raw materials for steel production varies across regions. For example, the EAF route requires significant scrap metal or high-quality iron ore, which are not always readily available. Similarly, green hydrogen is not yet widely available or economically viable.

The transition to carbon-free or low-carbon steel production processes will not progress equally across regions. Steel producers that have already invested substantially in sustainability (e.g., in Europe) are better positioned for a smoother transition compared to those that have invested less (e.g., in China and India). These regions, where decarbonisation is most urgently needed, will likely experience slower progress in reducing CO2 emissions. Nevertheless, investing in more sustainable production processes will deliver significant environmental benefits in the long term while creating unique steel products that meet the growing demands of end-users and society. Ultimately, this proposition could be decisive for business continuity and provide a boost to competitiveness.

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